Sol Inc. – Providing the world with solar lighting solutions since 1990. With tens of thousands of trouble-free commercial grade lights operating on 6 continents in over 60 countries, Sol Inc. is the MOST reliable and experienced solar lighting company in the world.

A Guide to Solar Outdoor Lighting

Put Solar to work for you!

“Green Energy” you can really use.
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WHO WE ARE

Providing the world with solar lighting solutions since 1990. With thousands of trouble-free commercial grade lights operating on 6 continents in over 60 countries, Sol Inc. is the MOST reliable and experienced solar lighting company in the world.

Company Overview

SOL INC. (formerly Solar Outdoor Lighting, Inc.) is a privately owned company founded in 1990 and headquartered in Palm City, FL (100 miles north of Miami). We are the world leader for solar powered lights for streets, parking lots, pathways, transit shelters, billboards and signs and other lighting applications that benefit from being independent from the electric grid. Reliability, security and safety, as well as minimal maintenance are the greatest benefits of SOL solar lighting.

Our systems provide a safer and more secure environment, extending hours for learning, medical treatment, commercial, advertising and social activities, and improve agricultural production and the general well-being of people throughout the world.

SOL’s Design and Engineering Team

At SOL INC., we can take your project from concept to reality. We have assembled a design and engineering team who understand design controls. These include budgetary costing, fabrication, verification and validation of design, as well as manufacturability. We are the leaders in light efficiency (maximum lumens per watt).

Our engineering team encompasses nearly 150 years collective experience in mechanical and electrical engineering, digital electronics, system design, AutoCad, solid models and detailed drawing and product development.

With the ability to work with any AutoCad compatible drawing, we can move from design concept to finished designs including layouts and tolerance valuations. We can overlay illuminance data with luminaire placement and photometric specific information.

World Wide Installations

Since 1990, SOL has provided more than 30 million hours of reliable lighting at locations in over 50 countries on 6 continents.

Our most recognizable customers in the United States include: all branches of the US Military, NASA (Cape Canaveral & Marshall Space Flight Center), U.S. Department of Interior which includes the National Park Service (Statue of Liberty and Arizona Memorial), U.S. Fish & Wildlife Service, Bureau of Land Management, Corps of Engineers, as well as many other federal agencies and the US Olympic Games in Atlanta in 1996. In fact, SOL is the largest supplier of solar lighting solutions to the US Government.

Outside of the United States, SOL’s solar powered lights have been installed at presidential palaces, foreign universities, publicly traded multinational corporations, military installations, and many, many roadways.
Alliances

SOL has entered into alliances with its well known, established suppliers to supply components which meet SOL’s stringent specifications. SOL has also developed its own proprietary components designed to maximize the efficiency and longevity of our systems.

Independent Lab Recognition

SOL products 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. Independent lab and field tests are regularly performed on our systems. SOL products undergo the most rigorous and demanding production and life tests in the industry.

Certifications

The ISO9001-2000 certification which was received in early 2005 confirms our consistently high quality standards. SOL products are listed by the U.S. Federal Government on its GSA schedule which is reserved for approved projects, with established prices, backed by vendor guarantees. In addition, our products are NEC and ASHTO compliant.

Our Hurricane Series products are designed and certified to meet or exceed the stringent South Florida building codes – the most demanding in the USA due to hurricanes.

Quality Policy

We at Sol Inc. are committed to provide our customers with innovative solar products that exceed their expectation of quality and value. Sol Inc. management team is committed to provide value to our customers through continuous improvement and the identification and fulfillment of regulatory standards. Through our stringent training, engineering, manufacturing, and inspection procedures, we are able to delivery products on-time that perform well and endure the test of time.

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.

SOL insists that our solar lights perform like new for decades. We have instituted computerized life testing of our 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.

Customer Satisfaction

With thousands of lights installed world wide and in service for years, SOL does not have a single unsatisfied warranty claim outstanding. SOL has a solid record of repeat orders from satisfied customers who have experience with SOL products.

The primary focus of our ISO 9001:2000 Quality Management System is customer satisfaction. Our certification as ISO 9001:2000 compliant is testament to our commitment to product quality and customer service.
Since 1990, SOL INC has provided more than 30 million hours of reliable lighting at locations in over 60 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 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 – NAVSAC Orlando – Flashing Traffic Beacons
- US Navy – Belle Chase – Area lighting
- 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 Granjeno – Granjeno, TX
- City of Irving – Campion Trail – Irving, TX
- Macon County Water Authority – Macon, GA
- Sonora Desert Museum – Pima County, AZ
- St. James Parish Council – Convent, LA
- City of Los Angeles – Venice, CA
- City of Victorville – Victorville, CA
- Monterey Bay Aquarium – Monterey, CA
- 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 – Scottsbug, VA
- New York Dept. of Environmental Conservation – Ticonderoga Park, NY

**Commercial & Industrial**
- Lockheed Martin – Fort Worth, TX & Valencia, CA
- I.E. Dupont Chemical – Starke, FL
- Volvo Trucks – Dublin, VA
- BP Chemical – Decatur, AL
- Amtrak – New York, NY
- Albert Einstein College of Medicine – Bronx, NY
- Occidental Chemical Corporation – Convent, LA
- Walt Disney World – Orlando, FL
- Union Pacific Railroad – Maringouin, LA
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 is typically designed with 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 to 25 year warranty – the strongest in the industry – and with our new LED light source offering, the LED’s will last at least 100,000 hours (or 22.5 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)

- LED technology – provides 100,000 hours
- 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 to allow for maximum resistance to corrosion
- Complete turn-key packages available.
- Independent test lab. Photometrics and .ies files available.
- Toll free telephone 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
- Power Management Design measures battery and ensures the light will virtually never go out. (LED only)
- Systems are designed specifically for your particular location and needs
- Components specifically designed 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 correctly “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

- **Light Level Requirement (if any):**
  - Different light level requirements may be required by city or county codes and will depend upon the pedestrian or vehicle usage of the project.

- **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, or one of our split time controllers (6/2 or 4/2 – 6 or 4 hours after dusk & 2 hours before dawn), etc.

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 Light Output**
  - 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 a reserve and round up to the next higher panel size.

- **The Model – Flat Solar Panel Array or Tilted Solar Panel Array**
  - Based on your particular parameters, we can recommend which system will be more cost effective.

- **The Size and Number of Batteries**
  - Our systems are typically sized with 5 days battery back-up.
  - Our Power Management feature monitors battery voltage and adjusts accordingly (LED models only)
  - Additional battery back-up can be added if needed.

- **The most suitable Fixture style**
  - Cobrahead or Shoebox -- Drop lens or cut off lens are available.

- **Optimal mounting height, pole spacing and placement to match your specified light requirements.**
The performance of solar lighting systems is measured in foot candles or lux on the ground.

These are influenced by:

- Type of light source
- 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**
  
  If security lighting is critical, our full dusk to dawn is calculated on your longest night in December.
Light Pattern – SOL Provides Computer Printout

Footprint shows:

- LED output
- Fixture type
- Mounting Height
- Light Pattern
- Light Intensity

Photometrics Provide Light Pole Locations

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

- Solar Array
- Fixture, Ballast, Reflector & Lens
- Battery Box, Controller & Wiring Harness
SOL’S OFFERING

SOL’s LED Light Source

- Solid State Ultra Flat Strip LED with digital driver
- Group of 48 small LED’s per strip.
- 192 LED’s per Quad -- Current configurations – 2 Quad (384 LED’s) and 3 Quad (576 LED’s)
- Light color temperature: 5100 K
- CRI Index 80
- Life Expectancy: over 100,000 hours
- Painted reflector gets more light to the target
- IDA Dark Sky Compliant
- Low LED junction temperature for long life
- Life Expectancy: 100,000 hours
- Optimal Operating Temperature: -40F to 110 F
- LED Quad produces rectangular light pattern
- High tech digital driver for consistent performance
- Input Voltage Range: 8 to 50 volts DC

SOL’s LED Specifications

SOL’s Intelligent Lighting Systems

SOL’s intelligent lighting systems will measure battery levels at the start of every night to optimize LED performance. In periods of extended bad weather, the light will dim to limit possible low voltage disconnect. System limits the discharge to 70% of usable total- this prolongs battery life. Rates of charge set not to exceed best rate for life of battery.

SOL’s LED systems use an intelligent light driver. LEDs require a regulated current to control both there brightness and life. SOLs PMD80 provides this constant current to the LED’s and safeguards against lamp failure due to spikes in power source and shorts.

SOL’s intelligent light driver also provides dimming features that in times of prolonged inclement weather will reduce the power to the lights to save the battery and extend the working time of the light without any noticeable difference in the output.
The world’s most efficient commercially available LED light source.

SOL’S Super-Efficient State-of-the-Art LED Light Source

Lighting Applications:
• Street & roadway
• Parking lots
• Security perimeter
• Gates, entrances, boat ramps

Benefits of Solar:
• Ultra safe
• Immune to power outages
• Vandal resistant
• Easy installation – no trenching, no wiring
• Minimal maintenance
• Stand alone, not connected to grid
• No transformers, no meters
• Easy installation
• Renewable energy – no electric bills
• Significantly reduced energy & maintenance costs – reduced greenhouse gas emissions

Unique LED performance characteristics:
• Super efficient, bright, white light 5,000 K, state-of-the-art LED light source
• The most efficient and aesthetically pleasing white light source in this wattage range.
• Excellent color rendering optimizes human visual acuity and contrast, offering best in class night-time vision.
• “Instant-on” – no warm up or cold start issues
• Unlike conventional lights, no risk of hazardous disposal – CF, CCFL, LPS and HPS contain mercury.
• IDA Approved Dark Sky compliant. Low light pollution outside of light distribution field.
• SOL’s Patent Pending LED directed light provides uniform light pattern with concentrated light where it is needed with no light pollution.
• Estimated 100,000 hours LED life at 12 hours per day would be 22.8 years between replacements! (Compare this to 1 to 3 years for other lamps)

Features:
• Our tilted panel series (TPM or PMV) Series features a totally integrated top of pole mounted Solar Power Module which can be mounted separately from the luminaire. This allows for the solar panel(s) to be mounted at the optimum angle to capture the sun’s energy for a particular geographic location
• SOL’s intelligent lighting systems will measure battery levels at the start of every night to optimize LED performance. In periods of extended bad weather, the light will dim to limit possible low voltage disconnect.
• Entire structural assembly is specifically engineered for rugged environment and usage.
• Sturdy corrosive resistant aluminum and stainless steel hardware throughout.
• Maintenance free gel batteries.
• Standard battery back-up of (5) days in case of inclement weather.
• Standard model includes a Cobrahead fixture
• Shaded by the solar panels, the rugged, vented aluminum battery box holds battery(s), controller and all interconnects.
• TPM system mounts at top of standard pole with tenon – square, round, fiberglass, steel, aluminum or concrete.
• PMV system mounts on side of a standard pole.
The world’s most efficient commercially available LED light source.

SOL’S Super-Efficient State-of-the-Art LED Light Source

SOL’s Unique LED Performance Characteristics:

- Super efficient, bright, white light 5000 K, state of the art LED light source
- Most efficient white light source in its wattage range
- Excellent color rendering optimizes human visual acuity and contrast, offering best in class night-time (scotopic) vision.
- IDA Dark Sky compliant. Fixtures maximizes light utilization, providing a uniform light pattern with concentrated light where it is needed with low light pollution outside of light distribution field. No skyward pollution
- No risk of hazardous disposal – unlike CF, CCFL, LPS and HPS which contain mercury.
- Estimated 100,000 hours LED life at 12 hours per day would be 22.8 years between replacement (compare this to 1 to 3 years for other lamps).
- “Instant-on” – no warm up or cold start issues. Starting and re-igniting period: 0.001 minute
- Significantly less energy and maintenance costs = reduced greenhouse gas emissions.
- Die cast corrosion resistant aluminum cobrahead style fixture
- Fixture enclosure is water tight, sealed, dust and insect free.
TYPICAL APPLICATIONS

Boat Launch Lighting
TYPICAL APPLICATIONS

Park Lighting
TYPICAL APPLICATIONS

Gazebo and Small Shelter Lighting
TYPICAL APPLICATIONS

Parking Lot Lighting
TYPICAL APPLICATIONS

Greenway Path & Trail
TYPICAL APPLICATIONS

Area & Security
TYPICAL APPLICATIONS

Remote Security or Intersections
TYPICAL APPLICATIONS

Roadway
TYPICAL APPLICATIONS

Top of Pole Area & Security
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)

<table>
<thead>
<tr>
<th>Item</th>
<th>Warranty Period</th>
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<tbody>
<tr>
<td>Solar Panel (40 watts and over) *</td>
<td>20 to 25 Years</td>
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<tr>
<td>Solar Panel (30 watts and under)</td>
<td>10 Years</td>
</tr>
<tr>
<td>Aluminum Panel Backing</td>
<td>20 Years</td>
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<tr>
<td>Aluminum Arm</td>
<td>20 Years</td>
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<tr>
<td>Aluminum Bracket</td>
<td>20 Years</td>
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<tr>
<td>Aluminum Pole</td>
<td>20 Years</td>
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<tr>
<td>Battery Box</td>
<td>20 Years</td>
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<tr>
<td>Luminaire</td>
<td>10 Years</td>
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<tr>
<td>Lens</td>
<td>10 Years</td>
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<tr>
<td>SOL EternO® Reflector</td>
<td>10 Years</td>
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<tr>
<td>SOL EternO® Battery – Limited **</td>
<td>5 Years</td>
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<tr>
<td>SOL EternO® Controller</td>
<td>5 Years</td>
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<tr>
<td>SOL EternO® Ballast</td>
<td>5 Years</td>
</tr>
<tr>
<td>SOL EternO® CCFL &amp; LED Lamps</td>
<td>5 Years</td>
</tr>
</tbody>
</table>

* Module Warranty: 25-year limited warranty of 80% power output; 12-year limited warranty of 90% power output; 5-year limited warranty of materials and workmanship.

** 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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