# Using solar power to improve port security

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A confluence of developments in technology has created a perfect opportunity for solar-powered security systems to address both green initiatives and important ISPS Code-driven requirements for enhanced security at modern ports. Thanks to innovations in solar power technology, compact and efficient 'solar engines' can be combined with small, low-powered surveillance technology to create a powerful new addition to port security infrastructure.

## The special security needs of ports

Every business faces security challenges, but the challenges facing seaports today are uniquely complex and ever-changing. Ports handle a broad set of responsibilities including the safeguarding of shipping containers and property; detection and prevention of crime, smuggling and illegal importation; safeguarding lives; controlling human access and dealing with the new and unpredictable threat of terrorism. Modern seaports are now front and centre in the war on terror, but the large size of most ports creates an extensive and sometimes indistinct perimeter that must be secured and monitored. As a result of the ISPS Code (International Ship and Port Security) requirements of July 2004, ports face persistent demands for better control of access and surveillance.

## Where is solar security most effective?

The opportunities for solar security are considerable: as a standalone instrument, a solar-powered security camera can now be installed anywhere it's needed, regardless of location, ease of access, or proximity to a source of grid power. Locations such as bridges, cranes, gantries, storage tanks, mechanical infrastructure, hazardous environments, and remote or rough terrain are just some of the sites that make strong candidates for a solar solution.

## The many sdvantages of solar

Solar is a 'green' technology and brings with it an extensive list of soft and hard benefits.

### Green

As its sole power source, solar uses the abundant resource of free, renewable sunlight. Without a reliance on grid power, solar-powered solutions don't contribute to greenhouse gases (GHG) and climate change. For organisations that support a commitment to the environment, the selection of green solar technology can illustrate an ongoing demonstration of that principle.



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### Demonstrated cost savings

Although the ISPS Code recommends security enhancements at modern ports, funding for the upgrades may be restricted or slow to materialise. The industry has generally accepted that to meet the two-pronged reality of tighter security with limited funds, a rollout of automated sensors is a necessary direction. An installation of solar-powered sensors offers considerable cost-saving advantages that can play a key role in addressing this financial challenge.

The first advantage is the elimination of typically large upfront construction charges associated with trenching, cabling or extensive wiring; the elimination of which also offers the benefit of easy, faster installation. The second advantage is the elimination of ongoing costs associated with grid power, no longer necessary because the system draws its energy entirely from the sun. With reduced installation and operating costs, a solar solution makes good financial sense.

### Have sun, will travel

Green technology means freedom – the ability for solar security arrangements to be portable and responsive to changing circumstances. Freed from the need for a power or data cable connection, solar-security equipment is easy to install, and when necessary, easy to move or reposition. The placement of solar security systems can be fine-tuned to optimise the visual field of video cameras, improve radio connectivity, eliminate blind spots, or adjust the illumination spread of LED lights without having to re-route AC power feeds. In locations where the optimal spot for surveillance may be impractical or impossible for a wired system due to a lack of grid access, the advantages of a versatile solar-powered system are clear.

Additionally, the portable nature of a solar security system makes it suitable for reactive deployment as well as prevention. If temporary construction is planned, or a breach or security 'event' occurs, the solar arrangement is capable of being immediately redeployed to wherever it's needed most. Another opportunity made possible by the portable nature of a solar set up is the ability to place the technology on buoys or floating non-powered platforms, effectively extending the virtual port security perimeter off land and out into the water. As an extension of its portable nature, solar security equipment can even be fitted to moving structures; as long as the unit has access to sunlight, it will continue to operate, even from the roof of a moving vehicle.

### Reliability

Solar security systems can produce reliable, maintenance-free operation for years due to the nature of their design, construction and underlying principles of operation. This reliability has been proven on a global scale through real-world applications of solar energy, lighting and security systems. A key advantage to solar is that it is essentially uninterruptible. It is unaffected by loss of grid power, whether caused by stormy weather or deliberate severance by potential intruders. Solid-state components, proven predictable battery technology and modern controller fabrication and quality control all contribute to security-grade reliability.

### Stealth

Solar security has a relatively small form factor, allowing a system to be installed in an environmentally unobtrusive way without disruption to the area. It is even possible to conceal the system within its environment to camouflage it from the casual observer. With no power leads or cabling to indicate its presence, and the ability to be installed just about anywhere, a solar security system can remain undetected as it monitors an area for potential hazards or intrusions.



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## Solar security applications

In any solar security system, the solar engine is the power backbone upon which a spectrum of services can be enabled. To accommodate an interface with most third-party devices, a solar engine can be modified to provide either AC or DC output. Thanks to improvements in energy efficiency, many third-party devices now require very little power to operate, making them the perfect partners for a solar-powered system. For maximum connectivity, the explosion in popularity of wireless technology over the past decade has also resulted in a multitude of wireless options including wireless broadband, Wi-Fi, VHF-UHF, cellular, and packet data. And of course, the massive adoption of the Internet has increased the availability of Ethernet and TCP/IP-based devices, providing an expanding range of tools that can be easily integrated into existing port data networks. This provides the added benefit of centralized control for efficient detection and response coordination.

The common topology implemented is point-to-multipoint, although a mesh arrangement offers an advantage; it could permit solar security systems serving perimeter areas that are radio-blocked from communication with central control to relay their information through adjacent systems back to central control.

While the number of parameters that sensors could measure and monitor seems unlimited, some of the most common security services available for combination with solar engines include:

- Low-voltage wireless video and photo surveillance with DVR (digital video recording)
- Area security lighting for parking, pathways or potential entry points using energy efficient ultra-bright LEDs. Lighting works very well in improving the effectiveness of a perimeter fence

• All forms of alarms including motion sensors, infrared, switched, and vibration-sensing cable embedded in chain link fences

• Remote gate control

• Access control devices (card readers, keyless entries)

• Emergency phone/callbox facilities to report intrusions, emergencies, and routine check-in during patrols

• Explosive, radioactive or biohazard monitoring sensors

## Installed equipment

Although a solar security system can be mounted on a building, fence, or even a vehicle, in many cases it's mounted on a pole for maximum flexibility. A typical implementation of a pole-mounted solar security system includes three parts; the solar engine itself, the security appliance(s), and the mounting structure.

The solar engine can either be modular or a combination of parts. The essential components are the solar panels, rechargeable batteries and an intelligent controller that monitors and balances the incoming energy from the panels, the charging requirements of the batteries, and the load presented by the security appliances. If the security appliances are AC powered, an inverter to convert the DC output of the solar engine will also be present. Solar panel wattage and battery amp-hour capacity must be sized to the load of the designed application and environmental factors, such as the latitude and the amount of insolation (available sunlight) at that location. Devices that are 'on' for extended periods of time such as an LED floodlight will require greater battery capacity than a device such as an alarm that monitors with a small quiescent current and activates only upon detection of a state change such as an intruder tripping a sensor.

Each system will also be designed for an amount of 'autonomy' – the number of days the system can continue normal operation without charging from sunlight. With these many configurable features, a solar-based security system can be optimised for maximum operation in any environment.

## Summary

By extending coverage to areas that were previously too remote, costly or difficult to cover, solar-powered port security and surveillance systems can play a key role in addressing the need for tight, contiguous port perimeter control. While
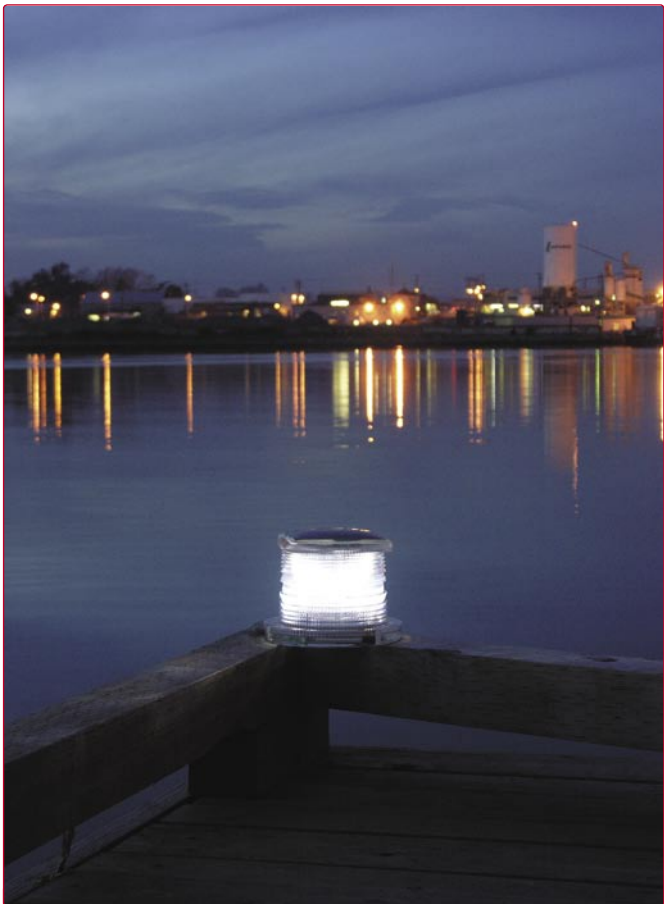


Other applications include area security lighting for parking, pathways or potential entry points using energy efficient ultra-bright LEDs.

simultaneously fulfilling requirements for green initiatives that reduce grid power dependency and eliminate greenhouse gases, solar security fulfils its double role by also offering an advanced level of customisation and adaptability.

Whether deployed in an environment where counterterrorism is the main concern, or in a location where the competitive global market for port services dictates increased security as a vital component to economic success, solar technology is a powerful enabler of the transformation of security into a coordinated and comprehensive part of daily operations.

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