

## LEED Credit for Light Pollution

Why the LEED credit for light pollution reduction should be on your list

By Jennie Morton

Imagine a LEED point that gives you the power to minimize your impact on wildlife and human health while putting money back into your pocket.

The Light Pollution Reduction point – SS Credit 8 – provides guidelines for reducing interior and exterior lighting levels. These adjustments, in turn, provide ongoing energy savings.

Brighter lighting is ultimately poor lighting. The credit's intent is to:

- Minimize light trespass from the building and site.
- Reduce skyglow to increase night sky access.
- Improve nighttime visibility through glare reduction.
- Reduce development impact from lighting on nocturnal environments.



The CDC Headquarters used daylighting strategies and dark sky-friendly fixtures to reduce light pollution. Photo Courtesy of James Gathany, CDC

### Follow the Rules of Good Lighting

To curtail these forms of over-illumination and meet the credit's specifications, adhere to the principles of proper lighting. According to Richard Heinisch, manager of energy and environmental standards with Acuity Brands Lighting, lighting design boils down to one simple principle – put the right amount of light in the right place at the right time. SS Credit 8 offers a detailed breakdown of footcandle across four project zones, as well as specific times lights should be adjusted.

Though every building pollutes with light, the SS Credit 8 is often bypassed because documentation requires professional assistance, explains Heinisch. Unlike points that can be earned by simply selecting the right product, like a bike rack, SS Credit 8 involves careful planning and the involvement of a lighting designer.

"This is also a calculation-intensive credit," says Heinisch. "The point demands the technical wherewithal to calculate horizontal and vertical illuminances at a variety of locations, along with an assessment of luminaire photometrics to determine compliance with sky glow requirements."

Whether you pursue LEED certification or build to its standards, there are several simple lighting tips that you can follow:

- A properly placed luminaire minimizes errant light.
- Take advantage of lighting controls to reduce or extinguish light levels.
- Use shielded luminaires whenever possible.
- High-efficacy fixtures support desired lighting levels using lower watts.
- Directional lighting – lighting from above – is the most effective use of lighting.

"Ultimately, the challenge is not to get the credit, but to educate owners as to what good lighting is," says Micah Rosen, associate principal with TVS Design, an architectural firm.

### CDC Gets Tough on Light Trespass

Located in Atlanta, the Centers for Disease Control and Prevention (CDC) earned LEED Silver in 2006 for the Arlen Specter Headquarters and Operations Center. The building's glass envelope and large amount of green space presented lighting concerns that prompted TVS Design to evaluate SS Credit 8.

Because CDC is a 24-hour operation, security lighting is a top priority. The building is located on 10 acres of green space with frequently used sidewalks. However, the preliminary light fixtures not only leaked light into the sky, but also flooded light well beyond the sidewalk's edges. "We were able to find an alternative from the same manufacturer's line of products that was downlight only and fully shielded," says Rosen.

The design team also found it could use pedestrian poles intermittently with the addition of bollards, which use localized light better suited to the 5-foot sidewalks. "Because bollards can be spaced closely together, you can use a lower footcandle level and get a more even spread of light," says Rosen. Both changes – the downlight-only pedestrian poles and the bollards – were made within the budget.

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To reduce spill light from the building's glass envelope, a series of solar shades and interior reflectors was installed, as well as two tints of low-E glass. Green-tinted glass reduces glare and provides shade for occupants. At the 7-foot level, the shades reflect natural light through clear glass. This strategy eliminated the need for artificial light within 8 feet of the building's perimeter. "This reduction in artificial light allows us to minimize light trespass at night," says Rosen.

Like many others, TVS Design didn't initially flag the light pollution reduction point as a must-do. Instead, it found that by following good lighting designs, it naturally met the credit's goals.

Jennie Morton ([jennie.morton@buildings.com](mailto:jennie.morton@buildings.com)) is assistant editor of BUILDINGS.

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## LEED® Certification

### Sustainable Sites

#### Credit 7: Light Pollution Reduction (1 Point)

Intent: Eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments.

How Window Film Can Play a Role: Window film reduces light trespass from buildings at night since most films reduce light transmission by 50% or more.

### Energy and Atmosphere

#### Credit 1: Optimize Energy Performance (1 to 3 Points)

Intent: Achieve increasing levels of energy performance above the prerequisite Energy Star® Rated Building standard to reduce environmental impacts associated with excessive energy use.

How Window Film Can Play a Role: Window films can provide as much as 5-15% whole building energy savings, enabling improvement in Building Energy Star Rating.

### Indoor Environmental Quality

#### Credit 7.1: Thermal Comfort (1 Point)

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

How Window Film Can Play a Role: A majority of building occupants report a significant improvement in thermal comfort after window film installation, due to reduced solar heat gain.

### Indoor Environmental Quality

#### Credits 8.1 and 8.2: Daylight and Views (1 to 2 Points)

Intent: Provide a connection between indoor spaces and the outdoor environment through introduction of daylight and views into the occupied areas of the building.

How Window Film Can Play a Role: Solar-control and glare-reduction properties of window films eliminate or help to greatly reduce the need for closed blinds or shades, thus significantly improving the introduction of daylight and connection to the outdoor environment – light reduction from window film is LESS than total view and total light reduction from closed blinds or shades.

### Innovations in Operations and Upgrades

#### Credit 1: Innovation in Upgrades, Operations, and Maintenance (1 Point)

Intent: Provide the opportunity for LEED® points for additional environmental benefits beyond those in other LEED Rating System areas.

How Window Film Can Play a Role: The up to 99.9% UV Protection provided by many films helps protect occupants and furnishings from harmful and damaging ultraviolet rays. Many window films are recognized by the Skin Cancer Foundation as effective for protection against skin cancer.

How Window Film Can Play a Role: Utilize safety and security films to upgrade existing glass which help protect occupants from injuries due to glass hazards.

How Window Film Can Play a Role: The application of designer films to interior glass for decorative purposes instead of replacing (and disposing of) the existing glass.

### Materials and Resources

#### Credit 2: Optimize Use of Alternative Materials (1 Point)

Intent: Reduce the environmental impact of the materials acquired for use in upgrades of buildings by using local and regional materials.

How Window Film Can Play a Role: The use of local and regional materials reduces pollution and transportation costs associated with the delivery of materials to the job site. Credit is possible if 50% or more of a product is harvested or processed within 500 miles of the LEED Project.

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## Fritted Glass

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Fritted glass is glass that producers are equipped to imprint the surface of glass with silk screened patterns of ceramic based paints.

The paints consist primarily of pigmented glass particles called frit. After the frit has been printed on the glass, the glass is dried and then fired in a tempering furnace, transforming the frit into a hard, permanent ceramic coating.

Many colours are possible in both translucent and opaque finishes. Typical patterns for fritted or silkscreen glass are various dot and stripe motifs, but custom designed patterns and even text are easily reproduced. This glass is often used to control the penetration of solar light and heat into a space.

Wikipedia

**Frit** is a ceramic composition that has been fused in a special fusing oven, quenched to form a glass, and granulated. Frits form an important part of the batches used in compounding enamels and ceramic glazes; the purpose of this pre-fusion is to render any soluble and/or toxic components insoluble by causing them to combine with silica and other added oxides.

However not all glass that is fused, and quenched in water is frit, as this method of cooling down very hot glass is widely used in glass manufacture.

The origin of the word "frit" dates back to 1662 according to the OED as "a calcinated mixture of sand and fluxes ready to be melted in a crucible to make glass". Nowadays this is more commonly called "glass batch", the unheated raw materials.

In antiquity, frit could be crushed to make pigments or shaped to create objects. It may also have served as an intermediate material in the manufacture of raw glass. The definition of frit tends to be variable and has proved a thorny issue for scholars. In recent centuries, frits have taken on a number of roles, such as biomaterials and additives to microwave dielectric ceramics. Frit in the form of alumino-silicate can be used in glaze free continuous casting refractories.

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