

## SMALL-SCALE HYBRID SOLAR POWER

### THE OPPORTUNITY

Today's solar power generation market-place is dominated by technologies tailored for *utility-scale* electric power generation. However, a large and under-served market exists for small-scale electric power generation. Systems capable of producing 5 – 20 kW of continuous power are uniquely suited for applications such as military use, off-grid power generation, residential back-up, emergency response, and deployment to under-developed countries.

### WHAT IS SMALL-SCALE HYBRID SOLAR POWER?

Hybrid solar power is a technology for generating electricity using heat from the sun, heat generated by burning fossil fuels (such as diesel fuel or natural gas), or heat generated by burning biofuels (such as jatropha oil). The heart of this technology is a mini-

turbine driven by hot air. This turbine technology has already been proven for large scale power generation (80 kW and higher) and can be scaled to smaller or larger sizes as needed to accommodate market needs.

### THE NEED IS REAL



International Blogger. "I could sell a couple of thousand units in my little country if the price per watt was less than US \$3. This would really be a life saver; people in developed countries can't imagine the toll the electricity problem has on the economy and the life of many people world-wide. A Solar or bio-waste-powered engine driving a 3-5 kW generator is the Dream Machine or Holy Grail solution to the energy problems of most of the world if the cost can be made affordable."

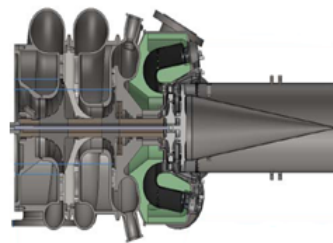
The Military and Alternative Energy. "The future of the combat soldier is an increasingly sophisticated array of sensors, communications, and related electronics for use in the battlefield." The most critical factor for maintaining this evolution will be the development of power supply systems that can operate those electronics effectively for missions from 1 to 15 days." The military has gone green and is using renewable energy to cut costs and improve national security. In Helmand province, Afghanistan, U.S. Marines use solar panels to cut down on fuel use in generators. The more gas the Marines save, the less that has to be brought in on dangerous convoys. The military is turning to alternative energy to improve security and cut costs. The fully-burdened cost for the U.S. military to deliver fuel overseas is estimated at \$400 per gallon!



### IMAGINE

What if it were possible to generate clean, renewable energy for a third world village, a remote military hospital, or an off-grid residence? What if it were possible to convert heat from the sun, fossil fuels or bio-fuels directly into usable electricity?

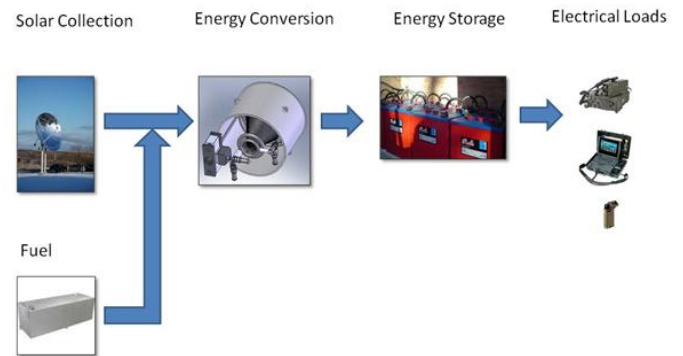
This is possible now using a turbine that fits in the palm of your hand.



## HOW IT WORKS

A hybrid solar power system integrates reliable, proven technologies to generate electricity from heat provided either by the sun or from a variety of fuels. This heat drives a turbine which converts thermal energy into electricity with impressive efficiency. This electricity can be stored in batteries or used directly to power any device that requires electricity.

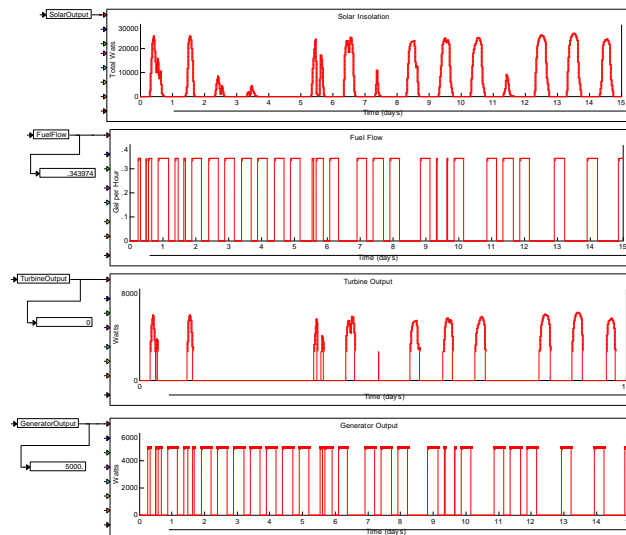
Each of the system's components has been proven to be robust and reliable.



## DIFFERENTIATORS

Conventional solar power systems such as solar panels work only when the sun is shining. At night or on cloudy days, conventional generators – typically diesel powered – must be used to provide the continuous power that people need. These generators are not particularly efficient nor are they environmentally “clean”. The Alanthus system requires **no** separate generator since our turbine is powered by air that can be heated by the sun, fossil fuels, or biofuels. This simple, reliable design provides 24 x 7 electrical power when and where required, whether on the battlefield, at an emergency response site, or in a third-world country.

## GAME PLAN



Alanthus has partnered with Brayton Energy, a trusted leader in the field of turbine development. During a recently completed Small Business Innovative Research Project for the Navy, Alanthus and Brayton developed a preliminary system design, assessed this design through realistic and detailed simulation, and completed a thorough technology evaluation. The current design is an adaptation of designs already proven to work. Our next step is to complete a detailed design and fabricate a system for test and evaluation, a process expected to take about 12 months.

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