Custom Off-Grid Solar Power for Seismic Monitoring at the Nevada National Security Site

In January 2026, 123eSolar completed the delivery of a custom-built **123-STG-72D62** solar power generator for Mission Support and Test Services, LLC (MSTS) at the Nevada National Security Site (NNSS).

Customer	**Mission Support and Test Services, LLC (MSTS)**
Site	**Nevada National Security Site (NNSS)**
Operated for	**U.S. Department of Energy's National Nuclear Security Administration**
Application	**Remote seismic monitoring station**
System	**Custom 123-STG-72D62 — solar, battery storage, diesel engine, cellular remote monitoring**
Delivered	**January 2026**
In service	**Testing from July 2026, full deployment from August 2026**
Measured, July 1 to September 13, 2026	**1,863 kWh of solar, 50 kWh of diesel**

Powering a Remote Seismic Monitoring Station

MSTS manages and operates the NNSS for the U.S. Department of Energy's National Nuclear Security Administration. The site supports highly specialized scientific, engineering, and national-security missions—including work that depends on reliable monitoring equipment in remote locations.

The **123-STG-72D62** was designed as a fully functional, all-in-one, off-grid power system for a seismic monitoring station.

Remote monitoring applications present a distinct set of challenges. Equipment must remain operational where utility power may be unavailable, site access may be limited, and environmental conditions can be demanding. The power system therefore needed to combine dependable energy generation, storage, control, and remote system visibility in one integrated solution.

123eSolar engineered the system specifically for this application rather than adapting a standard, one-size-fits-all product.

A Complete, Integrated Solar Solution

The delivered **123-STG-72D62** provides a self-contained platform for generating, storing, and managing energy at the monitoring location. Its integrated design reduces the complexity of deploying separate field components while providing the independent power needed to support continuous seismic instrumentation.

A cellular-band wireless connection allows authorized personnel to remotely monitor key operating conditions, including:

- Solar-power production
- Electrical load consumption
- Battery capacity and system status
- Diesel-engine operating conditions
- Remote diesel-engine control

These capabilities provide greater visibility into system performance without requiring personnel to travel to the remote installation for routine status checks. The combination of solar generation, battery storage, diesel-engine integration, and remote monitoring creates a resilient power platform for a demanding field application.

The completed system was delivered ready for its intended off-grid mission, giving the project team a purpose-built energy solution designed around the monitoring station's operational requirements.

Custom Engineering for Specialized Missions

Projects like the **123-STG-72D62** demonstrate the value of application-specific power-system design. Remote scientific and government installations often have requirements that cannot be satisfied by ordinary portable generators or standard solar packages.

By evaluating the equipment load, operating environment, autonomy requirements, communications needs, and deployment conditions as a complete system, 123eSolar can develop solutions suited to the realities of each location and mission.

The January 2026 delivery represents another successful example of our ability to provide integrated renewable-energy systems for remote, technically demanding applications.

Measured Performance in the Field

The system's inverter records its operation every five minutes and reports over the cellular link. The figures below are taken directly from those records.

Testing began on July 1, 2026, and the system entered full deployment in August.

From July 1 through September 13, 2026:

- 1,863 kWh produced by the solar array
- 1,737 kWh delivered to the load
- 50 kWh supplied by the diesel generator, equal to less than 3% of the energy the load used
- No diesel energy at all from August 20 through August 31

From September 7 through September 13, the load averaged 1.4 kW around the clock. On each full day from September 8 through September 13, the array produced between 34.7 and 38.1 kWh.

Over the first thirteen days of September, a generator-only system would have run for 312 hours. The diesel engine in the **123-STG-72D62** ran three times, for about four hours in total.

On September 6, the array produced 12.2 kWh while the load used 22.1 kWh. By 5:14 the next morning, the battery had fallen to 31%. The diesel engine ran from 5:14 to 8:04 AM and stopped with the battery at 56%. That is the Tri-Brid™ design working as intended: solar and storage carry the load, and the engine runs only when it is needed.

On September 14, the battery carried the load through the night, returned to full charge by 1:35 PM and still held 92% at 7:15 PM, with the load drawing 1,170 W. The generator did not run.

Specification	Case study	The difference
Solar harvest 31.6 kWh a day	34.7 to 38.1 kWh a day, September 8 to 13; up to 38.7 kWh in August	10% to 22% more than rated. The rating assumes a 4.3 sun-hour day; this site averages 7.1 sun-hours in August and 6.2 in September, and the array was still throttled once the battery filled.
Engine-off break-even 1.32 kW	Daily loads up to a 1.51 kW average with no diesel energy, August 20 to 31	14% more load than the break-even with the engine off, because the site had more sun than the rating assumes.
Array output 7.36 kW nameplate	7.1 kW peak	Within 4% of nameplate. Solar panels give up some output as they heat, and this was late-summer desert heat.
Battery runtimes planned on 15.9 kWh, half of the 31.8 kWh bank	17.1 to 18.8 kWh delivered each night, September 8 to 13; lowest charge 34%	8% to 18% more energy than planned each night, with a third of the bank still in reserve.
Diesel runtime a generator alone runs 24 hours a day, 312 hours over September 1 to 13	About 4 engine hours, in three runs	About 99% fewer engine hours than a generator alone.

Measured by the system's inverter every five minutes, July 1 to September 13, 2026. Specifications as published on the **123-STG-72D62** product page.

Built for Power Beyond the Grid

Whether the application involves environmental instrumentation, communications, security equipment, scientific research, or infrastructure monitoring, 123eSolar designs off-grid power systems for locations where dependable energy cannot be taken for granted.

The **123-STG-72D62** delivered for seismic monitoring at the Nevada National Security Site reflects that commitment: custom engineering, integrated functionality, remote system visibility, and reliable off-grid power—built around the mission.

123-STG-72D62

Solar Tri-Brid™ Generator

123esolar.com/123-STG-72D62

10.8 kW Tri-Brid™ with a 31.8 kWh bank and 9.4 days on a tank at 6 kW.



The Tri-Brid™ stowed: solar, lithium storage and a 10.8 kW diesel on one trailer.

OVERVIEW

A new cell site is often ready to go on air before utility power reaches it, and until it does, a temporary diesel generator runs it around the clock. 123-STG-72D62 is a Tri-Brid™ built for that job: sixteen panels, a 31.8 kWh lithium iron phosphate bank and a 10.8 kW diesel generator on one trailer. Sun first, battery second, and the engine only when both run short.

The 7.36 kW array harvests 31.6 kWh on an average day, and below 1.32 kW the site runs on sun and battery alone with the engine off. The generator sets the 10.8 kW continuous rating; the battery carries peaks to 12 kW and surges to 24 kW for 10 seconds, so motor starts never lean on the engine.

When the load is above the break-even, the controller runs the generator to carry the load and recharge the bank together, then shuts it down. At a steady 6 kW that is 10.77 engine hours a day where the 40 kW generator telecom sites use for temporary power would run all 24, and 9.38 days between refuels of the 120-gallon tank against 7.92 for the 40 kW alone — 12.15 gallons a day instead of 16.8. At 4 kW the tank lasts 16.14 days. Both engines are read by the same fuel rule: their own published figures, held at the lowest one below it. At a remote site every refuel is a truck, a driver and a day on the road, so the days between refuels are what make this the cost-effective way to keep the site on air. The bank alone carries 6 kW for 2.56 hours, with 15.9 kWh usable at the standard 50% reserve and 22.26 kWh at the 30% setting. The engine is certified to EPA Tier 4 Final.

Output is 120/240 V or 120/208 V at 50/60 Hz with a 5 ms transfer, rated for operation from +14 to +131 °F (-10 to +55 °C). Size a continuous load at or under 10.8 kW; the table below shows what happens at every step.

Every 123eSolar system is SMART enabled: cloud IoT monitoring and control from your phone or desktop, so the site is watched and managed without a trip to it.

FEATURES AND BENEFITS

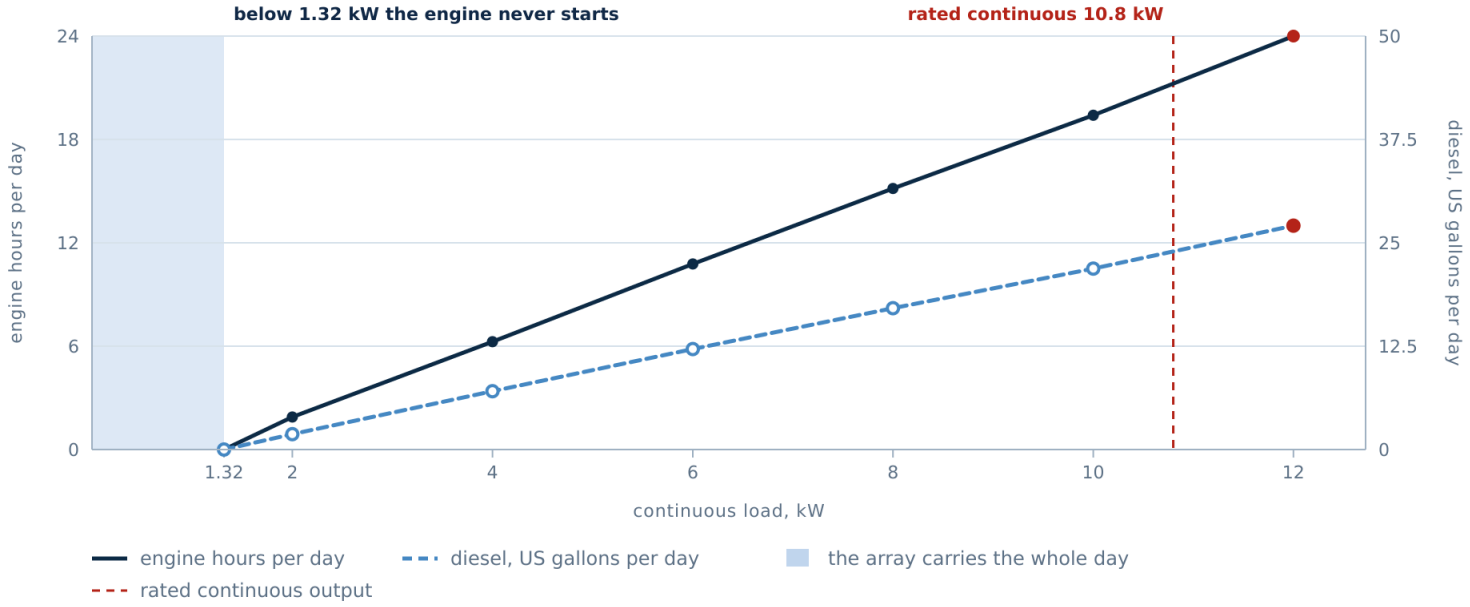
- **Sixteen 460 W panels, 7.36 kW** — Around a kilowatt, the site runs on sun and battery alone.
- **31.8 kWh lithium iron phosphate bank** — Fewer engine starts and longer silent periods.
- **10.8 kWe EPA Tier 4 Final diesel, 120-gallon tank** — 9.4 days between refuels at 6 kW, and 16.14 days at 4 kW.
- **24 kW surge for 10 seconds, 5 ms transfer** — Sensitive equipment rides through without a reboot.
- **SMART cloud IoT monitoring and control** — The site is watched and managed without a trip to it.

KEY SPECIFICATIONS

POWER	
Rated continuous output	**10.8 kW**
Peak output	**12 kW**
Surge	**24 kW**
Surge, 30 minutes	**13 kW**
Output voltage and phase	**120/240 V or 120/208 V**
Output frequency	**50 / 60 Hz**
Transfer time	**5 ms**
ENERGY STORAGE	
Battery technology	**Lithium iron phosphate (LFP)**
Arrays installed	**6**
Total stored energy	**31.8 kWh**
Usable stored energy at 50%	**15.9 kWh**
Silent runtime at 6 kW	**2.6 hours**
SOLAR	
Array rated power	**7.36 kW**
Solar panels	**16 x 460 W**
Daily solar production	**31.6 kWh/day**
Load covered by solar alone	**1.32 kW**
DIESEL BACKUP	
Generator output	**10.8 kWe**
Fuel capacity	**120 US gallons**
Days between refuels at 6 kW	**9.4 days**
Engine starts and stops at	**30% and 80% state of charge**
Engine runs at 6 kW	**3 a day, 3.6 h each**
Emissions	**EPA Tier 4 Final**
MECHANICAL AND SITE	
Ambient operating range	**+14 to +131 °F (-10 to +55 °C)**

PERFORMANCE ACROSS THE LOAD RANGE

What the engine does at each load. Below 1.32 kW the array carries the whole day and the engine never starts. Above it, the engine runs only to put back what the sun did not: at 10 kW, 19.4 hours a day on 21.9 US gallons.



LOAD, CONTINUOUS	BATTERY ONLY	DAILY DRAW	AFTER SOLAR	GENERATOR	ENGINE RUNS	DIESEL	DAYS ON A TANK
1.32 kW · solar break-even	**11.64 h**	**31.6 kWh**	**covered**	**0 h/day**	**none**	**0 gal/day**	**—**
2 kW	7.67 h	48 kWh	16.4 kWh	1.89 h/day	0.8 × 2.4 h	1.9 gal/day	61 days
4 kW	3.84 h	96 kWh	64.4 kWh	6.26 h/day	2.5 × 2.5 h	7.1 gal/day	16.1 days
6 kW	2.56 h	144 kWh	112.4 kWh	10.77 h/day	3 × 3.6 h	12.2 gal/day	9.4 days
8 kW	1.92 h	192 kWh	160.4 kWh	15.15 h/day	2.5 × 6.2 h	17.1 gal/day	6.7 days
10 kW	1.53 h	240 kWh	208.4 kWh	19.4 h/day	0.9 × 21.5 h	21.9 gal/day	5.2 days
12 kW	1.28 h	288 kWh	256.4 kWh	24 h/day	—	27.1 gal/day	4.2 days

Every load runs continuously and the day is 24 hours: daily draw is the load × 24 h. Solar is a daily energy offset, not an instantaneous power match. The engine starts at 30% state of charge (a 70% depth of discharge) and stops at 80%, putting 15.9 kWh back into the bank on each run while it carries the load.

AGAINST THE 40 KW GENERATOR RUNNING ALONE

LOAD, CONTINUOUS	40 KW ALONE	DAYS ON A TANK	THIS SYSTEM, ENGINE	THIS SYSTEM, DIESEL	DAYS ON A TANK	ENGINE HOURS SAVED	DIESEL SAVED
2 kW	16.8 gal/day	7.9 days	1.9 h/day	1.9 gal/day	61 days	**92%**	**89%**
4 kW	16.8 gal/day	7.9 days	6.3 h/day	7.1 gal/day	16.1 days	**74%**	**58%**
6 kW	16.8 gal/day	7.9 days	10.8 h/day	12.2 gal/day	9.4 days	**55%**	**28%**
8 kW	16.8 gal/day	7.9 days	15.1 h/day	17.1 gal/day	6.7 days	**37%**	2% more
10 kW	16.8 gal/day	7.9 days	19.4 h/day	21.9 gal/day	5.2 days	**19%**	30% more

The 40 kW generator telecom sites use for temporary power carries the load alone, 24 h a day with no sun and no battery, on its own 140-gallon tank (133 usable). Both engines are read by the same rule: their own published fuel figures, a straight line between them, and below the lowest published point that point's burn.