

NOVEMBER 2016

SMART CITIES TAKE OVER

Choose your
interactive
solar system

GAIN CONTROL

PLAN AHEAD STRUCTURE YOUR UPGRADE THE SMART WAY

- Solar Lighting for Residential
- Parks + Recreation: 2017 Ahead
- Auto Dealerships Join Retrofit
- NASA: LED Cures Insomnia
- LED Lights Provide Campus Safety



PLAN AHEAD, STRUCTURE YOUR UPGRADE THE SMART WAY

Over the years we have seen LED lighting opportunities change. In the 1990's we were given the fluorescent system. In the recent 2000's we saw HID systems emerge. As LED lighting has now taken the market, the payback on those systems (the time it takes to payback their initial costs in energy savings) are beginning to approach one or even two year averages.

Even with these valuable considerations there are several ways to maximize your investment by upgrading to ClearWorld's full suite system to speed up the payback while realizing the greater benefit and making a positive contribution to our environment.

Let's take a look at it from an overall market perspective: Over the last 3.5 years the LED lighting market has grown substantially in the range of 2% to over 22% saturation rate and growth. As part of this increase, we too at ClearWorld are seeing positive growth spurts for Solar, LED and battery storage.

More importantly, with this game changing technology, it's evident that the battery storage component will play a vital role for resiliency, smart grid control and smart city services for a long time to come.

Over the last decade we have seen decreases in the solar energy market to over 60%. As this market continues to mature and rapid technological developments occur, the solar photovoltaic (PV) industry and available 30% ITC 48 investment tax credit is helping to bring the solar PV paybacks down near the five year mark.

In addition to this federal tax credit, there are available state rebates and incentives that make it even more attractive.

Furthermore, since we use a DC/DC system with no driver, it not only saves costs, but provides efficiency and reduces maintenance by not having an inverter. By seeing these system reductions, owners should qualify under the dual use section of the ITC Tax Code since it is not drawing more than 25% from the electrical grid if any. ClearWorld's approach to using DC power saves an additional 25-30% in energy consumption making the clear choice.

By upgrading to ClearWorld's advanced technologies, you can upgrade to a system that not only take's you into the future, but **harnesses the power of the sun's free solar energy.**





InterGrid is an intelligent solar lighting system

RETROFLEX® and INTERGRID: Healthy for Bodies and Budgets

Powering cities, business, and homes, with solar power can help communities avoid greenhouse gas emissions, reduce air pollution, and avoid the cost of increasingly expensive natural resources. Most cities' utilities currently rely on a massive amount of natural gas to generate electricity for their communities. The main component of natural gas is methane — a strong climate pollutant that has 80 times the warming power of carbon dioxide in the short-term. Our team at ClearWorld is taking steps to eliminate these harmful effects.

According to the American Lung Association, 52 percent of Americans live in a place where pollution often reaches dangerous levels. There are also pressing public health concerns concerning methane and volatile organic compound leaks from oil and gas facilities. This directly increases ozone smog levels, which aggravate asthma and other cardiac and respiratory ailments. Health concerns are only going to intensify and Let us make your city healthier with clean energy.

Our products are also the most efficient during unexpected hiccups and blackouts. InterGrid, a division of ClearWorld, is an energy storage microgrid technology solution. InterGrid is an intelligent solar lighting system, designed to collect and store solar power to provide backup power to municipalities and utility companies. During emergencies and unexpected grid outages, ClearWorld and its Intergrid technology provide invaluable critical services to clients.

OUR WORLD SMARTER

A smart city has the ability to be interconnected with sensors everywhere that intake information, analyze it to provide real time results helping making your city the most efficient. We crunch that big data and then we make the city adapt to what's going on. ClearWorld is working to bring the most advanced technology to cities around the country. The applications ClearWorld are capable of implementing are endless and benefits substantial.

There are many ways ClearWorld makes improvements with RETROFLEX®. In urban areas we provide communications for intelligent parking and infrastructure for public WI-FI expansion, as well as emergency environmental sensors. Our technology is capable of real-time traffic monitoring and enhancing communications to provide solutions. In suburban retail areas, we provide off-grid installations to reduce retail development costs and encourage community growth.

For residential areas, we provide better security with smarter lighting and remote surveillance camera monitoring. At nearby parks and campuses we will provide security and emergency call buttons on light poles and USB charging stations options.

ClearWorld will also secure off-grid lighting for parks, trails, and recreational areas helping to ensure safety.

One of the best smart city technologies offered by ClearWorld is the ability to provide 80 hours or more of backup power to city infrastructure during power outages which greatly enhances city resiliency.

ClearWorld has successfully launched several pilot programs across the U.S., including hurricane prone areas like the City of Miami and Miami Dade where Resiliency and Crime reduction continue to be top priority. These cities are well on their way to become smarter cities and we are proud to partner with them in this progressive movement.

Think of your city as a machine: even if a machine is running, there can still be many deficiencies. The gist of the smart city movement is this notion that if we can somehow measure the data, optimize this data and in turn it into useful information to make our municipalities better for everyone. Our products can assist with harnessing and measuring this big data across smart cities.

Our team is happy to educate you on the Solar LED process, the installation, and what to expect from our products. ClearWorld, with the use of its RETROFLEX® and other related game-changing alternative energy technologies and solutions, proves time and again vast benefits for the environment, economy, and society.

D NEEDS CITIES





AUTO DEALERSHIPS JOIN RETROFIT

Gain more curb appeal with LED

Auto Dealerships are gaining more curb appeal with LED lighting. Whether it's the first row of cars, the showroom or the service bays—the entire dealership needs to have high-quality lighting to set it apart from competitors. Exterior lighting not only affect how the cars look, but also gives an outward impression of your business.

LED lighting has become increasingly popular at auto dealerships as hardware costs fall and the technology matures.

Much of the LED savings comes from lower power usage. But lighting maintenance is also far simpler because LED units last longer than incandescent bulbs. Expected replacement is measured in tens of thousands of hours instead of thousands of hours.

And because LEDs can be focused exactly on the location where the light is needed -- without the dim spots between lamp poles common to standard metal-halide, high-intensity lights -- that allows a retailer to showcase their inventory in the best possible light. Once dealers are reassured that the light from LEDs will make their cars look good, they look at the numbers -- and find a compelling case.

LED LIGHTS ON CAMPUS PROVIDE SAFETY

As college tuition continues to rise, so do the costs of running an educational facility. With sprawling campuses, there are often miles of pathways and dozens of student facilities that must be lit most of the day or even around the clock.

A move to LED lighting isn't just about going green and saving money. There are also tremendous advantages when it comes to campus security. With better quality light and more durable lamps brightening campuses, the move to LEDs improves student safety and gives facility managers the peace of mind that comes with a long-lasting product.

For students walking through campus, LED lighting offers even more light distribution, leaving fewer dark areas and locations that can be easily targeted by vandals or criminals.

of light, reducing shadows and collectively resulting in a noticeably better-lit campus. Unlike incandescent or CFL bulbs, LEDs also offer the ability to accurately control color and angle - making it easier to light corners and unusual spaces. LEDs also require less frequent maintenance and replacement, reducing light outages and maintaining the integrity of campus security.

The lights can operate for up to 50,000 hours - or approximately eight years - meaning most students will graduate long before the lights bulbs they walk by every day need to be changed. In addition to the safety benefits, the durability of the product leads to lower maintenance costs and higher staff productivity. That allows university employees to spend their time making campus safer in other ways instead of constantly changing light bulbs.

Finally, at night or during poor weather, LEDs will turn on to their full capacity immediately without having to warm up over time. With no transition period to full brightness, LEDs are either on or off - not somewhere in between upon startup.

SOLAR STREET LIGHTING

America is sadly nowhere near the leaders in this market. Asian countries such as India and China are leading Solar Street Lighting with 44% of the market while African countries like Kenya, South Africa, and Ghana are spearheading the Solar LED street lighting market on their continent. Germany and the United Kingdom are leading the third biggest market for Solar LED Street Lighting in Europe in 2015. The African market is expected to outgrow the Asian Pacific market in the next couple years. This expected growth is the result of numerous initiatives such as subsidies, campaigns, and different programs introduced by the World Bank and International Finance Corporation to promote Solar street lighting products.

- Solar technology is something we have all heard of and possibly have seen on your neighbor's pathway lights, in a plant bed or just a cool looking solar powered phone charger. Well, the day has come where ClearWorld is bringing a new market technology to you in a game-changing way by applying it to street and parking lot lights.
- ClearWorld's flexibly wrapped Solar LED street lights are not only used for lighting roadways or as a resilience measure when the grid goes down, but can be broadly segmented into 4 primary application types: New Installations (Off-grid), RetroFit: Light Poles (On-grid), RetroFit: Distributed Solar, Smart Grid/Smart City solutions.
- The benefits of Solar powered LED street lights are clear. They are not only sustainable and independent of the grid but they do not require moving parts and are virtually maintenance free.



ClearWorld is bringing a new market technology to you in a game-changing way by applying it to street and parking lot lights.



"Using LED lights to cure astronaut insomnia was an idea originated in the late 1980's"

- GIOIA MASSA, PROJECT SCIENTIST AT NASA KENNEDY CENTER



NASA HOPES LED LIGHTS WILL CURE ASTRONAUT INSOMNIA

Sleep deprivation is no joke. It can cause lower performance, decreased memory, and even sickness. So, if you spend your life orbiting Earth on a \$150B spacecraft, you're going to take sleep seriously. NASA, responding to an epidemic of insomnia, is ready to give the International Space Station (ISS) an LED makeover.

The cure? Living in the noisy, high-pressure ISS makes sleep difficult. The result: roughly half of all astronauts, at some point, take sleep medication. It's a quick fix, but it can cause dependency and inhibit astronauts' ability to wake up suddenly for an emergency. **You don't want zombie-like astronauts, but you also don't want drug-addicted ones.**

It's similar to an Earth-bound solution for the winter blues. Light therapy gizmos fight Seasonal Affective Disorder (SAD) by simulating daylight.

The bluish hue tricks the brain into suppressing sleep-inducing melatonin, and increasing energy-producing melanopsin. NASA hopes to apply the same principles. The system prepares the astronauts for better sleep, but its flexibility opens the door to smoother transitions of working hours.

Will the LEDs lead to better-rested, more focused ISS inhabitants? If so, the results would be difficult to measure, but likely plentiful. But if they fail and insomnia persists, you may hear more the next time NASA's budget is on the table.

PARKS RECREATION WELCOMES RETROFLEX

ClearWorld provides a variety of aesthetically pleasing solar on-grid lighting solutions that are functional, sustainable and in harmony with the environment.

The durable and economic stand-alone solar LED lighting solutions can illuminate small and large parking lots and recreational shelters located in areas too expensive or sensitive to run power lines. RETROFLEX® light poles harness solar energy and provide outdoor lighting that preserves resources, requires no moving parts, and is virtually maintenance free.

Solar LED lighting solutions can save thousands of dollars over traditional park lights when installed in new or existing parks.

Clearworld's high-performance solar LED lighting systems are easy to install. Its unique design allows the panels to be affixed to any dimension, diameter, or finish, and will work with any existing pole without compromising the integrity of its design. ClearWorld RETROFLEX® is a clear choice for today's energy solution for Parks & Recreation.







OFF-GRID VS. ON-GRID SOLAR SYSTEMS

Do you want to live off the grid or on the grid with Solar systems? What are the benefits? A grid-tied solar system is a solar system that is connected to the utility power grid. A grid connection will help you save money with solar panels through better efficiency rates, net metering, lower equipment rates and installation costs.

Batteries are required for a fully functional off-grid solar system which adds costs and maintenance. Grid-tied solar systems are generally cheaper and simpler to install. Solar panels often generate more electricity than can be consumed, so, with net metering, homeowners can use the extra energy on the utility grid instead of storing it themselves with batteries. Net metering is important for selling solar power. Without it, residential solar systems would be much less cost effective.

Excess electricity can be sold to utility companies at the same rate as they sell it themselves. Using solar power systems bring up the efficiency of our electrical system as a whole by mitigating the utility company's peak load and include access to backup power from the utility grid (for emergencies).

An off-grid solar system is an alternative to one that is grid-tied. Maintaining access to electricity at all times, off-grid solar systems require battery storage and a backup generator (if you live off-the-grid). The battery bank needs to be replaced after 10 years and

batteries are complicated, expensive, and decrease overall system efficiency. Off-grid solar systems can be cheaper than extending power lines in remote areas. ie Consider off-grid if you're more than 100 yards from the grid. The costs of overhead transmission lines range from \$174,000 per mile (for rural construction) to \$11,000,000 per mile (for urban construction).

Being self-sufficient is worth more than saving money to some. It's a form of security in case of power failures as the solar system is not connected to the grid. That said, batteries can only store a certain amount of energy and when the sun is not out, the grid provides a backup security. Backup generators should be used for these types of situations.

Hybrid solar systems combine the best from grid-tied and off-grid solar systems. Hybrid systems are less expensive, you don't really need a backup generator, and the energy capacity of the battery bank can be downsized. Off-peak electricity from utility companies is cheaper than diesel. You can temporarily store whatever excess electricity your solar panels in batteries and put it on the utility grid when you are paid the most for every kWh.

This concept will become increasingly prominent as the transition to the smart grids arises. Currently, for the majority of homeowners, connecting to the utility grid for electricity and energy storage is more practical than using battery banks and generators.



Solar Lighting for Residential

What's the best for you?

Whether your goal is to generate your own clean energy, increase your home's appraisal value, save money on your electric bill, or all of the above—investing in a small-scale solar electric system is a wise decision. A small solar electric system—or distributed generation (DG)—can produce reliable, emission-free energy for your home or business. However, it is important to make sure that your solar photovoltaic (PV) system is correctly sized, sited, installed and maintained, in order to maximize your energy performance.

Once you make the commitment to go solar, the next step is determining how big your solar PV system must be to meet your home electricity needs. "There's no one-size-fits-all," says Jake Greig, chief operating officer, ClearWorld.

Start by reviewing your electricity bills over the past year to get an idea of your typical electricity usage measured in kilowatt hours. **For example in 2011 the average American household used 11,280 kilowatt hours (kWh) of electricity per year, reports the U.S. Energy Information Administration (EIA).** Many utility companies also offer complimentary energy audits, as this can provide greater insight into your family's energy use habits.

After you know how much electricity your household utilizes, you have to decide the amount of energy you want to offset. While 100 percent seems appealing, it may not be financially feasible or practical due to space constraints. As a general rule, 100 square feet of solar panels will generate 1 kilowatt (kW) of electricity—but only when the sun is high and perpendicular to the panels.

The amount of power generated by a solar system at a particular site depends on how much of the sun's energy reaches it. Most residential solar electric systems require between 50 square feet (for small "starter" systems) and 1,000 square feet. Commercial systems may require even more surface area or rooftop space. to operate at maximum strength — but what if you live in Seattle or simply have a heavily shaded yard? It's not quite as simple, but you can still have solar-powered lights, even in a fully shaded area. A solar or landscape lighting pro can help position a remote photovoltaic panel on your roof or in a sunnier area of your yard, which can then be wired to the lights in the shady area.

If there simply isn't much sunlight to be gathered, even on the roof (for example, you live somewhere like Seattle or Portland), the solar lights will still work, but they won't shine as brightly or for as long each evening.

Many people assume that the bigger their solar PV system, the more savings they'll generate. While the benefits are undoubtedly greater with more solar panels, other factors may be considered before covering every inch of your roof in photovoltaics.

"To make the most of your solar power, the key is to implement simple energy efficiency strategies,"

advises the ClearWorld team. For example, rather than investing in a massive rooftop solar array, homeowners could integrate energy-efficient heaters, solar hot water systems or design features such as strategically-placed vents and insulation.



The logo for ClearWorld features the word "ClearWorld" in a green, sans-serif font. The letter "o" in "Clear" is replaced by a stylized globe. Above the globe is a green, semi-circular shape with a grid pattern, resembling a solar panel or a water filter. A thin black line arches over the globe and the semi-circle.

www.ClearWorld.us