



**BEST START**

## Partner Company Profile

**LEMA**  
lema.io



### Addressing the Need for Reliable Power in Military Operations

Military operations demand resilient, efficient, and sustainable power solutions to maintain communication, surveillance, and systems in remote or off-grid environments. Traditional power sources, such as diesel

generators, are often logistically burdensome, require frequent refueling, and can be vulnerable to supply chain disruptions. LEMA's dual-axis high-efficiency solar PV system solves these challenges by maximizing energy

generation through advanced tracking and bi-facial panel technology, ensuring continuous power even in harsh weather conditions. This capability is vital for forward-deployed units, disaster response teams, and remote bases where energy reliability directly impacts mission success.

### Enhanced Solar Technology for the Warfighter

The dual-axis solar PV system leverages cutting-edge technology to deliver superior performance in diverse environments. Unlike conventional solar panels, its bi-facial design captures sunlight on both sides, while the sun-tracking mechanism optimizes panel alignment throughout the day, boosting energy production by up to 60% compared to fixed systems. The system's snow-resistant design ensures year-round operation, even in winter climates, and when paired with battery storage, it provides uninterrupted power during nighttime or overcast conditions. Furthermore, its integration with military-grade diesel generators offers a hybrid power solution, enhancing energy security. Beyond electricity

generation, the system supports military communications, offering connectivity in austere locations. Proven in real-world installations and tested by the U.S. Army Corps of Engineers, this technology ensures that warfighters have dependable, renewable energy, reducing fuel dependence and increasing operational endurance.

The dual-axis system continuously adjusts panel angles to remain perpendicular to the sun, significantly boosting energy capture—especially during mornings and afternoons when sunlight is less direct. The bi-facial panels

generate additional power by absorbing reflected light from the ground. In snowy conditions, the panels can tilt vertically to shed snow accumulation, ensuring year-round operation. Integrated weather and system sensors enable adaptive responses to extreme conditions, such as activating de-icing modes, optimizing battery charging, and using resistance heaters to maintain performance in freezing temperatures.

*Harnessing the power of cutting-edge innovation, LEMA Power starts with bold ideas and refines them through disciplined prototyping—turning vision into real-world solutions for global water and energy challenges. Photo Courtesy of LEMA Power.*





## Modular Design & Hybrid Power Integration

LEMA Power systems are modular and scalable, allowing customization based on power demands. A single unit can generate 2.5 kW with 102 kWh of storage, while multiple systems can be linked for higher capacity (up to 30 kW or more). The technology supports both AC and DC outputs, making it compatible with military-grade generators like Cummins AMMPS for hybrid power solutions. Advanced power electronics, including Li-Ion battery management and solar charge controllers, ensure efficient energy storage and distribution. The system also provides real-time remote monitoring, enabling operators to track performance, detect

faults, and adjust settings from anywhere.

Designed for harsh environments, the systems feature insulated, heated cabinets to protect electronics in extreme cold. The panels can also reorient to minimize wind damage during storms. Installation is quick (~4 hours for permanent setups) and can be guided via live video instructions, allowing non-specialists to deploy the system efficiently. With applications in both on- and off-grid settings, the systems provide reliable, renewable energy for remote military bases, disaster response, and other critical operations while reducing fuel dependence and enhancing energy resilience.

Additional applications of the technology include:

- Border security in extreme environments
- Wildlife management in extreme environments
- Weather/climate monitoring
- Recreational/residential (e.g. off-grid residences, cabin deployments)
- Supporting scientific institutions in extreme environments

## About LEMA

LEMA is an energy and water company that works in diverse environments and countries to bring both on- and off-grid services to end users. Based in Saint Paul, Minnesota, and with manufacturing facilities in Wisconsin, the company designs

and manufacturers decentralized energy and water infrastructure. Its systems are currently installed at locations in the U.S., Haiti, Uganda, Kenya, South Sudan, and Liberia, with additional installations planned in Kenya and Zambia.



LEMA Power | <https://www.lema.io/>

## About BEST START

BEST START provides the crucial support businesses need to bring their visionary technologies to life. Whether refining smart grid technologies, enhancing green energy applications, or creating efficient solutions for power generation, BEST START partners with Minnesota companies to move technology forward. BEST START is a collaboration of three organizations—DEVCOM Army Research Laboratory, the University of St. Thomas in Minnesota, and ETC, a nonprofit defense solutions provider.