



Solar Outdoor Lighting, Inc.

A Guide to Solar Outdoor Lighting

The World Leader in Solar Lighting

SOL INC. - Providing the world with solar lighting solutions for over 14 years. With trouble-free lights operating in over 30 countries, SOL INC. is the MOST reliable and experienced solar lighting company in the world.

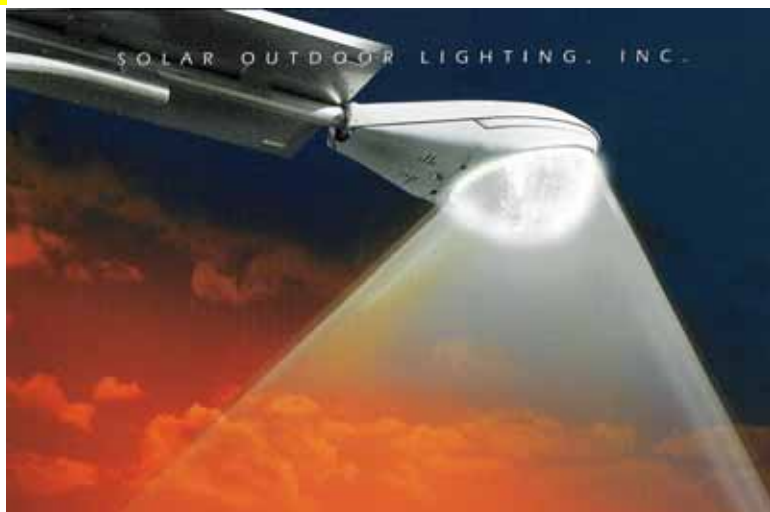
**Put Solar to work for you!
"Green Energy"
you can really use.**

SOLAR OUTDOOR LIGHTING, INC.

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SOLAR OUTDOOR LIGHTING, INC. (SOL)

WHO WE ARE

SOL is a privately owned company founded in 1990 headquartered in Palm City, FL (100 miles north of Miami). Our products are designed to meet or exceed the stringent South Florida building codes – the most demanding in the USA due to hurricanes. Since 1990, SOL has provided more than 30 million hours of reliable lighting at locations in 30 countries on 6 continents. Most recognizable customers include: all branches of the US Military, NASA (Cape Canaveral & Marshall Space Flight Center), US Department of Interior – NPS, USF&WS, BLM, BOR, USDA and the US Olympic Games in Atlanta in 1996.

SOL has entered into alliances with its suppliers, which include GE, Phillips, and BP Solar to supply components which meet SOL specifications. SOL has also worked intensively with the producer of its solar charge controller, the most critical component in any solar lighting system, to design an exclusive high quality device for use with its solar lights. SOL lights also use ballasts for its fluorescent lamps which are specifically modified to increase efficiency.

SOL products have been certified by Underwriters' Laboratory, and have undergone extensive testing at the National Renewable Energy Laboratory in Colorado, the Sandia National Laboratory in New Mexico, and the Florida Solar Energy Center. SOL products undergo the most rigorous and demanding production and life tests in the industry. SOL INC is currently undergoing ISO9001-2000 certification. SOL products are also listed by the U.S. Federal Government on its GSA schedule which is reserved for approved projects, with established prices, backed by vendor guarantees.

SOL insists that our solar lights perform like new for decades, and has instituted computerized life testing of its products to find any subtle but potentially crippling design flaws that do not show up in even the most thorough bench tests. SOL products are the most trouble free solar powered lights available.

The work of our Engineering and R&D departments has placed SOL at the forefront of solar lighting technology. Products are assembled in our factory production area. Quality control checks assure quality of the integrated component selection before the product is shipped. Our shipping department boxes the individual components to protect them for safe transport. All of our systems are shipped via freight companies on pallets to assure the safest transport possible.

Quality is the focus at SOL and we protect your purchase with the industry's strongest warranties.

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3210 S.W. 42ND AVENUE, PALM CITY, FL 34990**

WWW.SOLARLIGHTING.COM



Diversity of Customers

Since 1990, SOL INC has provided more than **30 million hours** of reliable lighting at locations in **30 countries** on **6 continents**. We have an extensive list of Federal government installations. Our customer base is broad and varied. Some of the more recognizable domestic customers are:

All Branches of the U.S. Federal Government

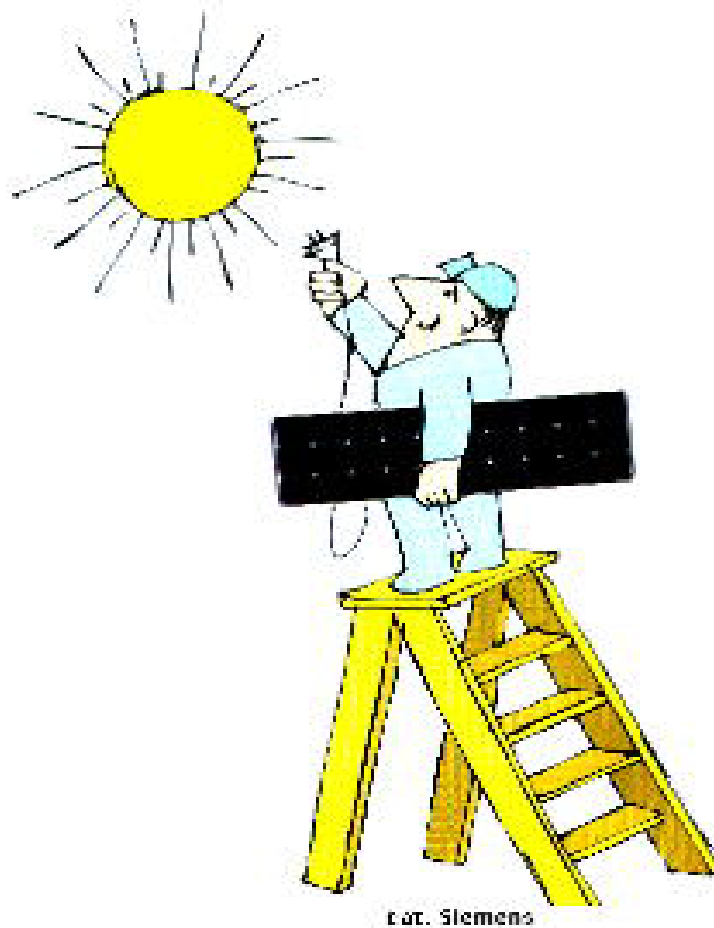
- ✓ US Forest Service – Seminole Ranger District, FL – *Security, Interior Restroom*
- ✓ US Park Service – Biscayne National Park, FL – *Interior Restroom*
- ✓ US Park Service – Gulf islands NS, FL – *Security*
- ✓ US Park Service – Everglades NP, FL – *Interior Restrooms*
- ✓ US Fish & Wildlife – Merritt Island Refuge, FL – *Boat Launch*
- ✓ EPA – Gulf Breeze, FL – *Boat Dock*
- ✓ US Navy – Jacksonville NAS – *Exercise Track*
- ✓ US Navy – NAWTC Orlando – *Flashing Traffic Beacons*
- ✓ US Navy – Belle Chase – *Area lighting*
- ✓ US Air Force – Canaveral AFS, FL – *Security, Launch Area*
- ✓ NASA – Kennedy Space Center, FL – *Security, Perimeter Fence*
- ✓ US Army - *Fort Hood, TX*
- ✓ US Army - *Fort Gillem, GA*
- ✓ Department of Defense – *The Pentagon, Washington, DC*
- ✓ US Marine Corps – *Camp Pendleton, CA*
- ✓ NASA – *Marshall Space Flight Center, AL*
- ✓ US Park Service – *Statue of Liberty, New York, NY*

City, County & State

- ✓ City of Baton Rouge – *Transit lighting*
- ✓ Red River Waterway Commission, LA - *Area Lighting*
- ✓ The Port Authority of NY & NJ – *Jamaica, NY*
- ✓ State of Wyoming Fish & Game (*several locations*)
- ✓ State of Kansas Parks & Recreation (*several locations*)
- ✓ State of Louisiana – Red River Waterway Commission – *Natchitoches, LA*
- ✓ State of Texas Parks & Wildlife – *Big Bend, TX*
- ✓ Mecklenberg County – DSS – *Charlotte, NC*
- ✓ City of Clarksville – *Clarksville, TN*
- ✓ City of Irving – *Campion Trail – Irving, TX*
- ✓ Sonora Desert Museum – *Pima County, AZ*
- ✓ St. James Parish Council – *Convent, LA*
- ✓ Okeechobee County – *Boat Dock Lighting*
- ✓ State of Florida – Office of Greenways & Trails – *Dock Lighting*
- ✓ Palm Beach County – Parks & Recreation – *Boat Ramp Lighting & Area Lighting*
- ✓ South Florida Water Management – West Palm Beach – *Area Lighting*
- ✓ City of Mesquite Parks & Recreation – *Mesquite, NV*
- ✓ Olathe Town Trail Lighting – *Olathe, CO*
- ✓ McClean County Parks & Recreation – *Hudson, IL*
- ✓ City of Reno Parks & Recreation – *Reno, NV*
- ✓ City of San Antonio New Territories Park – *San Antonio, TX*
- ✓ Staunton River State Park – *Scottsburg, VA*
- ✓ New York Dept. of Environmental Conservation – *Ticonderoga Park, NY*
- ✓ Zoological Society of San Diego – *San Diego, CA*

Commercial & Industrial

- ✓ Duke Energy – *Moss Landing Power, CA*
- ✓ Lockheed Martin – *Fort Worth, TX & Valencia, CA*
- ✓ I.E. Dupont Chemical – *Starke, FL*
- ✓ BP Chemical – *Decatur, AL*
- ✓ Zoological Society of San Diego – *San Diego, CA*
- ✓ Occidental Chemical Corporation – *Convent, LA*
- ✓ Walt Disney World – *Orlando, FL*
- ✓ Union Pacific Railroad – *Maringouin, LA*
- ✓ Cargill Plantation Foods – *Waco, TX*



Solar Lighting Basics

**The sun is a direct source of energy.
Using renewable energy technologies, we can convert that solar energy into electricity.**

Solar powered lighting is a relatively simple concept. In a basic way, the system operates like a bank account. Withdrawals from the battery to power the light source must be compensated for by commensurate deposits of energy from the solar panels. As long as the system is designed so deposits exceed withdrawals on an average daily basis, the battery remains charged and light source is reliably powered.

- The sun provides a direct source of energy to the solar panel.
- The battery is recharged during the day by direct-current (DC) electricity produced by the solar panel.
- The light source is powered by the battery each night.
- Electronic controls are used between the battery, light source and solar panels to protect the battery from overcharge and discharge, and to control the timing and operation of the light.

How Does Solar Power Work?

In principal, it's simple. A solar panel converts light to electricity. During daylight, even on cloudy days, this "solar generator" (solar panel) charges long-life batteries, which store the energy until needed. Thus, the energy of the sun is harnessed to product power.

In practice, of course, solar outdoor lighting is a little more complex. In addition to large capacity batteries and solar panels, the system also incorporates sophisticated proprietary charge regulators, which stop the flow of solar generated electricity when the batteries are fully charged, and then resume charging when more power is needed.

The key to solar outdoor lighting is the solar power pack, which houses photovoltaic solar panels, a proprietary microprocessor control system and batteries. It is attached to specifically designed lights having super reflectivity and high energy ballasts.

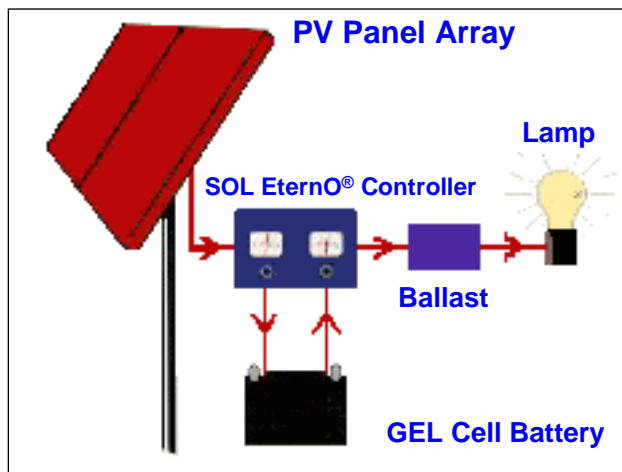
How Dependable is Solar Powered Lighting?

Very dependable. For one thing, it's never too cloudy to collect solar energy. In fact, if there's enough sunlight to see reasonably well, there's enough to collect and store energy – even if it's raining. The SOL system can store enough energy to operate five or more consecutive days without sun.

What's more, solar powered outdoor lighting is virtually maintenance free, since the batteries require no water or other regular service. Unlike some systems that are assembled from "off the shelf" parts not designed for solar service, SOL systems are assembled from components specifically designed for solar. The solar panel itself is backed by a 20 year warranty – the strongest in the industry – and with our new CCFL bulb, the entire SOL system is guaranteed for five (5) years.

What Advantages Does Solar Power Have?

SOL systems provide unmatched convenience, reliability and efficiency. Each SOL light has its own "power plant" – so you don't depend on far away generating stations, transmission lines, substations, switches and transformers. Since each solar electric light operates autonomously, every light is programmed through its own control system, to turn on and off as needed. And, in the unlikely event that an individual solar outdoor light fails, no other lights are affected. Solar systems outperform traditional wired systems hands-down. In a solar installation, initial costs are incurred for the self-contained energy collection and storage system. But after that, the energy itself is free! When compared to the traditional system's cost for cable, trenching, metering equipment and construction – plus electric bills continuing forever – the solar system's advantages can be dramatic and immediate.



Benefits of Solar Powered Lighting

- No trenching, no metering, no wiring
- Cost savings from day one due to ease of installation
- Lighting works well to deter crime
- People feel safer when areas are illuminated
- Can be installed in the most remote locations
- No cost for daily operation
- Free energy once installed – no electric bills.
- Not connected to grid power – will work even when electric power is out
- Will turn on even after cloudy days
- Reach beyond commercial power lines
- Immune to black outs

Benefits of SOL (SOLAR OUTDOOR LIGHTING)

- CCFL Bulb – provides 30,000 hours with 5 year warranty
- Max-Lite Reflector in fixtures is specially designed to maximize light output
- No maintenance gel cell batteries
- Batteries located in vented battery box at top of pole
 - ✓ Avoids vandalism
 - ✓ Shields batteries from sun's heat, provides longer life
- Only commercial-grade, high quality materials and components are used
- Weather resistant plug-in components for quick and easy interconnection
- Grade "A" aluminum allow for maximum resistance to corrosion
- Heavy gauge aluminum backing protects bottom of solar panel and eliminates vandalism
- Complete turn-key packages available – equipment, poles and installation
- Independent testing of light levels (photometrics)
- Complete in-house design and engineering facilities
- Toll free technical support
- Orders can also be placed using your authorized Visa or MasterCard
- Meets DOT specifications and wind load requirements
- Strongest warranty in industry - No outstanding claims
- Battery Backup - SOL systems work even after multiple days of bad weather
- Systems are designed specifically for your particular location and needs
- Components specifically designed for SOL deliver highest light output per watt of solar panel

How to Design a Solar System

Based on particular information, a series of calculations are run that will determine the appropriate size for the solar panel array. This process is called “sizing” a solar system. Only after a system has been “sized” can the specifics of the system and price be determined.

You Determine:

- **Geographic Location**
 - ✓ Different geographic locations have different solar insolation which determines the size of the required solar panels
- **The Application**
 - ✓ Different applications need different amounts of light
- **Preferred Bulb**
 - ✓ Cold Cathode (CCF), Compact Fluorescent (CF) or Low Pressure Sodium (LPS)
- **Run Time (Duration of the Load)**
 - ✓ Number of hours you need the lights to be on each night. Examples: Dusk to Dawn, 12 hours, 6 hours, split time controllers (4 hours after dusk & 2 hours before dawn), etc.
- **Fixture Model**
 - ✓ We have a variety of standard fixtures available.
- **Solar Panel -- Flat or 45 Degree Angle**
 - ✓ Because the solar panels on the SL systems are flat, the SL has a lower EPA and can withstand higher wind velocity. However, PM models are generally more cost effective because they take better advantage of the sun's location.

We Determine:

- **Sun Hours based on your location**
 - ✓ Different geographic locations have different solar insolation (sun hour factor) which will determine the size of the solar panel(s) needed.
- **The Bulb Size**
 - ✓ Based on the amount of light you need for your particular application or specific footcandle requirement on the ground
- **The Size of the Required Solar Panels**
 - ✓ Solar panels typically come in a variety of sizes. We always calculate at least a 10% reserve and round up to the next higher panel size.
- **The Model – SL or PM**
 - ✓ Based on your particular parameters, we can recommend which system will be more cost effective.
- **The Size and Number of Batteries**
 - ✓ Our systems are sized to work after 5 dark or cloudy days
 - ✓ Additional battery back-up can be added if needed.
 - ✓ In addition, we build in a 20% safety factor.
- **The most suitable Reflector and Refractor**
 - ✓ Drop lens or cut off lens are available.
- **Optimal pole spacing and placement to match your specified light requirements.**

Performance of Solar Lighting Systems

The performance of solar lighting systems is measured in foot candles on the ground.

These are influenced by:

- Type of light bulb
- Power of light bulb
- Reflector
- Refractor or Lens
- Pole Height
- Spacing of Poles

How to Scrutinize Projects for Viability

- **Common Sense - Avoid Shaded Areas**

Solar panels need the sun. In heavily shaded areas, solar arrays can be mounted remotely to gain access to sun. Be sure there is a **clear southern sun exposure**.

- **Check any lighting level requirements**
- **Evaluate Required Operation Time(s)**

The longer a light needs to stay on, the larger the system, and subsequently the more expensive it is.

- **Determine Reliability/Security Issues**

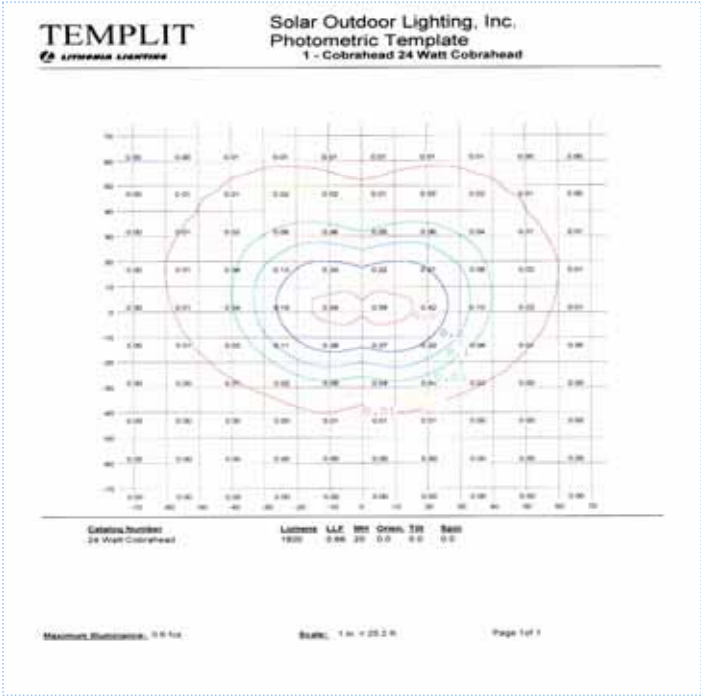
When security lighting is critical, full dusk to dawn is available. Systems with different run times can be used because they are stand-alone systems.

Consider cost of running wire from traditional power grid and cost of sidewalk or other paving to be torn up, tunneled under and replaced.

Light Pattern – SOL Provides Computer Printout

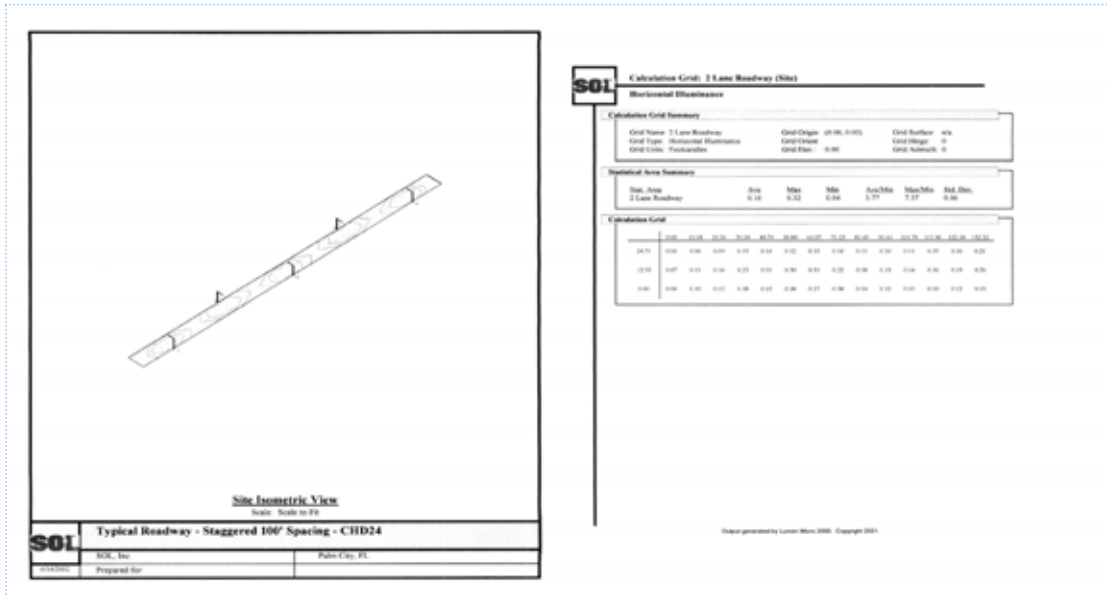
Footprint shows:

- Bulb
- Fixture type
- Mounting Height
- Light Pattern
- Light Intensity



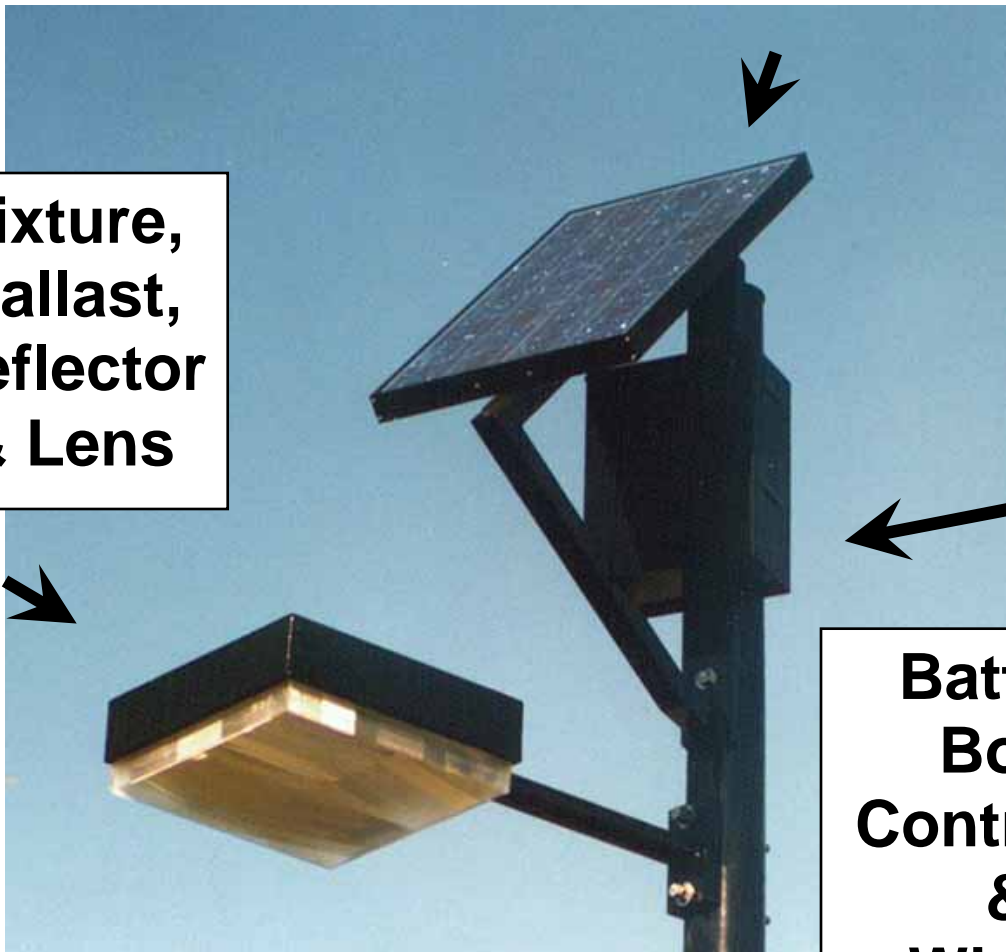
Photometrics Provide Light Locations

- SOL provides lighting layout showing:
 - ✓ Area to be illuminated
 - ✓ Placement of lights at point of installation



Solar Array

**Fixture,
Ballast,
Reflector
& Lens**



**Battery
Box,
Controller
&
Wiring
Harness**

Solar Light Components

CCFL LAMP

30,000 HOUR LIFE

A major breakthrough in lamp efficiency
and long lamp life.

SOL introduces the CCFL (Cold Cathode Fluorescent) – a major breakthrough in lamp efficiency and long lamp life. This provides significant cost savings relating to re-lamping costs. In addition, the CCFL lights last over twice as long as regular fluorescents, providing an important measure of safety and security.

Background

For 14 years SOL has been at the forefront of technology in solar lighting. The product of three years R&D effort between SOL and the lamp manufacturer has produced a product superior to the compact fluorescent. For many years the compact fluorescent (CF) has been a good lamp for solar lighting because it is energy efficient and has a high quality light output. Now CCFL goes beyond the traditional CF. In fact, CCFL actually produces more lumens per watt than CF. The CCFL will outperform and outlast any PLT, PLS or PLL compact fluorescent lamp.

CCFL is a scientifically advanced evolution of 75 year old neon lamp technology. The physics and chemical operating principles are unchanged, but new rare phosphors and gas mixes, unavailable a generation ago, have led to luminosity efficiencies far superior to existing compact fluorescent lamps.

CCFL vs. CF

Lighting efficacy (lumens/watt) of incandescent bulbs is around 10 l/w. White LED's are currently at 30 l/w. Compact fluorescents reach 60 l/w, but our advanced CCFL lamps are emitting over 80 l/w.

In solar lighting applications, a compact fluorescent (CF) lamp has a 2.5 year life. The CCFL, as stated by the lamp manufacturer, has a 7 to 10 year life. SOL provides a warranty of five (5) years. By using CCFL costs associated with re-lamping are more than cut in half.

Certification

To meet engineering standards, SOL has sent their CCFL lamps and fixtures to independent and certified IES (Illuminating Engineering Society) testing labs. This is the assurance that the light levels produced are accurate.

Reflectors

The reflectors used in our luminaries have been designed by lighting specialists specifically for our CCFL lamp geometry. The resulting optical assemblies assure maximum light projection in Roadway Lighting Photometric Tests.

Warranty

CCFL lumen half-life maintenance is warranted at five (5) years. Compact fluorescents carry no warranty, but "average life" is given as two (2) years. This means that after two years, a compact fluorescent lamp will produce only 50% of its initial luminosity. The superior efficacy, lumen maintenance and long life of CCFL make is a positive choice in solar lighting applications.

The CCFL has made it possible to offer a five (5) years warranty on the lamp and the entire solar powered system – which is the longest warranty in the industry.

Cold Cathode Fluorescent Lamps

A SOL Exclusive!!



Highly Polished Aluminum Reflector

A reflector is an important part of the fixture.

We have also spent a considerable amount of time perfecting reflectors for our fixtures that will provide the greatest light output for both our compact fluorescent and CCFL bulbs.



TYPICAL APPLICATIONS



Pathway Lighting



Trail Lighting



Boat Launch Lighting





Playground lighting, special fixtures, gazebo & vault toilet





SOL INC. Worry-Free Performance Warranty

(May 2004)

SOL INC. offers the longest warranties in the industry. SOL products are guaranteed to work as specified for five (5) years from the date the product is shipped from SOL's factory. SOL will provide a replacement part for any component that fails during the five years. The warranty does not cover any lamps, except SOL INC.'s Cold Cathode Fluorescent Lamps (see below). Batteries have a limited warranty (see below).

In addition, SOL offers the following **Extended Component Warranties:**

(The original 5 year warranty period is included in these)

<u>Item</u>	<u>Warranty Period</u>
Solar Panel (40 watts and over)	20 Years
Solar Panel (30 watts and under)	10 Years
Aluminum Panel Backing	20 Years
Aluminum Arm	20 Years
Aluminum Bracket	20 Years
Aluminum Pole	20 Years
Battery Box	20 Years
Luminaire	10 Years
Lens	10 Years
SOL Eterno[®] Reflector	10 Years
SOL Eterno [®] Battery – Limited*	5 Years
SOL Eterno [®] Controller	5 Years
SOL Eterno [®] Ballast	5 Years
SOL Eterno [®] CCF Lamps	5 Years

* The limited warranty for batteries means that after 1 year SOL will cover 80% of the original cost, after 2 years 60% and so on.

During the additional Warranty Period SOL will provide the replacement for any component that fails F.O.B. SOL factory. For third party products (vehicles, refrigerators, radios, television sets, pumps, water treatment systems, etc.) the original manufacturer's warranties apply.

Warranties are subject to Purchaser using the equipment in the manner and for the purpose for which it was intended. The product must be installed properly, with no unauthorized adjustments. The Purchaser shall select installation locations with full exposure to the sun. The solar panels must be free from shading. Damage caused by lightning strikes is not covered. The use of electrical components not supplied by SOL voids any of the above warranties.

SOL reserves the right to substitute like or better components in its equipment to improve product to perform equally or better under the same guarantees.



Contact Information:

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