

Certification No. 41116

Effective: April 1, 2012

Gessler: Display Vision LED Exit Sign

Green-Buildings' team of LEED Accredited Professionals performed a benchmark analysis of the 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 is an effective choice when seeking to achieve certification under the LEED green building rating system.



EXECUTIVE SUMMARY

The Display Vision LED Exit Sign (“Display Vision”), manufactured by Gessler GmbH, is a decorative emergency exit light-emitting-diode (LED) signs.

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



Green-Buildings’ team of accredited professionals performed a benchmark analysis of the Display Vision and determined that use of the Display Vision 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 make it an effective option when seeking to obtain certification through the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) Rating System.

While no single product may guarantee a building certification, Green-Buildings believes that the use of the Display Vision may contribute positively toward earning LEED Certification¹. Buildings can be certified under nine LEED rating systems: New Construction, Existing Buildings: Operations & Maintenance, Commercial Interiors, Core & Shell, Schools, Retail, Healthcare, Homes, and Neighborhood Development. Each rating system has a set of prerequisites and optional credits. The building project must meet all prerequisites and a certain number of credits to become certified under the rating system.

LEED CREDIT SUMMARY

LEED Scoring and Certification:

Use of LED lighting products, such as the Display Vision, may contribute materially to the LEED certification process.

Use of the Display Vision may provide measurable performance in the following LEED credit categories:

Credit Category: Energy & Atmosphere (EA):

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 can deliver significant positive impacts.

Credit Category: Green Infrastructure and Buildings (GIB):

Green buildings are a key feature of any sustainable neighborhood. The LEED for Neighborhood Development rating system recognizes that green buildings, whether they have earned LEED certification or have achieved optimal energy efficiency, are essential for reducing a community's environmental impact. The Data Vision improves the energy efficiency of buildings, helping them earn LEED certification and/or energy savings, which can contribute to the GIB credit category

Each rating system includes its own credit and prerequisite categories; We believe that the Display Vision can potentially contribute to the following prerequisites and credits in each of the following rating systems:

LEED Rating System	Applicable Prerequisites or Credits	Points Available per Credit
New Construction	Energy and Atmosphere (EA) Prerequisite 2: Minimum Energy	0 points
	EA Credit 1: Optimize Energy Performance	1-19 points
Existing Buildings: Operations & Maintenance	EA Prerequisite 2: Minimum Energy Efficiency	0 points
	EA Credit 1: Optimize Energy Efficiency	1-18 points

LEED Rating System	Applicable Prerequisites or Credits	Points Available per Credit
Commercial Interiors	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1.1 – Lighting	1-5 points
Core & Shell	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1: Optimize Energy Performance	3-21 points
Schools	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1: Optimize Energy Performance	1-19 points
Retail: New Construction	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1: Optimize Energy Performance	1-19 points
Retail: Commercial Interiors	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1.1 – Lighting Power	1-5 points
Healthcare	EA Prerequisite 2: Minimum Energy	0 points
	EA Credit 1: Optimize Energy Performance	1-24 points
Homes	EA Credit 1: Optimize Energy Performance	0-34 points
Neighborhood Development	Green Infrastructure and Buildings (GIB) Prerequisite 1: Certified Green	0 points
	GIB Prerequisite 2: Minimum Building Energy	0 points
	GIB and Buildings Credit 1: Certified Green Buildings*	1-5 points

LEED Rating System	Applicable Prerequisites or Credits	Points Available per Credit
	GIB Credit 2: Building Energy Efficiency	2 points

*Note: Since the Display Vision can contribute to a building’s LEED certification, it may also contribute to this credit, which requires a certain number of LEED certified buildings.

DETAILS

An exit sign is defined as “a sign that is permanently fixed in place and used to identify a means of egress”. Typically, an exit sign must have an illuminated, legally–required legend, which differs based on country. Exit signs that are required by Life Safety Codes to remain illuminated via an emergency power source upon failure of the normal power supply are (in most countries) designated as green (color). Red exit signs are allowed in many states and municipalities in the US, but green is becoming more favorable due to the fact that it’s less likely to blend in during a fire event.



Currently there are six primary categories of exit signs on the market: incandescent, compact fluorescent, radio luminescent (tritium), Light–Emitting Diode (LED), electroluminescent, and photo luminescent. While each of these types has their own distinct advantages and disadvantages, for the purposes of this report we will focus almost exclusively on LED signs and compare to the others where applicable to quantify savings or benefits.

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

Considering that exit signs must operate day and night, 365 days a year, they can be a significant contributor to energy usage in a building. As such, any associated reduction in energy usage from exit signs quickly adds up.

Though the technology for LED exit signs has been around since approximately 1985, the idea gained momentum in the 1990’s. In 2005, LED products accounted for about 80% of exit signs sold, according to the American Council for an Energy–Efficient Economy, and that percentage has risen with passage of the Energy Policy Act of 2005.

The edge–lit Gessler Display Vision exit sign shown here includes a clear panel that allows for an even ambient glow of light to crest the edges of the sign.

As described below, the Display Vision provide 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 in buildings 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, 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 Exit Sign Luminaire 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. Therefore, LED exit signs provide a valuable energy-savings option in a building retrofit scenario.

A conventional incandescent exit sign contains two (2) 20-watt incandescent bulbs. The idea behind the two-bulb scenario for incandescent bulbs was that if one burns out, the building maintenance staff will notice the dimmer sign and replace the burnt-out bulb. And though in many instances only one bulb is operating, for the purposes of our calculations we'll assume both bulbs are operating as designed. Each 20-watt bulb consumes approximately 175.2 kWh of electricity per year, so one sign costs an average of \$33.29/yr to operate, assuming an average utility rate of \$0.095/kWh (according to the Department of Energy). 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 \$81.

The Display Vision LED exit sign operates at 0.8 watts, so only would cost \$0.67 a year to operate. Labor and maintenance costs would also be saved due to the exceptionally long life of LEDs.

In the EPCRA of 2005, the US Congress passed a new minimum federal efficiency standard stating that exit signs must have an input power demand of 5 watts or less per face. The Display Vision provides more than 4-watts of savings over this baseline.²

Life Cycle Cost Estimate for 1 Exit Sign(s)			
Number of exit signs	1		
Electricity rate (\$/kWh)	\$0.095		
	Option A	Option B	
Type of Exit Sign	Incandescent	LED	
Initial Cost Per Unit (Est. Retail Price)	\$0.00 (Already Existing)	\$93.00	
Sign Wattage	36	0.8	
Number of Lamps/Sign	2	2	
Cost per Replacement Lamp	\$2.93	\$2.56	
Annual Operating and Life Cycle Costs for 1 Unit			
Operating Cost	Option A	Option B	Cost Difference
Energy Cost	\$30.00	\$1.00	\$29.00
Maintenance Cost	\$80.00	\$0.00	\$80.00
Total	\$110.00	\$1.00	\$109.00
Life Cycle Cost	Option A	Option B	Cost Difference
Operating Cost (Energy & Maintenance)	\$1099.00	\$7.00	\$1,092.00
Purchase Price for 1 Unit	\$0.00 (Already Existing)	\$93.00	-\$93.00
Total	\$1099.00	\$100.00	\$999.00
		Simple Payback of Initial Additional Cost for Option B (years)	0.9

Through the above calculation results, use of the LED exit sign at 0.8 watts also includes life cycle air pollution reduction equivalent to the CO₂ emission remediation of 0.46 acres of forest (more on carbon savings in the next section).

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 may add significantly to the amount of energy required to keep the building cool and further increase energy usage.

By incorporating the Display Vision LED Exit Sign Luminaire 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 (CO₂) per kWh, and using the conservative assumption that the life of the Display Vision 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 in total CO₂ 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). The LED exit sign is assumed to be rated at 0.8 W, while the incandescent sign is 40 W. 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:

	Full Capacity LED Lifetime (4.5 years)	Total LED Lifetime (9 years)
Energy Saved:	12,544 kWh	25,088 kWh
Pounds of CO ₂ Saved:	17,185	34,371
Tons of CO ₂ Saved:	7.8	15.6
Energy Cost Savings:	\$1,192	\$2383

To put things into a quantifiable perspective, the 9 year greenhouse gas savings are equivalent to the following:

- Annual GhG emissions from 3.1 passenger vehicles.
- CO₂ emissions from the electricity use of 1.9 single family homes for one year.
- Carbon sequestered annually by 3.3 acres of pine or fir forest.

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 contains no mercury and presents an alternative to the potential dangers associated with CFLs.

The use of energy efficient lighting, such as the Display Vision LED Exit Sign Luminaire, reduces electricity demand and, therefore, reduces 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 to be 40,000 hours.

The extremely long operating life of the Display Vision 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 compared the Display Vision LED Exit Sign with a standard 40-watt incandescent Exit Sign. The model details are as follows:

Model #	Watts/ Fixture	Fixture type	Life (hours)	Unit cost/ bulb	Color	CRI
Display Vision LED Exit Sign Luminaire	0.8	Exit Sign	>30,000	\$93	2,600 (min) - 7,000 (max)	80
Incandescent	40	Exit Sign	3,000	\$2.93	2,700	100

Green-Buildings computed the return on investment (ROI) from replacing a traditional Exit Signs with the Display Vision. Given that the Display Vision LEDs cost \$93 (70 euros) and an incandescent bulb costs an average of \$2.93 (EPA), and the assumption that exit signs operate 24 hours a day for 365 days a year, Green-Buildings calculated the following:

Cost Add for LEDs (over incandescent)	\$90.07
Average cost per kilowatt hour (kWh)	\$0.095
LED (0.8 W) – Annual Energy Cost	\$0.67
Incandescent (36 W) – Annual energy cost	\$29.96
Annual cost savings for LEDs	\$29.29
Simple Payback	3.1 years (excluding labor, maintenance, etc.)
Total Savings (assuming LED lifetime of 40,000 hours)	\$133.74
Return on Investment (assuming LED lifetime of 40,000 hours):	48%

Note that this estimate of \$133.74 total savings and a 48% return on investment is extremely conservative given that it excludes the costs of labor and maintenance and only assumes an LED lifetime of 40,000 hours (it can operate for more than twice as long, though at a reduced capacity).

CONCLUSION

Green Buildings believes that the Display Vision LED Exit Signs by Gessler meet three significant criteria used in green building initiatives:

- I. **Conserve energy and electricity**
- II. **Reduce GhG emissions and pollution**
- III. **Increase building durability**

Furthermore, use of the LED Spot LS1 is an effective choice when seeking to achieve certification under the LEED rating system, by potentially earning points in the area of Energy and Atmosphere. Finally, the use of the Display Vision should result in a positive return on investment (ROI) for owners and operators who are considering the benefits of LEDs in a new building.

LEED Scoring and Certification:

Use of LED lighting products, such as the Display Vision, may contribute materially to the Leadership in Energy and Environmental Design® (“LEED®”) green building certification process.

Accordingly, use of the Display Vision may provide measurable performance in the following LEED rating systems:

- **New Construction:** EA Prerequisite 2, EA Credit 1
- **Existing Buildings: Operations and Maintenance:** EA Prerequisite 2, EA Credit 1
- **Commerical Interiors:** EA Prerequisite 2, EA Credit 1.1
- **Core and Shell:** EA Prerequisite 2, EA Credit 1
- **Schools:** EA Prerequisite 2, EA Credit 1
- **Retail (Commercial Interiors):** EA Prerequisite 2, EA Credit 1.1
- **Retail (New Construction):** EA Prerequisite 2, EA Credit 1
- **Healthcare:** EA Prerequisite 2, EA Credit 1
- **Homes:** EA Credit 1
- **Neighborhood Development:** GIB Prerequisite 1, GIB Prerequisite 2, GIB Credit 1, GIB Credit 2

¹ 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.

² This calculator was developed by the U.S. EPA and U.S. DOE and is provided for estimating purposes only. Actual savings may vary. Annual costs exclude the initial purchase price. All costs, except initial cost, are discounted over the products' lifetime using a real discount rate of 4%. LED life cycle costs are based on 10 years of operation, which is the minimum lifetime of most available types of exit signs.