

Stikopedia

Presented by: Brian Bosley, CEO of Solar Stik™ Inc.



SOLAR STIK™

Solar Stik™ Company Profile

- Founded in 2005
- All products made in America with American-Made components
- Integrators of engineered hybrid portable power solutions

Mission Statement:

“USING AMERICAN-MADE COMPONENTS & CONSTANT INNOVATION SOLAR STIK™ CREATES PORTABLE POWER SOLUTIONS THAT ENABLE SELF-SUFFICIENCY FOR THE SOLDIER, THE SAILOR, & BEYOND... IN DOING SO, WE SAVE LIVES, CHANGE LIVES, & HELP REVIVE AMERICAN MANUFACTURING!”

For more information, please visit JSPE Booth# 312.



STIK the Acronym

- Superior
- Technology
- Integration
- Knowledge



What is Stikopedia?

Stikopedia is an ever-evolving document which seeks to do the following:

- Describe the benefits of a hybrid power system over the traditional portable power model
- Teach the user how to design and size a system based on the needs of his or her application
- Continually adapt to new technologies
- Reinforce the 5 tenets of Solar Stik Inc. design



What is Stikopedia? (cont.)

The 5 Tenets of Solar Stik™ Design

- Portability
- Adaptability
- Scalability
- Durability
- Autonomy



Leading Edge vs. Cutting Edge Technologies

Cutting Edge Technology

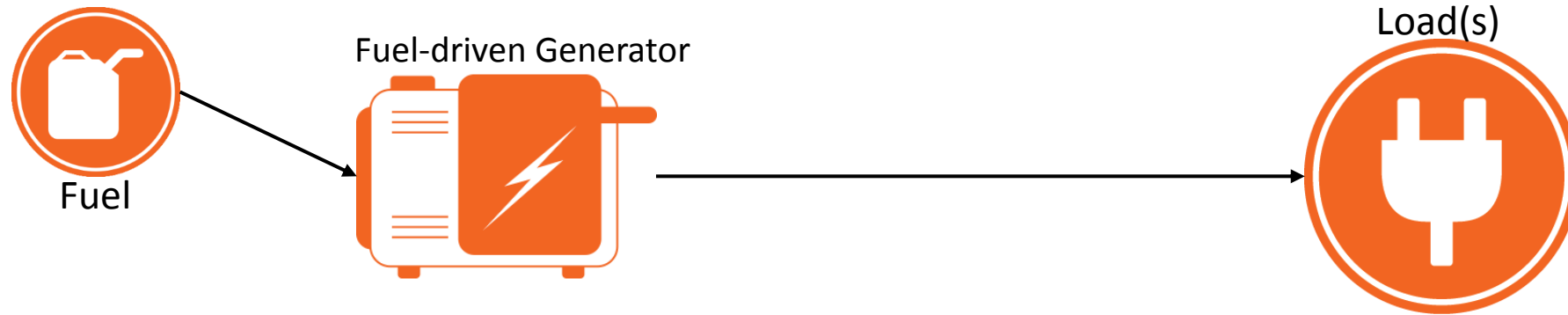
- Newest available technology
- High risk
- Expensive
- Very little (if any) field testing
- No established customer base
- No existing field support

Leading Edge Technology

- Best stable technology
- Much lower risk
- Reasonably priced
- Proven in the field
- Established customer base
- Fully supported in the field



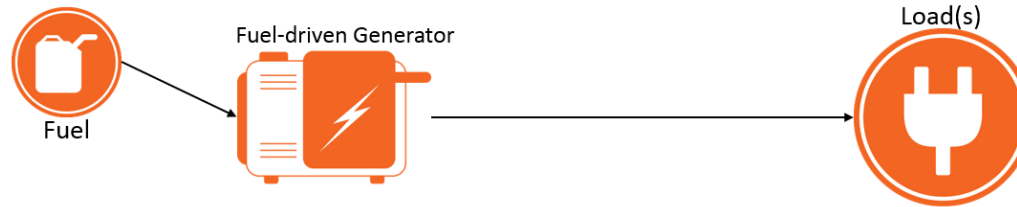
Traditional Portable Power Model



Traditionally, portable power consists of a fuel-driven generator directly powering a load

This is a low efficiency system

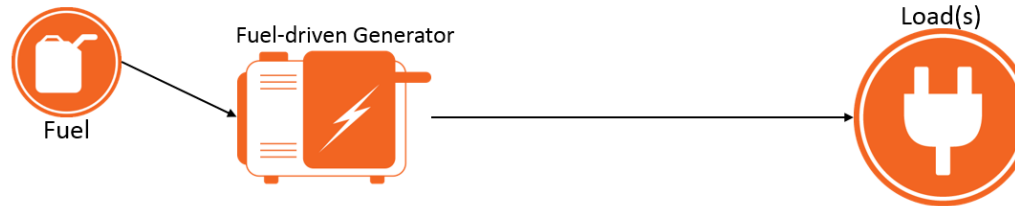
Traditional Portable Power Model (cont.)



What is efficiency?

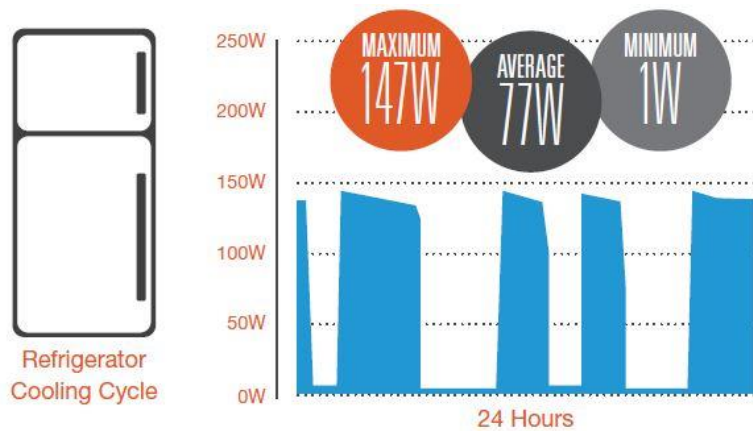
$$\textit{Efficiency} = \frac{\textit{useful work performed}}{\textit{total energy expended in accomplishing the task}}$$

Traditional Portable Power Model (cont.)



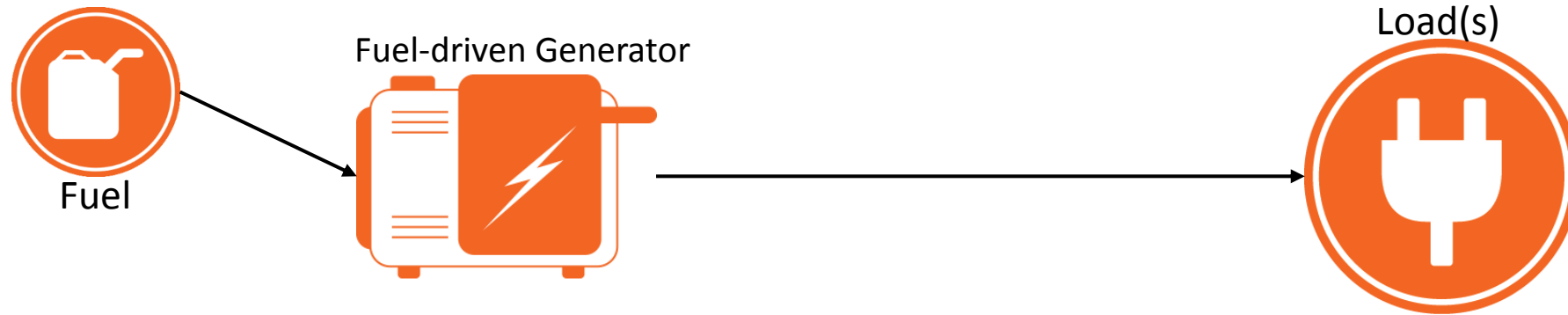
Why is this a low efficiency system?

Because of the dynamic nature of electrical loads.



When a load requires less than the rated output of a fuel-driven generator, the generator wastes fuel, as it will continue to convert the energy of the fuel into electricity, even if that energy is not being used.

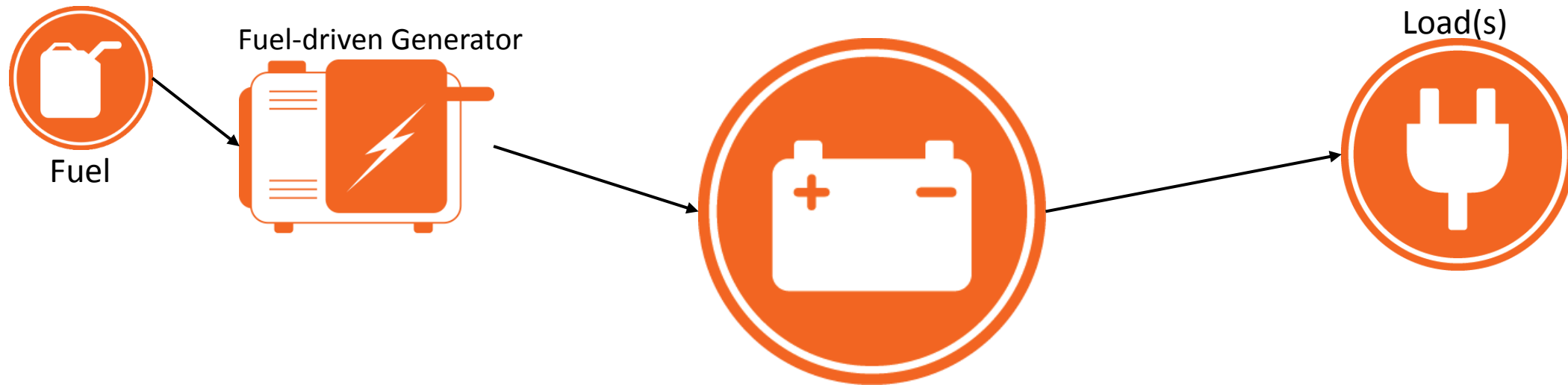
Traditional Portable Power Model (cont.)



How to make this a high efficiency system?

Simply adding a battery bank will make this a high efficiency circuit!

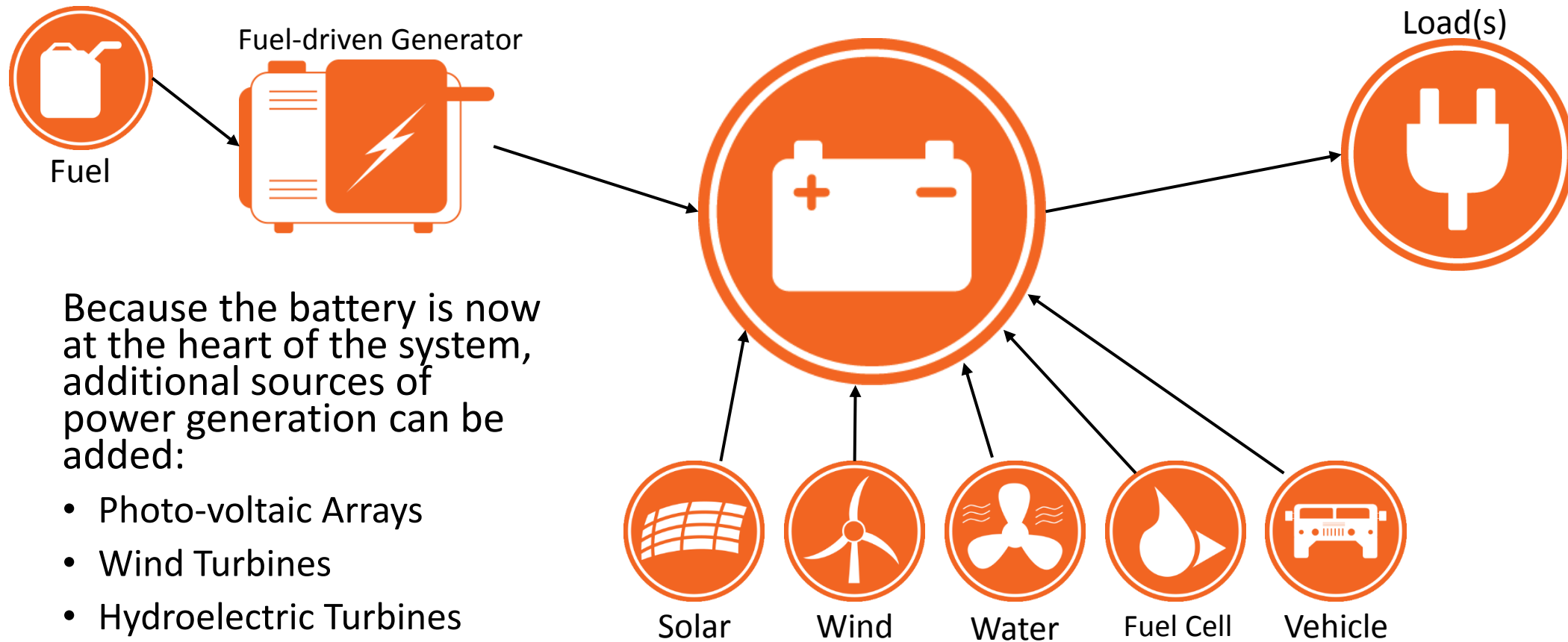
Hybrid Portable Power Model



Instead of directly running the load from the generator, in a hybrid power system the battery bank powers the load.

This means that almost all of the electrical energy from the generator is stored and can be used only when needed.

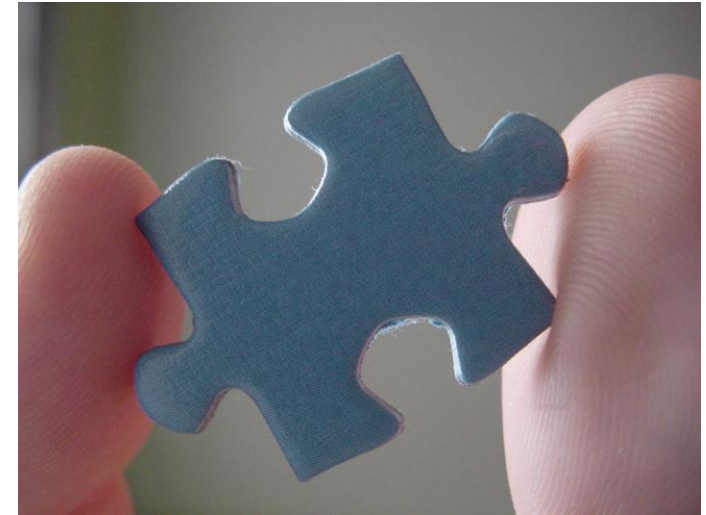
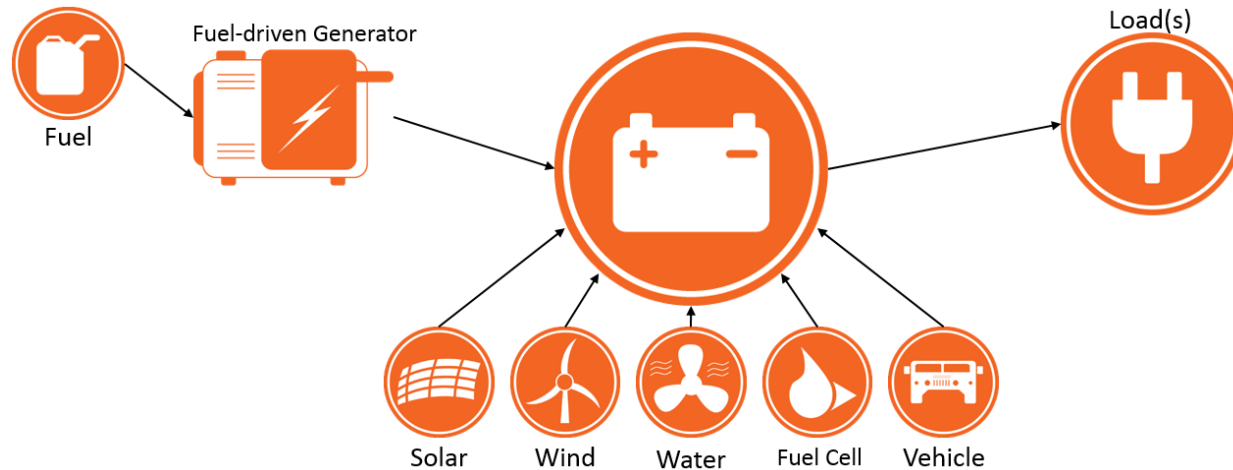
Hybrid Portable Power Model (cont.)



Because the battery is now at the heart of the system, additional sources of power generation can be added:

- Photo-voltaic Arrays
- Wind Turbines
- Hydroelectric Turbines
- H₂ Fuel Cells
- Vehicles

Hybrid Portable Power Model (cont.)



A hybrid portable power system is like a puzzle.

All of the various pieces (generator, batteries, solar arrays, etc.) must be put together in the correct way to support the load, and make running the load easy for the user.

The foremost rule in designing a hybrid power system is,

Power Generated must be \geq Power Consumed by the Load

How to Size a Hybrid Power System



1. Add up all of the loads



2. Calculate the size of the battery bank



3. Determine which power generation sources would be applicable to the operating environment

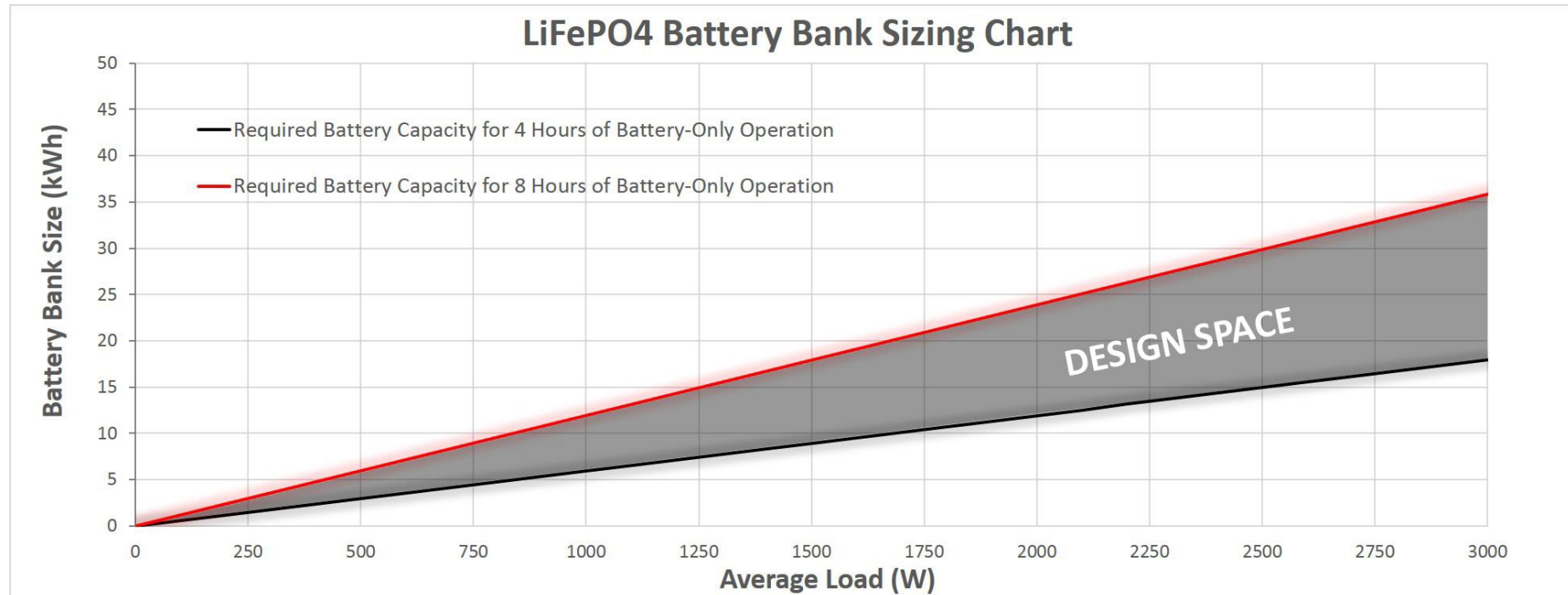


4. Connect the appropriate power management equipment



How to Size a Hybrid Power System (cont.)

After determining your average load requirements, calculate the size of the battery bank, using the graph below:



How to Size a Hybrid Power System (cont.)

The battery capacity recommendations on the previous slide were determined by using the following battery capacity formula:



$$C_B = \frac{h \left(L_{AC} * \left(\frac{1kW}{1000W} \right) \right)}{.8(\eta_{inv} * DOD * k_t)}$$



The 5 Tenets of Solar Stik™ Design



Portability



Adaptability



Scalability



Durability



Autonomy



The 5 Tenets of Solar Stik™ Design (cont.)



Portability

- Lightweight human-portable components
- Design-optimized for nearly any mobile application
- D.O.T. approved for Land, Sea & Air transport
- Rapidly deployable
- 100W-to-5kW Power Spectrum
- Modular architecture



The 5 Tenets of Solar Stik™ Design (cont.)



Adaptability

- Maximum configuration options based on load and capability requirements
- Best-of-breed technologies integrated
- Can be used in a wide spectrum of applications ranging from recreational to tactical



The 5 Tenets of Solar Stik™ Design (cont.)

- “Plug & Play” scalable architecture allows operator to scale the system in accordance with load requirements



Scalability

The 5 Tenets of Solar Stik™ Design (cont.)

- Rugged designs
- No “planned obsolescence” built into the system
- MIL-810G tested for punishing conditions
- Field-proven in remote austere regions and climates
- Manufactured in America using domestic source components (98%)
- Most components are field serviceable



Durability

The 5 Tenets of Solar Stik™ Design (cont.)

- Battery-based, high efficiency electrical circuit
- Allows as much renewable power to be used as is possible, with considerations for the environmental conditions
- Reduces logistics burden when supporting forward operating locations
- Requires no additional purchases, permits, or engineering for operation



Autonomy



Portable Hybrid Systems in the Field (Military)



SOLAR STIK™

Portable Hybrid Systems in the Field (Civilian)



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