

## Solar Power Growth in the Developing World

Solar power is poised for a very big year in the United States. The US Energy Information Administration (EIA) suggests that the booming solar sector will add more new electricity-generating capacity than any other source, including natural gas and wind. The EIA anticipated 9.5 gigawatts of utility-scale solar as compared with 8 gigawatts of natural gas and 6.8 gigawatts of wind power. This only includes large utility-scale solar arrays and does not account for fast growing rooftop solar, which will add several additional gigawatts.

While this is impressive, many of the greatest benefits of solar power are being realized in the developing world. The first time that I noticed this was in a 2012 story on CNN that highlighted the Solar Sisters in Uganda. The women use an Avon style distribution system to sell low cost solar lighting systems which revolutionize life for people who are off the grid. The systems were more economical, safer, and delivered better quality light than the options that were currently employed.

The Business of Humanity® Project often recognizes that win-win opportunities exist for business and individuals in need. One of the most dramatic examples has been solar power in the developing world. In the poorest regions of the world, 80+percent of the population are not able to access electricity from an electric grid. Historically, solutions were either expensive, relying on diesel generators, or dangerous in terms of both fire hazards and indoor air quality with solutions like kerosene lanterns. Even for people on the grid, electric service is often sporadic. The first time that I lectured in India, I was struck by the fact that no one paused when the lights in the lecture hall went out. This was obviously such a common occurrence that both the projector and computer were on battery backup. After the power and air conditioning had been out for 20 minutes, the students began opening the windows allowing in a warm breeze as the only way to battle the Bangalore heat.

Where grid power is not available, solutions like the aforementioned generators and kerosene are not only polluting, but are expensive. For example, it is estimated that kerosene costs \$10-\$12 per month, a steep cost where individuals often survive on \$2 per day. This also includes the inconvenience of having to go to market and carry the kerosene back home. For this, they get inferior light, indoor air pollution, and a fire hazard. One company offering an affordable alternative is Off-Grid Electric. In Tanzania, the company has pioneered a revolutionary microfinance solution which has customers paying a \$6 installation fee for a solar system with panels, lights, and a battery to store energy. Thereafter, customers pay for the service via mobile payment systems about \$5-\$10 per month. They offer a similar service in Uganda that charges 35 cents per day.

While home systems with limited capacity already provide a superior solution to the off-grid power problem, one might ask if as these countries develop, will homes be placed on a traditional electric grid as most in the West rely? My belief is that, just like cellular phones rendered the need for copper phone cables to connect homes to the telecommunication

system obsolete and thus never be fully implemented in the developing world, so too will solar micro grids render traditional electric service obsolete for the developing world.

There are several examples of pioneering firms developing large-scale solar systems in the developing world. Earthspark, Powerhive, and Solar Universe are all examples of companies that have rolled out microgrids in multiple developing nations. Prior to their recent financial difficulties, US based SunEdison had announced major initiatives to deploy off-grid solar in India and other Asian countries. In January of this year SunEdison had set a goal of deploying 250 megawatt off-grid solar system in 5,000 villages across India, partnering with Omnigrad Micropower Company. While SunEdison's projects may have been derailed, one can see the ambitious nature of development in the solar microgrid industry.

The opportunities go beyond providing light at night. Solar power will help modernize and connect developing countries. Solar power operates base stations for telecommunication companies in rural areas (versus diesel generators whose fuel was often the target of bandits) and many individuals have developed profitable side businesses charging cellular telephones for 12 cents or so. Solar power has brought irrigation pumps to Palestine and helped to electrify small workshops in a number of developing nations. Clearly this technology has economic ramifications that are bringing new opportunities and changing not only individual lives, but entire villages.

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