

PLUG INTO NREL'S RESILIENT CUBE

With the potential to replace diesel-only power generation at forward operating bases for the U.S. military, the National Renewable Energy Laboratory's (NREL's) **Consolidated Utility Base Energy (CUBE)** platform could literally be a lifesaver.

Designed for mobility and flexibility, the CUBE is a hybrid power generation system that converts energy from different sources—solar panels, batteries, diesel generators, and host grid power—into tactical electricity, improving the efficiency and reliability of power for the military's forward operating bases. By reducing dependence on diesel generators, the CUBE also helps reduce the number of soldiers, sailors, airmen and marines shipping fuel across dangerous territory.



CUBE features:

- Minimized diesel fuel use
- Quiet operations
- Standalone battery and PV operation
- Intelligent dispatch (weather forecast, load forecast)
- NREL-developed power architecture, design, and controls
- Ability to host grid connection and multi-unit chaining for improved resilience and microgrid operations.

Fast, Flexible, and Smart

The CUBE's intelligent power integration platform creates a resilient and flexible 60-kilowatt hybrid power system. It can connect to nearly any photovoltaic (PV) or battery asset, international host grid electricity, and can be configured in parallel operation for scalable microgrid formation. Its control system facilitates the swift transition from one power source to another, enabling uninterrupted energy supply to deliver enhanced power reliability and reserve power standing by. The CUBE is capable of microgrid operations and control, making it ideal for emergency response scenarios when rapid deployment of power is critical.

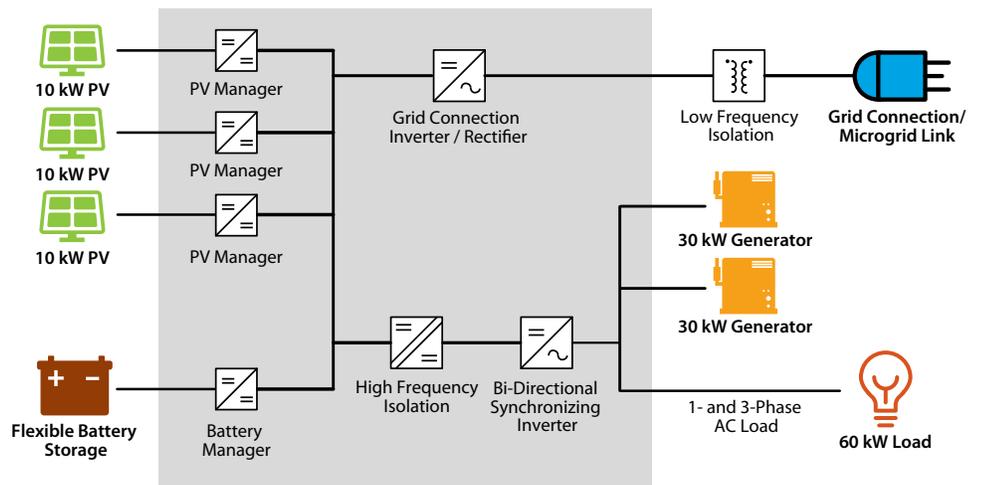
Flexible



Intelligent



Fast Power



Research and Development of the CUBE

The CUBE currently resides at NREL's Energy Systems Integration Facility (ESIF), where validation tests have shown that the technology can achieve up to 30% savings in fuel use, compared to diesel generators alone that serve equal loads. Results in field operations are expected to be similar, with added benefits of improved stealth (when generators are turned down or off) and greater redundancy in power supply options.

The CUBE was originally developed for the Army's Expeditionary Energy and Sustainment Systems, formerly known as Mobile Electric Power. It was further developed through a collaboration between NREL and Wyle Labs, funded by U.S. Department of Defense Rapid Equipping Force.

Software Control for Military and Disaster-Prone Settings

Wide swings in temperature:

The CUBE's components can withstand conditions from 140 degrees Fahrenheit to 40 degrees below zero.

Versatility for any scenario:

Operates in 18 different power modes with smooth transitioning for uninterrupted supply.

Fast response, rapid recovery:

Draws power from any source that's available—including the local grid—and converts to stable, usable electricity.

Compatible and open-source:

Designed for plug-and-play use with a standard Tactical Quiet Generator, with a wide range of PV configurations and battery voltages.

CUBE is flexible enough to provide necessary power for disaster relief support or military operations.



Get Connected

Want to know more? We want to hear from you.

Get in touch to learn more about the CUBE's mobile power capabilities by contacting: Jerry.Davis@nrel.gov

Learn more about the ESIF's R&D capabilities at www.nrel.gov/esif.



National Renewable Energy Laboratory
15013 Denver West Parkway
Golden, CO 80401
303-275-3000 • www.nrel.gov

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC
NREL/FS-5B00-75550 • January 2020