# How Awnings and Solar Shades Can Contribute to LEED® Certification

Report to Professional Awnings Manufacturers Association

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# Introduction

Awnings and solar shades offer a number of benefits to buildings and their occupants. Many projects today use one of the U.S. Green Building Council's LEED rating systems to certify their environmental features and performance, so the question often arises about how awnings and solar shades can contribute. This report to the Professional Awnings Manufacturers Association (PAMA) seeks to inform and clarify for the Association's members how their products can contribute to a LEED's project's certification.

# The Products

For the purposes of this report, we have assessed four standard products typically supplied to a building project by PAMA members:

### Stationary awnings

Window awnings are used to shelter windows from sun and heat, control light and glare, for privacy, and for aesthetics. Stationary awnings are fixed in place and provide shade over windows or other openings.

### Drop-arm (adjustable) window awnings

Drop-arm window awnings are lightweight frame structures over which a cover is attached, supported by articulating supports that allow the fabric shade to extend, retract, and change angle. The arms pivot from either side of the window at the midpoint vertically, while the shade extends from a roller at the top. The shading device can thus provide total privacy and sun-protection, like an exterior blind, or it can extend horizontally at any angle to provide partial or full shade while allowing daylight and views to the outside. Drop-arm awnings are typically operated either with a gear-and-crank mechanism or with an electric motor, which may be automatically controlled.

### Exterior solar shades

Exterior shades are mounted above a window or storefront and extend or retract in a plane parallel to the window to protect the window and interior. They provide similar benefits to drop-arm window awnings, except that they lack the ability to extend outward from the wall plane, so they can't simultaneously shade the window and provide views (except to the extent that the fabric might open enough to allow partial views). For operation, the screens can be operated with a gear and hand crank, a motor with a toggle switch, a motor with a remote control, or a motor controlled by an automation system.

### Stationary commercial canopies

Stationary canopies are fabric structures that provide shelter and shade. They can be attached to the building at one end and supported by posts at the other, or they can be constructed independently of a building.

# LEED Rating System Basics

This report is based on the current version of the LEED Rating Systems, known as "LEED 2009," and sometimes called "LEED version 3." LEED 2009 opened for registration on June 27, 2009, although there are many still-active projects registered before that date that are using older versions of LEED. The differences between those prior versions and LEED 2009 are minor, and do not change our analysis for most credits.

There is also a new version of LEED, LEED version 4, or LEED v4, currently in development and scheduled for release late in 2013. That version includes more substantive changes to some key credits, which are discussed separately below. Even after LEED v4 is released, however, projects will be allowed to register for the LEED 2009 rating system until mid-2015, and once those projects are registered, they will continue using LEED 2009 through their design and construction process. So the transition from LEED 2009 to LEED v4 will be gradual through 2014–2017 and even beyond.

*Table 1: LEED-NC Chronology*

| LEED version | Year Introduced | Widely Used Until |
|---|---|---|
| **LEED Pilot** | 1998 | Never |
| **LEED v2.0** | 2000 | 2005 |
| **LEED v2.1** | 2003 | 2009 |
| **LEED v2.2** | 2005 | 2013 |
| **LEED 2009 (a.k.a. LEED v3)** | 2009 | 2018 (estimate) |
| **LEED v4 (a.k.a. LEED 2012)** | 2013–2015 | 2020 (estimate) |

## LEED 2009 Rating Systems

- Building Design & Construction (BD&C) rating systems
  - LEED for New Construction and Major Renovations (LEED-NC)
  - LEED for Schools
  - LEED for Core & Shell (LEED-CS)
  - LEED for Retail – New Construction
  - LEED for Healthcare
- Interiors Design & Construction (ID&C) rating systems
  - LEED for Commercial Interiors (LEED-CI)
  - LEED for Retail – Commercial Interiors
- Operations & Maintenance (O&M) rating system

    - LEED for Existing Buildings Operations & Maintenance (LEED-EBOM)
- Homes rating system
    - LEED for Homes
- Neighborhood Development rating system
    - LEED for Neighborhood Development (LEED-ND)

This report addresses all of the above except LEED for Neighborhood Development, which is more focused on planning-scale issues than on individual structures. Some, but not all, buildings within a certified LEED for Neighborhood Development must be certified under a building-scale rating system, such as LEED-NC.

## LEED Terminology

The LEED family of rating systems uses specific terms to describe various aspects of its program. When talking about LEED with designers, contractors, and owners it is important to be clear and consistent about these terms.

LEED: Short for "Leadership in Energy and Environmental Design." Never say "Leeds"—that's a city in England.

LEED certification: Buildings become "**LEED certified**" by completing the registration and documentation requirements and receiving official certification from the Green Building Certification Institute (GBCI). They can be certified at one of four levels:

1. Certified
2. Silver
3. Gold
4. Platinum


Certification can also apply to tenant improvements using the LEED for Commercial Interiors (LEED-CI) rating system, even if they don't encompass an entire building. Entire neighborhoods can also be certified under LEED for Neighborhood Development (LEED-ND).

LEED registration: Before they become certified, projects must have registered with GBCI in order to submit their documentation. A **LEED-registered** project may be in the process of pursuing certification, but is not considered certified.

LEED Accreditation: Professionals in the building industry who learn about green building and LEED and pass an exam can become "**LEED-accredited**" and use the credentials "LEED AP" (for LEED Accredited Professional), or LEED Green Associate. The AP credential is for designers, contractors, and other members of a project team, while the Green Associate credential is intended for sales reps and other associated professionals.

Note: Building manufacturers sometimes want to get their products, assemblies, or building systems "LEED certified." Products cannot be LEED certified or otherwise preapproved for LEED. They can only contribute to the earning of specific LEED credits and therefore to the certification of a project.

LEED prerequisite: A section of a LEED rating system with specific intent and requirements that must be met for a project to become certified. Missing even one prerequisite will disqualify a project from LEED certification. Prerequisites are typically very easy to achieve, if planned for.

LEED credit: A section of a LEED rating system with specific intent and requirements that a project can meet to earn one or more points toward certification. Credits are typically more challenging than prerequisites and represent greater-than-standard practice. By definition there are no required credits, but to achieve a high LEED score projects must achieve many or most available credits.

## Upcoming Changes in LEED version 4

LEED version 4, just approved by USGBC member ballot in June 2013, includes many substantive changes to prerequisite and credit requirements. It will be available to projects teams beginning in the fall of 2013, but USGBC has scheduled an extended phase-in period until June 1, 2015, so many projects will continue to register under the current LEED 2009 system until then. Projects that register under a given version of LEED may then take several years (depending on the project type and rating system) to complete their construction and certification, so LEED 2009 will still be in widespread use until at least 2018.

Despite the extensive changes in LEED v4, most of the credit intents and requirements will remain largely consistent with LEED 2009. The primary exceptions are in the Materials and Resources category, where LEED v4 introduces a series of entirely new approaches to products.

A point for recycled content materials will continue to be available, but will be deemphasized in favor of an approach based on environmental life-cycle assessment (LCA) and reporting transparency. For the first time in LEED,

specific credit will be conferred for reusing buildings that have been designated historic.

The LCA-based approach recognizes products that have been through a thorough assessment of their environmental impacts throughout their life cycle, from raw material extraction through construction. This assessment must be documented in the form of an Environmental Product Declaration (EPD). Before product manufacturers can produce qualifying EPDs, however, they must collaborate within their industry to define the "product category rules" that govern how EPDs for that particular category should be generated.

The other significant change in v4 affecting awnings and solar shades is a credit for transparent reporting of product ingredients.

# Product Contribution to Credits

Across the nine rating systems assessed for this report, fabric structures can contribute directly to helping a project achieve 11 LEED credits, and may play a supporting role in the achievement of 11 additional credits. (Note that some of those credits apply to just one rating system, while others occur in several of them.)

*Table 2: Number of credits to which each product type can contribute*

| Product | Number of Credits with Direct Contribution Potential | Number of Credits with Supporting Contribution Potential |
|---|---|---|
| **Stationary awnings** | 7 | 4 |
| **Drop-arm window awnings** | 9 | 5 |
| **Exterior solar shades** | 9 | 4 |
| **Stationary commercial canopies** | 8 | 7 |

The tables and details that follow describe how each of these three products can contribute, either directly or indirectly, to LEED certification. In some cases they may or may not contribute depending on how they are manufactured, configured, or installed. Those conditions are also described.

## Direct Contributions: Credits to which Fabric Structures Can Contribute Directly

*Table 3: LEED Credits to Which Awnings and Solar Shades Can Contribute Directly*

| Credit | Relevant Rating Systems | Relevant Products | Limitations and constraints |
|---|---|---|---|
| **Alternative Transportation—Bicycle storage and changing rooms** | New Construction, Core & Shell, Healthcare | Stationary commercial canopies | Only applies to multiunit residential products in *nonresidential* rating systems: dorms, apartment buildings, barracks. |
| **Heat Island Effect—Nonroof** | New Construction, Core & Shell, Healthcare, Schools, Retail-New Construction | Stationary commercial canopies | Fabric covering has to be light colored and/or reflective (SRI≥29). |
| **Light Pollution Reduction** | New Construction, Core & Shell, Healthcare, Schools, Retail-New Construction | Drop-arm awnings, Exterior solar shades | Shades have to be automatically controlled (not just motorized) and scheduled for nighttime deployment. |
| **Site Selection** | Commercial Interiors, Retail-Commercial Interiors | Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | Awnings and shades apply to Light Pollution Reduction; Stationary canopies to Heat Island Effect. |

| | | | |
|---|---|---|---|
| **Minimum Energy Performance/ Optimize Energy Performance** | New Construction, Core & Shell, Schools, Healthcare, Retail-New Construction, Retail-Commercial Interiors, Existing Buildings, Homes | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | Existing Buildings (EBOM): any energy use reduction can contribute to earning points. Homes: predicted energy savings attributable to shading a façade can contribute. Other rating systems: only energy savings from automated or fixed shading devices can contribute, based on predicted energy cost reductions. |
| **Recycled Content** | New Construction, Core & Shell, Commercial Interiors, Retail-Commercial Interiors, Schools, Retail-New Construction | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | Post-consumer recycled content is valued more highly than preconsumer; recyclable materials do not contribute. |
| **Regional Materials** | Commercial Interiors, Retail-Commercial Interiors | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | First of two points is based on manufacturing location only, not point of raw material extraction, so local fabrication can contribute. |
| **Sustainable Purchasing—Facility alterations and additions** | Existing Buildings | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | The product must contain at least 10% post-consumer recycled content or 20% preconsumer (or a combination of the two) to contribute. |
| **Sustainably Sourced Materials and Products** | Healthcare | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | Recycled content is one of several green attributes of products that can qualify them to contribute. |
| **Daylight and Views—Daylight** | New Construction, Core & Shell, Commercial Interiors, Healthcare, Retail-Commercial Interiors, Schools, Retail-New Construction | Stationary awnings, Drop-arm awnings, Exterior solar shades, | Installations that prevent glare problems indoors while allowing sufficient daylight qualify for the point. |
| **Daylight and Views (combined)** | Existing Buildings | Stationary awnings, Drop-arm awnings, Exterior solar shades, | Installations that prevent glare problems indoors while allowing sufficient daylight qualify for the point. |

## Alternative Transportation—Bicycle storage and changing rooms

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Healthcare
- Relevant Product:
  - Stationary commercial canopies

In mixed-use and multi-unit residential projects (including apartment buildings, dorms, and barracks), the credit requires "covered storage facilities for securing bicycles for 15% or more of building occupants." (Note that this does *not* apply to LEED for Homes projects: (single-family and low-rise multifamily projects). Stationary canopies could be an attractive option for a building that needed covered storage.

## Heat Island Effect—Nonroof

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Schools
  - Healthcare
  - Retail–New Construction
- Relevant Product:
  - Stationary commercial canopies

In the BD&C rating systems, reflective surfaces that provide shade for areas of hardscape (walkways, patios, terraces) and/ or for parking areas can help earn a point for reducing urban heat islands. Commercial canopies are good candidates for this purpose, as long as the fabric covering is sufficiently reflective, which requires the use of light colors. The relevant language in the credit is:

> Option 1, 3rd bullet: "Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29," (total amount of shade and reflective or open-grid pavement must encompass at least 50% of site hardscape).
>
> Option 2: Place 50% of parking under cover with material of at least 29 SRI. "For the purposes of this credit, under cover parking is defined as parking underground, under desk, under roof, or under a building."

Contributing materials must have been tested/ rated according to the procedures referenced in ASTM E1980.

## Light Pollution Reduction

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Schools
  - Healthcare
  - Retail-New Construction
- Relevant Products:
  - Drop-arm awnings
  - Exterior solar shades

Interior Lighting Control, Option 2, rewards projects for using window shades to prevent leakage of light from inside the building during nighttime hours.

> "All openings in the envelope (translucent or transparent) with a direct line of sight to any nonemergency luminaires must have shielding (controlled/ closed by automatic device for a resultant transmittance of less than 10% between 11 p.m. and 5 a.m.)." (LEED-NC)

There are several specific conditions included in this language, all of which must be met:

- Shades must be automatically controlled as well as scheduled to be deployed for at least the designated hours. Either individual timer-based controls or a centralized building management system can be used. Motorized shades that require manual activation are not acceptable.
- Shades must block at least 90% of the incident light.

Residential occupancies in mixed-use or high-rise multifamily buildings can earn the point without meeting this requirement, so the awnings and shades do not apply in relation to those spaces.

## Site Selection

- Relevant Rating Systems:
  - Commercial Interiors
  - Retail–Commercial Interiors
- Relevant Product:
  - Stationary commercial canopies

LEED-CI and CI–Retail consolidate a range of site-related strategies under one credit, since site improvements are not always available to CI projects. The heat island reduction strategy is in Option 2, Path 4. This light pollution reduction strategy is in Option 2, Path 6.

## Minimum Energy Performance/Optimize Energy Performance

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
  - Existing Buildings
  - Homes
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

The LEED rating systems include a minimum energy performance requirement as a prerequisite, and points for achieving energy efficiency beyond that level as a credit. Both the prerequisite and the credit use the same calculation methods in most of the rating systems. All LEED rating systems (except for those focused exclusively on interiors) include ways in which the energy benefits of fabric structures can be recognized.

Many LEED projects use a computer simulation to document their anticipated energy cost savings; the exceptions are projects using LEED for Existing Buildings and LEED-CI. In addition, there is a "prescriptive path" option in the other LEED rating systems that allows relatively small and simple projects to follow a specific set of measures instead of doing a whole-building energy simulation.

### *Prescriptive Path*

The Prescriptive Path in the BD&C systems including LEED-NC, CS, Schools, NC-Retail and Healthcare, allows for windows in hot and mixed climates to have higher solar heat gain factors when they are shaded. However, the overhang or fins causing the shading have to be "permanent projections that will last as long as the building itself" (ANSI/ ASHRAE/ IES Standard 90.1-2007 5.5.4.4.1(a)), which suggests that awnings and other fabric structures will not be acceptable.

If they were acceptable, the benefit would be more flexibility in terms of glass specification within the prescriptive path—allowing for glass that might cost less, let in more daylight, or allow more solar gain in the winter, when the sun is low in the sky.

Otherwise, the prescriptive path does not offer a way for designers to take credit for the energy benefits of fabric structures. Most projects opt for the performance path anyway, as many more points can be achieved that way.

### *Performance Path in the BD&C Rating Systems*

The performance path option applies to the BD&C rating systems including NC, CS, Schools, NC–Retail, and Healthcare. It requires computer simulations comparing the energy cost for a code-compliant "baseline" building with the proposed building. The rules for how that comparison has to be done are in Appendix G of ANSI/ ASHRAE/ IES Standard 90.1-2007, or "ASHRAE 90.1-2007" for short.

ASHRAE 90.1-2007 specifically allows users to take advantage of the benefits of exterior shading devices by stipulating that the baseline building should not have any, while the proposed building can include them, as long as they are either fixed or automatically controlled. Manually deployed devices, even if motorized, do not qualify, although automatically controlled shades may have manual overrides.

Any fixed shading devices have to be permanent, but there is no specific definition of what permanent means in this context, so fabric structures should be acceptable. (As noted above under the prescriptive path, for the purposes of defining projections that can be used to offset solar gain allowances in glazing, permanent is defined as "for the life of the building." That definition has not been applied to the simulation instructions, however.)

> 90.1-2007 Appendix G. Baseline building: "All vertical glazing shall be assumed to be flush with the exterior wall, and no shading projections shall be modeled." (Table G3.1 section 5)
>
> Proposed building: "Manual fenestration shading devices such as blinds or shades shall not be modeled. Automatically controlled fenestration shades or blinds may be modeled. Permanent shading devices such as fins, overhangs, and light shelves may be modeled." (Table G3.1 section 5)

The engineer responsible for the energy simulation will require data on the opacity or shading factor of the fabric covering. PAMA may want to develop a method for standardizing how this information is reported to customers.

### *Performance Path in LEED for Retail Commercial Interiors*

Even though it's specifically for tenant fit-outs, LEED for Retail Commercial Interiors includes a credit called "Optimize energy performance - building envelope" that allows for an energy simulation comparison of the thermal performance of the building envelope based on ASHRAE 90.1-2007. This option is not included in LEED for Commercial Interiors.

### *LEED for Homes*

The prescriptive path in LEED for Homes does not have any mechanism for crediting the use of shading devices. The performance path is the HERS Index, which does allow projects to take advantage of shading, like in the non-residential rating systems. Unlike ASHRAE 90.1, the HERS method is based on units of energy, not energy cost.

In the latest HERS Standard from RESNET (BSR/ RESNET 301-2013: Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using the HERS Index. Final Draft Standard, March 1, 2013), this opportunity is spelled out in Table 4.2.2(1): Specifications for HERS Reference and Rated Homes. Shading on each façade of a home is specified as either "full," "partial," or "none." There may be an opportunity for PAMA to work with RESNET on developing a more sophisticated method for modeling the benefits of fabric structures. Such a method would also have to be accommodated by the relevant simulation software. The most common software package used to determine HERS Index is REM/ Rate from Architectural Energy Corporation, and it also accommodates shading devices.

The next version of LEED for Homes, LEED v4, includes a separate credit for Passive Solar Design that specifically mentions awnings as an acceptable shading method. The nature and construction of acceptable awnings has yet to be defined, however. PAMA could engage with USGBC to ensure that fabric awnings will be deemed acceptable.

### *LEED for Existing Buildings*

Because this rating system is for projects that are already occupied, the energy prerequisite and credit are based on their actual measured energy use. Users enter energy use data into the Energy Star Portfolio Manager tool, which calculates an Energy Star score. A score of at least 69 is required for the prerequisite; higher scores earn points through the credit.

Because this method is based on actual energy use, awnings, shades, and fixed pavilions can all contribute if they are deployed in a way that actually saves energy. Exterior shading devices will have the most benefit in situations where the glass has not been upgraded to one that incorporates an integral shading factor. Up to 18 points in total are available for this credit. Due to the many factors determining whole building energy use, it is difficult to say how many points window shading devices might claim credit for, but it is safe to say that they could contribute to credit achievement.

## Materials & Resources Credit Calculations

In most LEED 2009 rating systems, products and materials can contribute to several credits based on green attributes in their ingredients. These credits are:

- Materials Reuse: for use of salvaged materials
- Recycled Content: both post-consumer and pre-consumer (also known as post-industrial)
- Regional Materials: both raw material extraction and manufacturing locations
- Rapidly Renewable Materials: plant-based (or "biobased") materials that regenerate within 10 years or less

Recycled Content is the only one of these credits that is applicable to most fabric structures; the Regional Materials credit is also relevant for the Commercial Interiors rating systems (see details below).

In all four of these credits, the formulas for how products can contribute to earning the points are similar:

1. Start with the cost to the contractor of the product (not including labor).
2. Calculate the fraction of that cost that is attributable to the relevant green attribute, based on the relative mass of each ingredient.
    a. For example, a steel stud might have 25% post-consumer recycled content.
3. Multiply the product cost by the relevant fraction:
    a. If the stud costs $5, then it contributes $1.25 in recycled content value.
4. Sum the value of all product contributions to that green attribute:
    a. 100 studs @$1.25 = $125
    b. + rebar
    c. + paper facing in drywall
    d. + recycled resins in carpet, etc.
5. Compare that sum to the total cost of all architectural products and materials purchased.
6. Project earns one or more points if the ratio of green ingredient value to total product cost exceeds the stipulated threshold.
    a. In LEED-NC, the recycled content threshold for one point is 10%. So if the sum of the recycled content value from all products exceeds 10% of the total materials cost, the project earns that point.

The Constructions Specifications Institute's MasterFormat system for organizing a construction project defines the products and materials that can be included in this calculation (and must be included in the total cost). LEED includes specific MasterFormat divisions and sections that include architectural and landscaping components (as opposed to plumbing, electrical, or mechanical equipment). In

lieu of summing up the cost for all architectural materials, the project team can opt to use 45% of the materials plus labor cost for everything in the relevant MasterFormat divisions and sections.

The Recycled Content credit calculation is actually more complicated, because it takes post-consumer recycled content at full value and pre-consumer content at half value. See details below.

## Recycled Content

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

All the LEED 2009 rating systems, except LEED for Homes, generally reward projects for the use of recycled content in architectural products (LEED for Homes only rewards the use of recycled content in certain specific product categories). LEED-EBOM and LEED for Healthcare each include recycled content as a contributing factor within a more integrated green materials credit; these are explained below.

For most of the rating systems listed above, project teams have to tally up the recycled content value of all the applicable products and materials in the project in hopes of reaching the threshold to earn one or two points. One point requires that the recycled content value constitute at least 10% of the total materials cost for the project—a second point requires at least 20%.

Recycled content value includes any post-consumer recycled content at full value, and any pre-consumer recycled content at half value. Post-consumer content is material that has reached its end user before being reclaimed for recycling; pre-consumer content has been recycled from the manufacturing or supply stream prior to reaching its end user (scrap recycled directly within a manufacturing process doesn't count). See the "Materials & Resources Credit Calculations," above, for more details on the formula for determining a product's contribution to the credit.

Recycled content is almost always an ingredient in metal structural components, and may be available in fabric coverings as well. LEED allows a default

combined post-consumer and pre-consumer recycled content value of 25% for steel. Suppliers simply have to document what portion of the mass of the product is made of steel.

If the structure is instead made of aluminum, the supplier will have to get documentation from their supplier regarding the fraction of aluminum that is post-consumer and/ or pre-consumer recycled, as there is no default value in LEED for recycled content in aluminum. It should not be hard to find aluminum components from suppliers that can document relatively high levels of recycled content.

Note: "recyclable" is not the same as "made with recycled content." There is no mechanism in current LEED rating systems to reward the use of materials that are recyclable in the future.

### Regional Materials

- Relevant Rating Systems:
  - Commercial Interiors
  - Retail–Commercial Interiors
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

In most LEED 2009 rating systems, the regional materials credit requires that both raw material extraction and manufacture all happen within a 500-mile radius of the project site. Given that most fabric structures are made from metals and polymer fabrics, tracking the raw material extraction locations is not feasible.

In the LEED for Commercial Interiors rating systems, however, the credits are structured with one point based only on manufacturing location, and a second point tied to where the raw materials come from. Therefore, as long as the manufacturer of a fabric structure is located within 500 miles of the project, the product can contribute to achieving that credit.

For the other rating systems, there is one condition that may make it possible for a fabric structure to contribute to this credit. If the structure is made with metal components from a steel or aluminum plant within the 500-mile radius, and that supplier can document that their recycled content is collected from scrap yards that are also within 500 miles of the project, then the recycled content portion of those components can also count as regional material.

See the discussion "Materials & Resources Credit Calculations," above, for details on the formula for determining the product's contribution to the credit.

## Sustainable Purchasing—Facility alterations and additions

- Relevant Rating Systems:
  - Existing Buildings
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

This LEED-EBOM credit offers one point if at least 50% of products and materials used in facility alterations and additions, by cost, have one or more specific green characteristics that are listed in the credit. The only characteristic on that list that is applicable to most awnings and solar shades is for recycled content: if the product as a whole has at least 10% post-consumer or 20% pre-consumer recycled content, then the entire cost of the product counts towards the 50% threshold.

Any pavilion or awning using steel structural elements is likely to comply easily with the minimum recycled content level, because LEED allows a default combined post-consumer and pre-consumer recycled content value of 25% for steel, and steel typically represents 80%–90% of the mass of the entire installation. Suppliers will just have to document the product's porportion of mass constituted by the steel.

If the structure is made of aluminum, the supplier will have to get documentation from their supplier regarding the fraction of aluminum that is post-consumer and/ or pre-consumer recycled because there is no default value in LEED for recycled content in aluminum. It should not be hard to find aluminum components from suppliers that can document relatively high levels of recycled content.

## Sustainably Sourced Materials and Products

- Relevant Rating Systems:
  - Healthcare
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

This credit is similar to the EBOM credit in that products used in the construction of the healthcare facility can contribute if they have any of a list of green characteristics. Recycled content is, again, the most relevant characteristic. The calculation method is different, however.

In this case, there are four points available: one for each 10% of materials, by cost, that has one or more of the characteristics. The entire value of each product is not included, however, just the relevant fraction that contributes. In the case of a fabric pavilion, for example, if the steel has 50% post-consumer recycled content and represents 90% of the mass of the entire assembly, then 45% (50% x 90%) of the cost of the assembly contributes towards that 10% threshold.

### Daylight and Views—Daylight

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades

The credit in LEED for daylighting indoor spaces encourages the introduction of lots of daylight, but in a managed, controlled way. Too much daylight, or strong contrasts between bright and dark surfaces in a room, can hinder visual comfort rather than helping it.

There are several different methods described in the credit for documenting appropriate daylighting. LEED-NC Option 2 describes a prescriptive option that includes specific instructions to use "sunlight redirection and/ or glare control devices to ensure daylight effectiveness."

Awnings and solar shades are a good example of possible glare control devices.

### Daylight and Views (combined)

- Relevant Rating Systems:
  - Existing Buildings
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades

The EBOM credit combines parts of the two separate NC credits for daylight and for views, with the same stipulation to "Provide glare control devices to avoid high-contrast situations that could impede visual tasks."

## Indirect Contributions:
## Credits for which Awnings and Solar Shades May Play a Supporting Role

*Table 4: LEED Credits to Which Awnings and Solar Shades Can Contribute Indirectly*

| Credit | Relevant Rating Systems | Relevant Products | How They Can Contribute |
|---|---|---|---|
| **Durability Management Process** | Homes | Stationary awnings, Drop-arm awnings | Awnings can protect window and door openings from rain penetration, enhancing durability. |
| **Building Exterior and Hardscape Management Plan** | Existing Buildings | Stationary commercial canopies | Fabric structures can shelter entrances and walkways, thereby reducing the need for snow and ice melting and snow clearing. |
| **Alternative Transportation—Low-emitting and fuel-efficient vehicles** | New Construction, Core & Shell, Healthcare | Stationary commercial canopies | Covering alternative fuel fueling stations is not required, but may increase their acceptability. |
| **Alternative Transportation—Parking capacity** | New Construction, Core & Shell, Healthcare | Stationary commercial canopies | Covering carpool drop-off areas is not required, but may increase their acceptability. |
| **Alternative Transportation (combined)** | Retail-New Construction, Retail-Commercial Interiors | Stationary commercial canopies | Covering alternative fuel fueling stations is not required, but may increase their acceptability. |
| **Building Reuse** | New Construction, Core & Shell, Schools, Healthcare, Retail-New Construction, | Stationary awnings, Drop-arm awnings, Exterior solar shades, | Stationary awnings may be a good fit for historic buildings; any window shading may help with adaptive reuse. |
| **Environmental Tobacco Smoke (ETS) Control** | New Construction, Core & Shell, Schools, Healthcare, Retail-New Construction, Existing Buildings, | Stationary commercial canopies | Covering outdoor smoking areas is not required, but may increase their acceptability. |
| **Low-emitting Materials – Adhesives and sealants** | New Construction, Core & Shell, Commercial Interiors, Schools, Healthcare, Retail-New Construction, Retail-Commercial Interiors | Stationary awnings, Drop-arm awnings, Exterior solar shades, Stationary commercial canopies | Any adhesives, or sealants used for installation should meet applicable VOC limit. |

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|---|---|---|---|
| **Indoor Chemical and Pollutant Source Control** | New Construction, Core & Shell, Commercial Interiors, Schools, Healthcare, Retail-New Construction, Retail-Commercial Interiors | Stationary awnings, Stationary commercial canopies | Covered outdoor grates at entrances can help achieve the requirement for reducing tracked-in pollutants. |
| **Controllability of Systems—Thermal comfort** | New Construction, Core & Shell, Schools, Commercial Interiors, Healthcare Retail-Commercial Interiors, Retail-New Construction | Drop-arm awnings, Exterior solar shades | Rewards manual (crank or motorized) operation of exterior shading. |
| **Daylight and Views—Views** | New Construction, Core & Shell, Schools, Commercial Interiors, Healthcare Retail-Commercial Interiors, Retail-New Construction | Drop-arm awnings, Exterior solar shades | Views through shades don't count, but if shades can be manually controlled to allow views or provide shading as needed, they may be helpful. |

## Durability Management Process

- Relevant Rating Systems
  - Homes
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings

LEED for Homes includes a two-part prerequisite and a related credit aimed at improving the durability of the home through careful planning and implementation of appropriate measures. The two perquisites involve planning and implementing a durability-enhancement process; the optional credit is for third-party verification of those measures.

While protecting the façade from rainwater penetration is not specifically mentioned in the rating system, "exterior water" is the first in a list of eight "principal durability risks" mentioned in the LEED for Homes Reference Guide. Awnings can help promote durability by protecting windows and doors from rain and can therefore be a valuable element in a durability plan. For optimal durability benefit, the awning installation should be detailed to effectively channel all water away from the building and so attachment points do not become potential sources of water intrusion.

## Building Exterior and Hardscape Management Plan

- Relevant Rating Systems:
  - Existing Buildings
- Relevant Products:
  - Stationary commercial canopies

Fabric structures are often used to shelter entrances and walkways, thereby reducing the need for snow and ice melting and snow clearing. This credit encourages the use of environmentally sensitive, low-impact management of the area around a building, including a specific reference to snow and ice removal.

## Alternative Transportation—Low-emitting and fuel-efficient vehicles

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Healthcare
- Relevant Products:
  - Stationary commercial canopies

Option 2: Alternative fuel reads: "Install alternative-fuel fueling stations for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors."

These fueling facilities could benefit from being covered by a lightweight structure. Any facility providing flammable fuels would likely be subject to special flame-retardant requirements.

## Alternative Transportation—Parking capacity

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Healthcare
- Relevant Products:
  - Stationary commercial canopies

Case 2 – Residential Projects, Option 1 requires teams to "provide infrastructure and support programs to facilitate shared vehicle use" and lists "carpool drop-off areas" among the options for that infrastructure. These drop-off areas would benefit from weather-protective structures that might be provided by a fabric canopy.

### Alternative Transportation (combined)

- Relevant Rating Systems:
  - Retail–New Construction
  - Retail–Commercial Interiors
- Relevant Products:
  - Stationary commercial canopies

This credit combines many of the options from the various Alternative Transportation credits in LEED-NC, including alternative fuel refueling stations, which could benefit from a covered canopy.

### Building Reuse - Maintain existing walls, floors and roof

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Schools
  - Healthcare
  - Retail–New Construction
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades

As historic buildings were often graced with awnings, restoring that aesthetic can be an important element in historic restoration. In addition, designers are often prevented from upgrading window glass in historic buildings, so shading historically accurate glass with awnings is critical to maintaining indoor comfort and saving energy. LEED 2009 does not specifically reward historic preservation as distinct from other types of building reuse, but LEED v4 does, so this benefit may be more explicit in the future.

For adaptive reuse of existing buildings that are not constrained by historic appearance, awnings and shades can both help improve the comfort, energy efficiency, and appearance of the project.

## Environmental Tobacco Smoke (ETS) Control

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Schools
  - Healthcare
  - Retail–New Construction
  - Existing Buildings
- Relevant Products:
  - Stationary commercial canopies

This prerequisite requires that project teams either prohibit smoking in or near the building, or, if indoor smoking is to be allowed, provide carefully controlled designated smoking areas (this option is not available in LEED for Schools).

Smoking outdoors is also restricted—it can only be allowed at least 25 feet from any entries, operable windows, or outdoor air intakes. As a result, projects that have sufficient site area are encouraged to designate a smoking area at some distance from the building. Covering that area to protect smokers from weather is not required, but, as a practical matter, would likely make the area more usable and improve the likelihood of compliance with the smoking policy. Fabric structures are an attractive, low-cost option for providing such cover.

## Low-emitting Materials – Adhesives and sealants

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Stationary awnings
  - Drop-arm awnings
  - Exterior solar shades
  - Stationary commercial canopies

This credit encourages the use of adhesives and sealants with low volatile organic compound (VOC) emissions. This is not so much a credit to which fabric structures can contribute, but more of a credit that they could potentially jeopardize if installers are not careful. This concern only applies to products installed inside the weather barrier of a building: atria, shopping malls, etc. Manufacturers should check that any adhesives they specify or provide to installers do not exceed the allowable limit for that type of adhesive. A table of

allowable limits is included in the credit requirements. For "multipurpose construction adhesives" the limit is 70 grams per liter of VOCs.

### Indoor Chemical and Pollutant Source Control

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Stationary awnings
  - Stationary commercial canopies

Several measures are required to earn this credit, including the provision of walk-off grates and matts at entryways to capture dirt from people's shoes and prevent that dirt from entering the building. These walk-off matts can be just inside the entry, or they can be under a canopy sheltering the outside of the entry, which can save valuable indoor space.

### Controllability of Systems—Thermal comfort

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Drop-arm awnings
  - Exterior solar shades

This credit rewards projects for giving occupants (as opposed to facility managers) direct control over one or more of four conditions that affect thermal comfort: air temperature, radiant temperature, air speed, and humidity. Because shading on an adjacent window will affect the radiant temperature of that window, it should be possible to claim this point if enough occupants have the ability to control an operable exterior shading device near their indoor location.

In most cases, such occupants would also have the ability to open a window, which is a common way to earn this credit. But in situations where the windows are not operable, giving occupants control over a motorized exterior shade might

be an alternative to consider. Note that in this case the shades should *not* be automated, or, if they are, occupants must have manual override capability.

In the two retail rating systems, controllability of systems for lighting and thermal comfort are combined into one credit.

### Daylight and Views—Views

- Relevant Rating Systems:
  - New Construction
  - Core & Shell
  - Commercial Interiors
  - Schools
  - Healthcare
  - Retail–Commercial Interiors
  - Retail–New Construction
- Relevant Products:
  - Drop-arm awnings
  - Exterior solar shades

This credit rewards projects that give most occupants in the building direct views to the outdoors. Anything that obscures the view will not be acceptable, so even exterior shades that have a fabric with an openness factor and allow some visibility will not achieve this credit. However, if the exterior shades can be manually controlled to allow views or provide shading as needed, then they may help improve thermal comfort in a space, while still allowing the project to achieve this credit.