



## THE FUTURE OF SOLAR WATER PUMPING

Collecting groundwater for potable use is a basic global human need, and Franklin Electric is a pioneer in the field. Solar panels have been around for many years, and recently, costs have declined such that the solar photovoltaic (PV) industry is challenging the business model of the standard energy company. Many countries are at, or have surpassed, “grid-parity” with solar PV versus conventional energy sources.



This has made a significant impact for solar water pumping installations, now with significantly shorter ROI periods making for a more viable long-term installation. By putting the power at the source, i.e. the borewell or other water supply, a micro-grid of energy is created and dedicated to supplying the most essential life source - water.

Globally, millions of pumps still run on diesel, and hundreds of millions run on electric grids that are generated from fossil fuels. Many grids are unstable, causing premature motor failures or short windows of available electricity for which to use a water pump.

Regardless, if a farmer is living in Sub-Saharan Africa, India, or the United States of America; a cattle rancher in Texas, Brazil, or Australia; or living in a tribal village in a developing nation using a hand pump, they all depend on a reliable water source – the sun.



Solar water pumping can also apply to other remote, or energy intensive applications such as irrigation, pool circulation, storage transfer/recirculation, fountains and ponds, wetland restoration, aquaculture, hydroponics, and many other water pumping needs. In addition, solar power continues to spread globally with massive growth predicted for the foreseeable future. Additional environmental concerns and regulations in recent years have put solar photovoltaic (PV) on the radar globally for policymakers and governments.<sup>1</sup>

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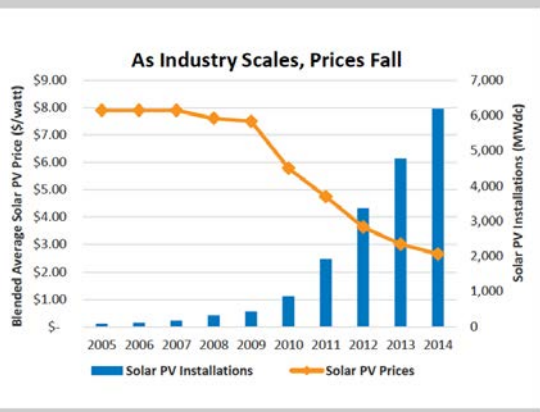
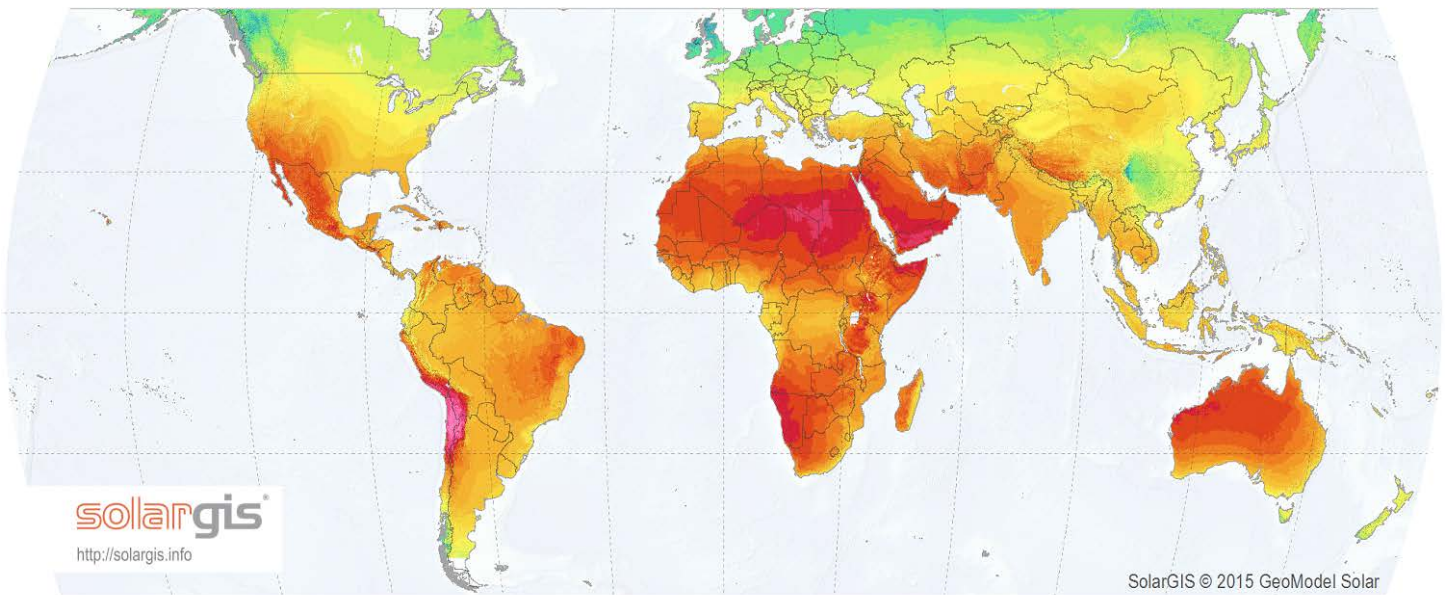
MOVING WATER. MOVING FUEL.  
**MOVING FORWARD.**

# GLOBAL HORIZONTAL IRRADIANCE AND THE IMPACT OF THE SUN

The radiation reaching the earth's surface can be represented in a number of different ways. Global Horizontal Irradiance (GHI) is the total amount of shortwave radiation received from above by a surface horizontal to the ground. Global Horizontal Irradiation is the most important parameter for evaluation of solar energy potential of a particular region and the most basic value for PV simulations.

## GLOBAL HORIZONTAL IRRADIATION

GeoModel  
SOLAR



“Solar power could trump alternatives like fossil fuels, wind, hydro and nuclear to be the world’s largest source of electricity by 2050,” according to the International Energy Agency (IEA).<sup>2</sup> “By the end of 2014, total installed capacity for solar PV globally amount to at least 177 gigawatts, up from nearly 140 gigawatts in 2013,” according to the International Energy Agency’s Photovoltaic Power Systems Program (IEA-PVPS).<sup>2</sup> Today, 19 countries produce at least 1 percent of their electricity from solar PV.<sup>2</sup>





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## PHOTON™ SOLARPAK: WATER PUMPING SYSTEM SOLUTION

The Photon™ SolarPAK is the system solution to your solar water pumping requirements. Photon optimizes the direct current (DC) power available from an array of PV panels and converts the PV array's DC voltage and current into 3-phase AC power to drive the highly robust and reliable Franklin motor and pump.

Franklin's 3-phase motor is a key system component, since it reduces the line current, thus reducing necessary drop cable size and cost relative to single-phase motors, and has higher starting torque than single-phase motors. Photon's motor control algorithm and hardware design enables a high solar- or photon-to-water energy conversion ratio, which means more water for the amount of available sunlight.

This highly efficient hardware design generates very little heat, provides motor protection and requires minimal maintenance. Photon can drive a broad range of submersible and surface motor types such as induction, permanent magnet (PM), and brushless DC (BLDC).



## EXPERIENCE FRANKLIN ELECTRIC

Franklin Electric is a global leader in the development and manufacturing of systems and components that move water and automotive fuels. Recognized as a technical leader in its products and services, Franklin Electric serves customers around the world in residential, commercial, agricultural, industrial, municipal, solar, and fueling applications.





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## FRANKLIN ELECTRIC'S COMPLETE WATER PUMPING SYSTEMS

Franklin Electric was established in 1944, and later innovated the first reliable, water-lubricated submersible electric motor. Since then, its complete line of motors, pumps, drives, and controls have been distributed to a global market. Long recognized as the world's largest manufacturer of submersible electric motors, Franklin has leveraged its expertise in motor applications to expand its innovative product line and serve numerous markets.



As a leader in clean water pumping systems, Franklin offers complete water pumping systems for use in a wide variety of installations. Franklin Electric also specializes in the water transfer market with products that include wastewater pumps; sump, sewage, and effluent pumps; dewatering and trash pumps; condensate pumps; magnetic drive pumps; low pressure sewer systems; water garden pumps and products; and a wide variety of utility pumps.

## INDUSTRY-LEADING INNOVATION AND SERVICE

Franklin Electric remains at the forefront of product innovation by listening to its customers, adapting to the market and continuing to invest in research and development. Its 25,000+ square foot state-of-the-art U.S. engineering test and prototyping facility challenges each product and mimics working environments to ensure optimum performance, which is critical in demanding markets and applications.

Furthermore, the industry's leading problem-solving Technical Support Hotline professionals and expert Field Service Engineers provide real answers in real time for troubleshooting and/or product questions.

Experience Franklin Electric's  
Key Factors for Success:

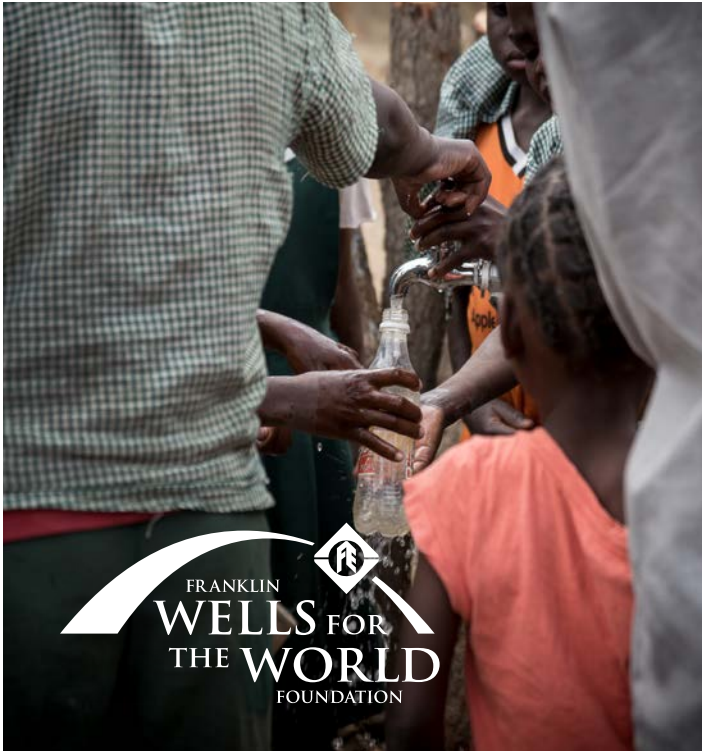
**Quality, Availability, Service,  
Innovation, and Value**





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**MOVING FORWARD.**

## PROVIDING SOLUTIONS FOR GLOBAL WATER NEEDS: THERE IS HOPE



There are nearly one billion people in the world that don't have access to safe, clean drinking water. For most of us, a drink of fresh, clean water is only a few feet away. However, in many developing regions, the nearest source of water is a few miles, and the only water they have is contaminated.

These unclean water sources cause diarrhea, dehydration, dysentery, and death. In one week, approximately 47,000 people die from a water-related illness; 90% of those deaths are children under five. That's approximately 6,000 children every day or one child every 15 seconds.<sup>3</sup>

A majority of the world's fresh water is buried hundreds of feet below the ground, and Franklin Electric is the world leader in accessing groundwater. Franklin Wells for the World Foundation was established to help end the water crisis and has impacted the lives of over 100,000 people by bringing fresh water via solar pumping to the surface in Sub-Saharan Africa and India.

Our mission is to provide safe, reliable, and cost-effective water systems to developing regions and water-stressed communities. It is Franklin's goal to provide solar water pumping systems and our technical resources for water projects by assisting global partnerships with charitable organizations having a similar focus on clean "green" water for all human beings.

## THE FRANKLIN ELECTRIC ADVANTAGE

Franklin Electric is the world leader in accessing groundwater and its Photon SolarPAK is the system solution to your solar water pumping requirements. Solar makes an ideal choice for remote installations where grid power doesn't exist and fuel delivery for engines/generators is impractical and expensive, or where reliability is a must. **Harness the power of the sun with Franklin Electric's Photon SolarPAK.**



1. Pyper, J. (2015, March 31). *The Global Solar PV Market Hit 177GW in 2014, A Tenfold Increase From 2008*. Retrieved from <http://www.greentechmedia.com>

2. Clinch, M. (2014, Sept. 30). *Sun may be our main energy source by 2050: IEA*. Retrieved from <http://www.cnbc.com> | 3. *Child Survival Fact Sheet: Water and Sanitation*. (2015). Retrieved from <http://www.unicef.org>