

Certification No. 41116

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# Gessler: Display Vision LED Exit Signs

Green-Buildings' team of LEED Accredited Professionals performed a benchmark analysis of the Gessler Display Vision LED Exit Sign and determined that the product will:

- A. **Conserve Energy and Electricity**
- B. **Reduce GhG Emissions and Pollution**
- C. **Improve Building Durability**

Green-Buildings also believes that the use of the Gessler Display Vision LED Exit Sign are an effective choice when seeking to achieve certification under green building rating systems, such as LEED.



## EXECUTIVE SUMMARY

The Display Vision LED Exit Signs (“Display Vision LED”), manufactured by Gessler, are decorative emergency exit light-emitting-diode (LED) signs.

Green-Buildings.com (“Green-Buildings”) worked with Gessler to complete a review and evaluation of the Display Vision LED. Green-Buildings believes that the Display Vision LED meet several important accepted green building principles and, as such, the product is applicable to high-performance building.



Green-Buildings’ team of LEED Accredited Professionals performed a benchmark analysis of the Display Vision LED and determined that use of the Display Vision LED will:

- A. **Conserve Energy and Electricity**
- B. **Reduce GhG Emissions and Pollution**
- C. **Improve Building Durability**

Additionally, Green-Buildings believes that the characteristics of the Display Vision LED make it an ideal option when seeking to obtain certification through various green building rating systems, such as the US Green Building Council’s Leadership in Energy and Environmental Design (LEED) Rating System. While no single product may guarantee a building certification in a green building rating system, Green-Buildings believes that the use of the Display Vision LED may be effective in earning points in LEED Certification<sup>1</sup> in the following categories:

- a. **Energy & Atmosphere (EA): 1-19 Points**

## DETAILS

Gessler has developed the Display Vision LED as a replacement for the various less efficient, traditional incandescent exit signs commonly found in conventional buildings. The characteristics of the Display Vision LED provide several benefits over the conventional emergency sign models.

As described below, the Display Vision LED provides a long-lasting, energy efficient light which is consistent with green building.

### **A. *Conserve Energy and Electricity:***

According to the U.S. Department of Energy, buildings are responsible for approximately 39% of the energy consumed in the United States. Of the electricity used, building operations result in approximately 74% of total U.S. consumption. Lighting represents approximately one third (28%) of this demand in commercial buildings and approximately twelve percent (12%) in residential buildings.

A key green building principle is the conservation of energy and electricity through the use of energy efficient technologies and controls. The simplest way to reduce electricity demand is to use less of it by eliminating unnecessary use of energy through lighting. Taking steps to replace inefficient lamps and/or lighting components has also been shown to greatly improve the effectiveness and efficiency of green building energy strategies, while simultaneously reducing the demand, and carbon output from, coal-fired power facilities, a common energy source.

Buildings that incorporate high-performance building components, such as the Display Vision LED, will use much less electricity than conventional buildings and result in a cleaner environment. This is because the underlying technological design of the Display Vision LED produces light in a far more efficient way than incandescent bulbs or even compact fluorescent lamps. The result is that the same amount of light is delivered from the LED with the use of far less energy.

Specifically, incandescent bulbs may require up to four (4) times as much energy to produce the same amount of light, when compared to LEDs. A conventional incandescent exit sign contains two (2) 20-watt incandescent bulbs. Each 20-watt bulb consumes approximately 175.2 kWh of electricity per year, so one sign costs an average of \$28/yr to operate, assuming an average utility rate of \$0.08/kWh. Add to that the fact that incandescent bulbs have a much shorter life than LEDs and that someone has to change them (labor costs), total yearly operating cost for an incandescent exit light is something around \$76. The Display Vision LED Exit Signs operate at 6-watts each, so only would cost \$4.20 a year to operate. Labor and maintenance costs would also be saved due to the exceptionally long life of LEDs.

The additional energy required by the incandescent bulb is then lost in the form of heat to the surrounding environment. In indoor environments, the additional heat causes building temperatures to rise putting incremental pressure on AC systems and greater demand for

increased cooling loads. Over the long term, this incremental heat will add to the amount of energy required to keep the building cool and further increase energy usage.

**By incorporating the Display Vision LED into a holistic, energy-saving green building strategy, building owners and operators may not only save money and realize a positive return over the life of the product, but also save energy and reduce the environmental impacts of greenhouse gas emissions and other harmful pollutants.**

## **B. Reduce GhG Emissions and Pollution:**

### **i. Reduce GhG Emissions**

The vast majority of electricity consumed in the U.S. is initially generated through the burning of fossil fuels, such as coal, at conventional power plants. A byproduct of the operation of coal-fired power plants is the production of a significant amount of greenhouse gases (GhG) and other harmful pollutants.

According to the U.S. Green Building Council and the U.S. Environmental Protection Agency, for each megawatt of coal generated electricity produced, an average of 2,249 pounds of carbon dioxide, 13 pounds of sulfur dioxide and 6 pounds of nitrogen oxides are released into the atmosphere. Indeed, more than 65% of the sulfur dioxide pollution in the U.S., or approximately 13 million tons per year, is the result of coal fired power generation.

Considering that the average national emissions factor for electricity in the United States is 1.37 pounds of carbon dioxide (CO<sub>2</sub>) per kWh, and using the conservative assumption that the life of the Display Vision LED is 40,000 hours (before capacity is decreased), compared to a conventional Exit Light as described above, Green-Buildings calculated the benefits of utilizing the Display Vision LED in total CO<sub>2</sub> eliminated below.

This calculation assumes a modestly sized building (30,000 sf) has 8 exit signs (also please refer to additional performance characteristics mentioned in the section on ROI calculations herein). As alluded to above, LEDs do not burn out like an incandescent bulb, rather, their brightness slowly fades. So, while the lifespan of an LED might be listed at 40,000 hours, that is the point when the bulb will most likely be shining at around 70% capacity (the industry assumes people notice a decrease in brightness at that point).

Assuming that total life is double the full-capacity life for the calculations below:

	<b>Full Capacity LED Lifetime (4.5 years)</b>	<b>Total LED Lifetime (9 years)</b>
<b>Energy Saved:</b>	2,680 kWh	5,360 kWh
<b>Pounds of CO<sub>2</sub> Saved:</b>	4,243	8,486
<b>Tons of CO<sub>2</sub> Saved:</b>	2.1	4.2
<b>Energy Cost Savings:</b>	\$214	\$428

## ii. **Reduce Pollution**

The U.S. Environmental Protection Agency (EPA) estimates that indoor pollution levels may be two to five times (potentially up to one hundred times) higher than outdoor pollution levels. As indoor pollution levels and exposure to harmful toxins are also a concern, products that help reduce exposure to potential harmful air pollutants and the presence of biological contaminants are an important consideration in green building. While compact fluorescent lamps (CFL) are significantly more efficient than traditional incandescent bulbs, they also contain mercury. Because CFLs contain mercury, they must be carefully handled and properly disposed of to prevent potentially significant environmental hazards that may occur throughout a product's life. Exposure to mercury poses risks not only to indoor occupants, but also to others in any surrounding environment downstream. The Display Vision LED contain no mercury and present an alternative to the potential dangers associated with CFLs.

**The use of energy efficient lighting, such as the Display Vision LED, reduce electricity demand and, therefore, reduce the amount GhG emissions released into the atmosphere from coal-fired power generation.**

## ***C. Improve Building Durability***

A key green building principle is to deliver durable, high-performance design and construction to create a built environment that will last. Indeed, according to a survey by PPG Industries, architects report that durability is the most important attribute for a green building product. The use of durable, high-performance building materials and construction may result in a building that may require less frequent renovation, repair and replacement.

By reducing the environmental impacts of materials chosen for construction, i.e. by using materials that provide longer life and performance, builders can reduce waste and system failures, enjoy more predictable maintenance schedules and benefit from a lower cost of ownership.

According to the EPA, depending on their environment and use, LEDs are is capable of lasting between 35,000 and 50,000 hours. For the purposes of our calculations herein, we assume estimate the life of the Display Vision LED to be 40,000 hours.

**The extremely long operating life of the Display Vision LED provides real estate owners and operators with the benefit of reduced labor and materials costs while decreasing the frequency and amount of waste from replacement bulbs that would otherwise be sent to landfills. See ROI calculations below.**

## ***Return on Investment (ROI) Considerations:***

For better or worse, the relatively short-term incentive to profit by keeping less efficient, less expensive, systems in place may be considered by some to be more important than any potential negative implications that could occur to the environment in the future. Therefore,

calculating the potential financial benefits of green building investments is critical to their adoption by the commercial real estate industry.

Green-Buildings computed the return on investment (ROI) as well as the total lifetime savings from replacing fifty (50) traditional Exit Signs with the Display Vision LED. Using conservative assumptions, Green-Buildings calculated the following:

<b>Cost Add for LEDs (over incandescent):</b>	<b>\$2,000</b>
<b>Total lifetime savings:</b>	<b>\$5,479</b>
<b>Annual total savings:</b>	<b>\$1,200/year</b>
<b>Simple payback:</b>	<b>1 year, 8 months</b>
<b>Return on Investment:</b>	<b>40%</b>

Green-Buildings compared the Display Vision LED with a standard 40-watt incandescent Exit Sign. The model details are as follows:

<b>Model #</b>	<b>Watts/ Fixture</b>	<b>Fixture type</b>	<b>Life (hours)</b>	<b>Unit cost/ bulb</b>	<b>Color</b>	<b>CRI</b>
<b>Display Vision LED</b>	6	Exit Sign	>30,000	\$55	9,016	80
<b>Incandescent</b>	40	Exit Sign	3,000	\$3	2,700	100

The following formula illustrates the total lifetime cost savings that may be realized when using the Display Vision LED in place of a less efficient, less expensive bulb with a shorter life. The calculation considers factors including labor, inventory and frequency of replacement for one Exit Sign:

**Total lifetime Cost Savings = A/B x (C+D) x E-F**

**Total lifetime energy savings = A/G x (J x I)**

<b>A = Replacement Bulb Life (hours)</b>	<b>&gt;40,000</b>
<b>B = Original Bulb Life (hours)</b>	<b>2,920</b>
<b>C = Labor cost (\$) to Change Original Bulb</b>	<b>\$10</b>
<b>D = Cost (\$) of Original Bulb</b>	<b>\$3</b>
<b>E = Number of Replacement Bulbs</b>	<b>28</b>
<b>F = Cost (\$) to Install Replacement Bulbs</b>	<b>\$140</b>
<b>G = Hours of Operation/Year</b>	<b>8,760</b>
<b>H = W Saved</b>	<b>34</b>
<b>I = kWh Saved/Year (H x G)</b>	<b>300</b>

<b>J = Cost per kWh</b>	<b>\$0.08</b>
<b>L = Labor Cost/Hour to Replace</b>	<b>\$20</b>

<b>Total lifetime cost savings</b>	<b>\$4,846</b>
<b>Total lifetime energy savings</b>	<b>\$110</b>
<b>Total Savings from Investment</b>	<b>\$4,956</b>

### ***LEED Scoring and Certification:***

Use of LED lighting products, such as the Display Vision LED, may contribute materially to the Leadership in Energy and Environmental Design® (“LEED®”) green building certification process. Accordingly, use of the Display Vision LED may provide measurable performance in the following LEED credit categories:

#### **LEED 2009 Energy & Atmosphere: EA (1 to 19 Points)**

Energy efficiency reduces the negative environmental consequences associated with the production and use of energy. As buildings are commonly powered by fossil fuels, energy savings are critical to green building. The EA credit category represents the primary area where the inherent efficiencies and long life of the Display Vision LED product can deliver significant positive impact. (1-19 Points)

#### **LEED v4 Energy & Atmosphere: EA (1 to 19 Points)**

Energy efficiency reduces the negative environmental consequences associated with the production and use of energy. As buildings are commonly powered by fossil fuels, energy savings are critical to green building. The EA credit category represents the primary area where the inherent efficiencies and long life of the Display Vision LED product can deliver significant positive impact. (1-19 Points)

### **CONCLUSION**

Green Buildings believes that the Display Vision LED Exit Signs by Gessler meets three significant criteria used in green building initiatives: **Conserve energy and electricity, reduce GhG emissions and pollution and increase building durability.** Furthermore, use of the Display Vision LED is an effective choice when seeking to achieve certification under a green building rating system, such as LEED, by potentially earning points in the area of Energy and Atmosphere. Finally, the use of the Display Vision LED should result in a positive return on investment (ROI) for owners and operators who are considering the benefits of LEDs in a new building.

<sup>1</sup> Green-Buildings.com has evaluated and reviewed this product using its own methodology. While Green-Buildings.com believes that certain products have characteristics that may allow users of the products to earn points in a LEED certification, only the Green Building Certification Institute (GBCI) may award points and grant certification. Accordingly, Green-Buildings.com does not make any assurances, guarantees, representations, or warranties, express or implied, and specifically disclaims all warranties or representations, that products will earn LEED points, or any project that utilizes such products, will receive LEED® certification.

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