Moser Energy Systems Overview

Hybrid Solutions for the Warfighter

Peter W. Dawes, CEO

Introduction to Moser

Celebrating 50 years in business, Moser Energy Systems is a leader in engineering, manufacturing, and servicing industrial prime power, distributed generation systems

Moser pioneered flare gas utilization for upstream oilfield operations, turning a waste stream into useful energy, replacing oilfield diesels

Moser is also at the forefront of oilfield hybrid generation

OUR CORE BUSINESS

- Mobile Energy, Delivered Locally – Island/Microgrid
- Hybrid Systems (Batteries + Generators)
- Natural Gas/Propane powered generators
- Mobile EV charging solutions
- Industrial, **prime** power engine repair & remanufacturing
- Operating reliably in the harshest conditions

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Capabilities

Moser’s 24-acre main campus houses the corporate offices as well as:

- Complete generator manufacturing and fabrication
- In-house engineering team, including reverse engineering capability
- Engine and component refurbishment to restore to like-new condition
- Rapid prototype development & manufacture
- Testing and validation

Field locations for local service support

- 200+ MW lease fleet of approximately 1,000 generators
- Equipment uptime 98+% (April 99.87%)
- 2hr callout response time
- 24/7/365 operation
- Continuous condition monitoring

Moser’s Impact

- Half of Moser’s employees are in Wyoming, ranging from Fabricators, Welders, Field Technicians and Assemblers to Supply Chain, Accounting, and Engineering to Executive levels. Our headcount has grown over 20% over the last 2 years
- Community Impact
  - Casper College internships
  - Casper College hiring
  - Boys & Girls Club Career Works
  - UW hiring/Manufacturing Works
  - CSU Powerhouse partnership
- Over the last three years:
  - Moser’s WY payroll has totaled $12 million
  - Moser has spent over $23 million with WY suppliers

High Value Jobs

Economic Growth

Innovation Hub

Moser Technology Innovations

Natural Gas and Propane Fueled Generators

Oil & Gas On-site Power Generation

Remote Communities On-site Power Generation

Grid Services - Demand Response

Mining Operations

HybridGen*

* U.S. Patent Awarded

Mobile Electric Vehicle Charging

Construction Site Power Generation

Emergency Response & Critical Power

Military Battlefield Power

REV Station

(Remote Electric Vehicle Station)

POWER WHERE YOU NEED IT – WHEN YOU NEED IT

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Moser Mobile Generation Solutions

- In emergencies, mobile power is paramount
- Grid Interconnections, when available, take too long & cost too much
- As business needs evolve, mobile energy solutions facilitate these transformations
- Moser solutions are typically lower emissions than the grid
- Remote locations with limited or no grid power need the certainty provided by mobile solutions

Moser's culture is to engage the challenge, and our Mobile Solutions address many of the issues and uncertainties in today's evolving energy landscape

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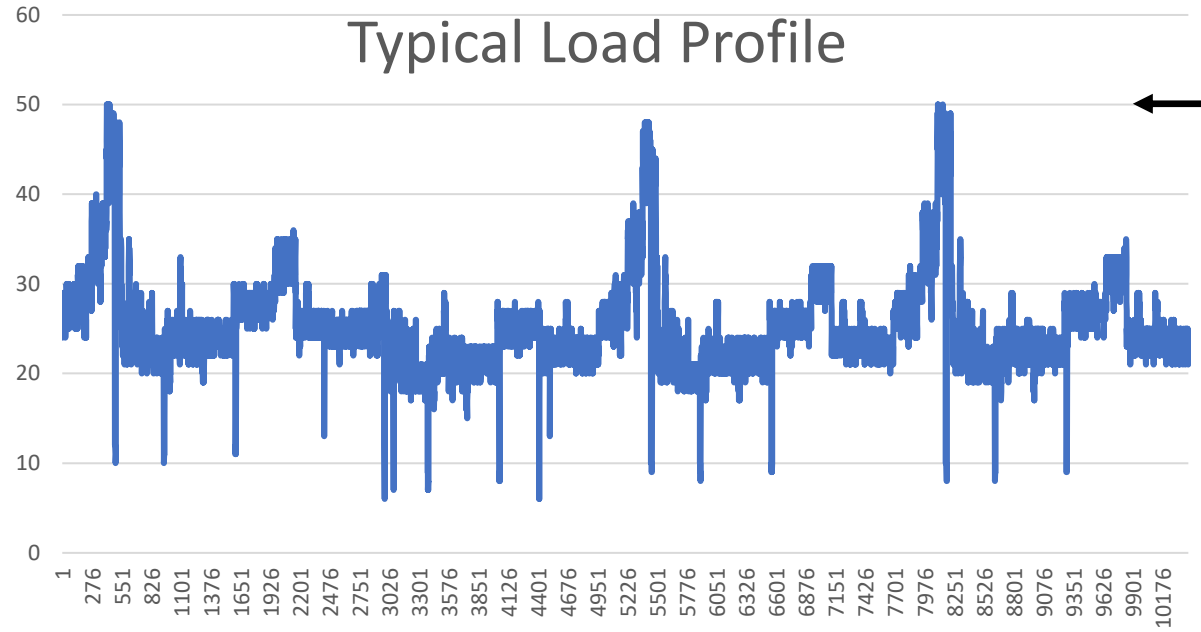
Operational Energy Load Profile



Sized to meet peak demand

- Operational energy profiles favor hybrid power
- High peak demands with periods of low power requirements
- Average loads are typically a fraction of the generator rating
- Leads to excessive fuel consumption and higher emissions

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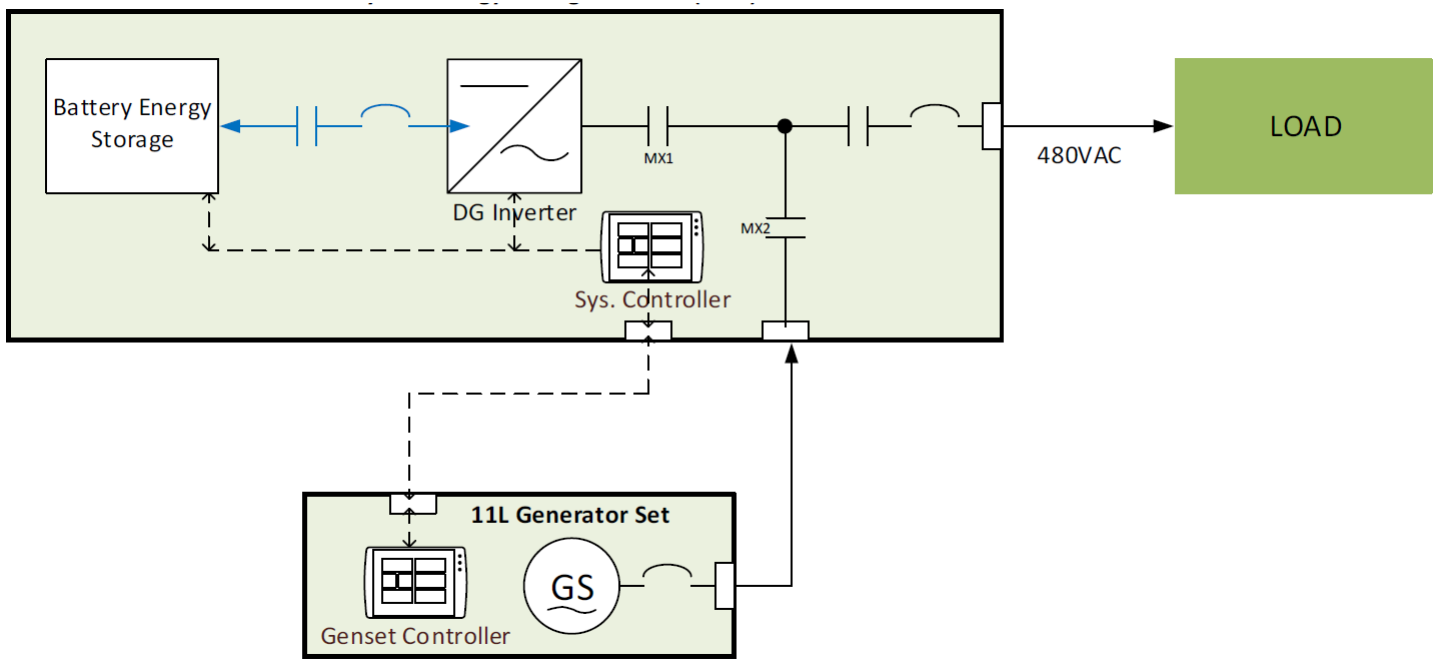
Hybrid Power Generation

Typical hybrid power systems integrate batteries and power electronics, with a conventional generator set

Benefits

- Smaller displacement engines
- Improved fuel efficiency
- More robust power delivery
- Lower emissions
- Enhanced resiliency



Moser’s BISON

Battery **I**nverter **S**torage **O**ptimization **N**exus

- 500kVA bi-directional ruggedized inverter
- 120kWh 2C Li-ion battery (3C peak)
- Integrated proprietary controls
- Power distribution
- Generator integration (AC-coupled)
- Extreme-duty enclosure
- Onboard HVAC and fire suppression

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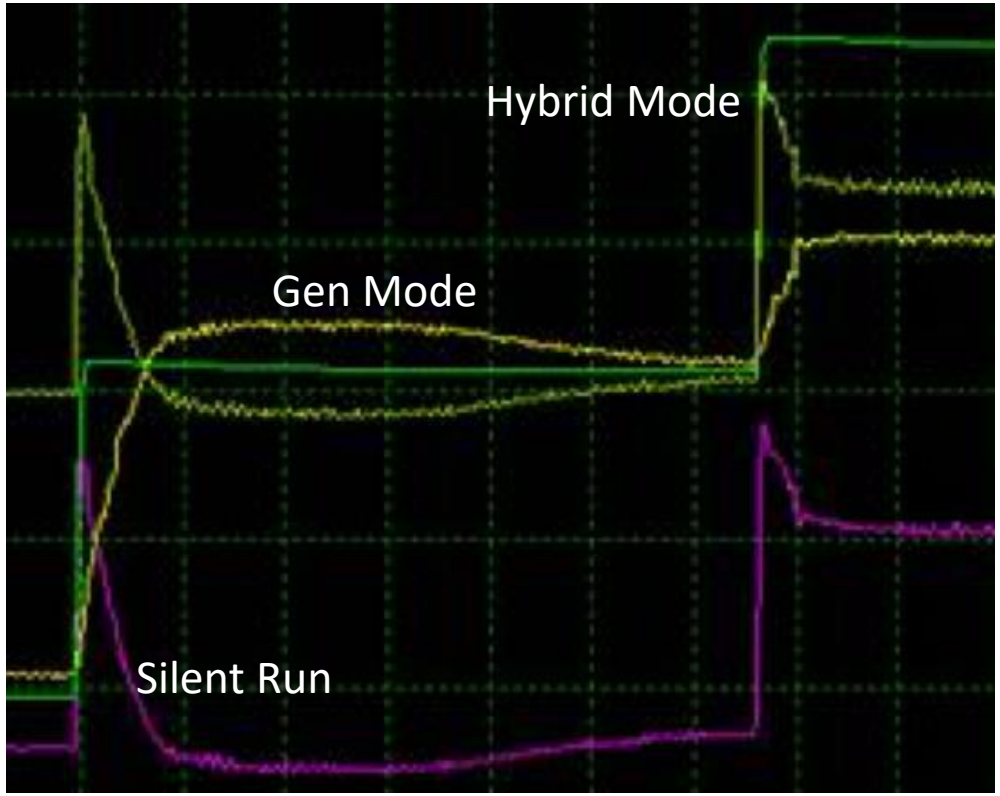
Moser's Proprietary BISON Technology

Operates in and supports the entire power range to ensure the most efficient utilization of the generating resources in four modes of operation:

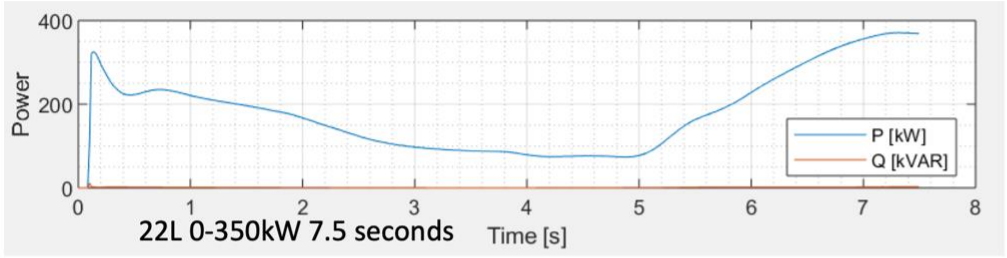
- **Silent Watch** provides an active live bus that can inject power within 20 milliseconds (the time it takes for the breaker to close) for fast response to outages and intermittent power demands
- **Silent Run** uses only the battery during periods of low power output for higher efficiency, lower emissions, reduced wet stacking, and low heat/noise signature
- **Generator Mode** when loads are most efficiently served by the generating resource(s)
- **Hybrid Mode** provides peak output by combining the generator and battery outputs

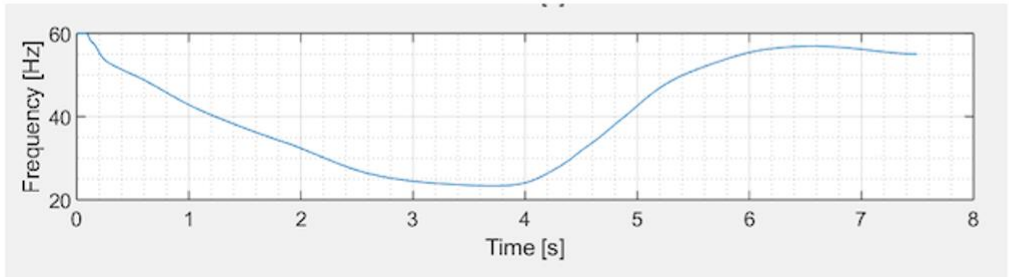


Hybrid Power Delivery Advantages

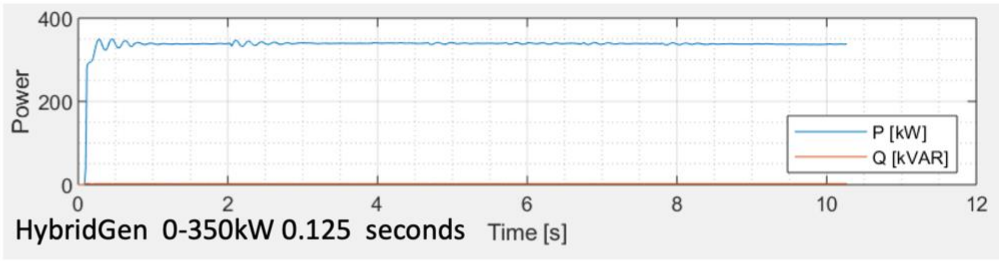
350 kW load step comparison – note the lag between conventional and hybrid

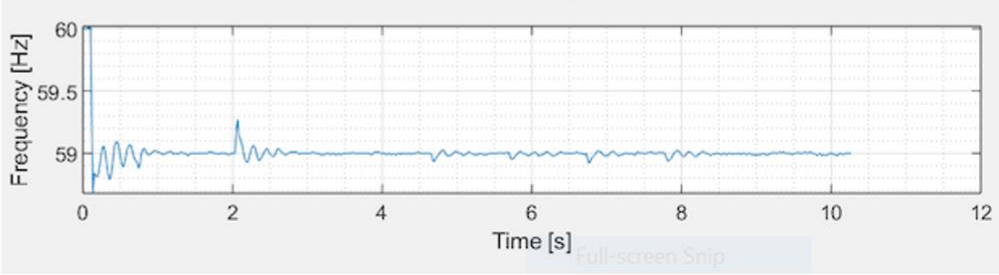
22L Conventional Gen



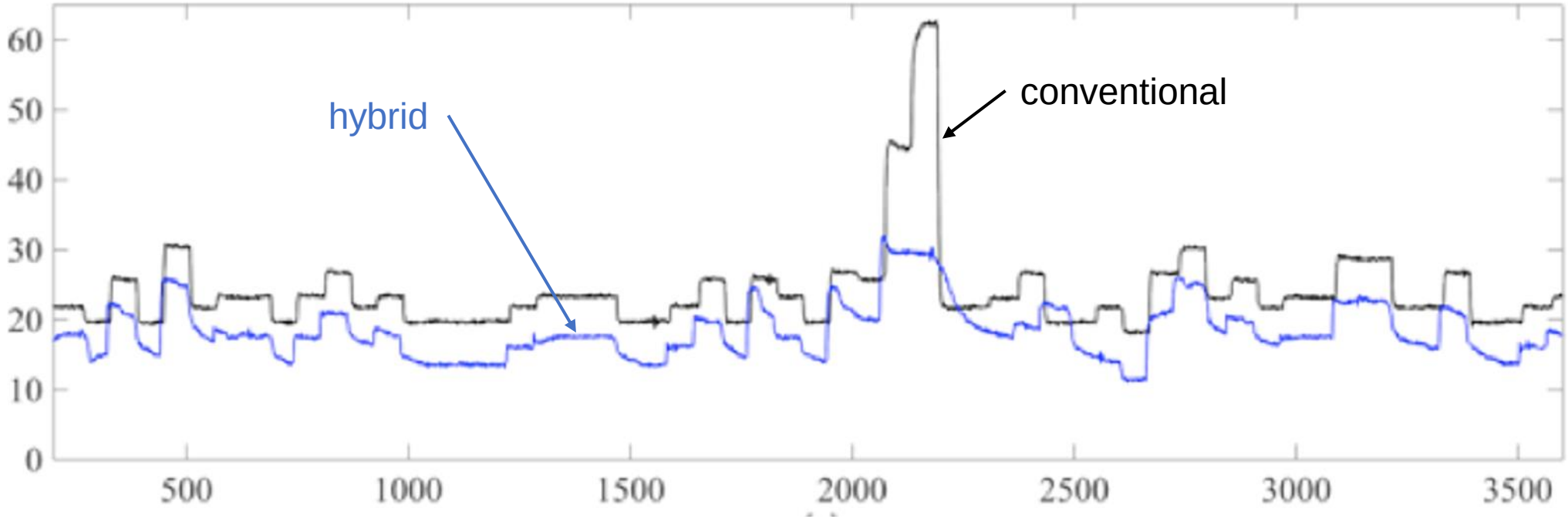


11L Hybrid Generator





Fuel Efficiency Improvements with Hybrid Solutions

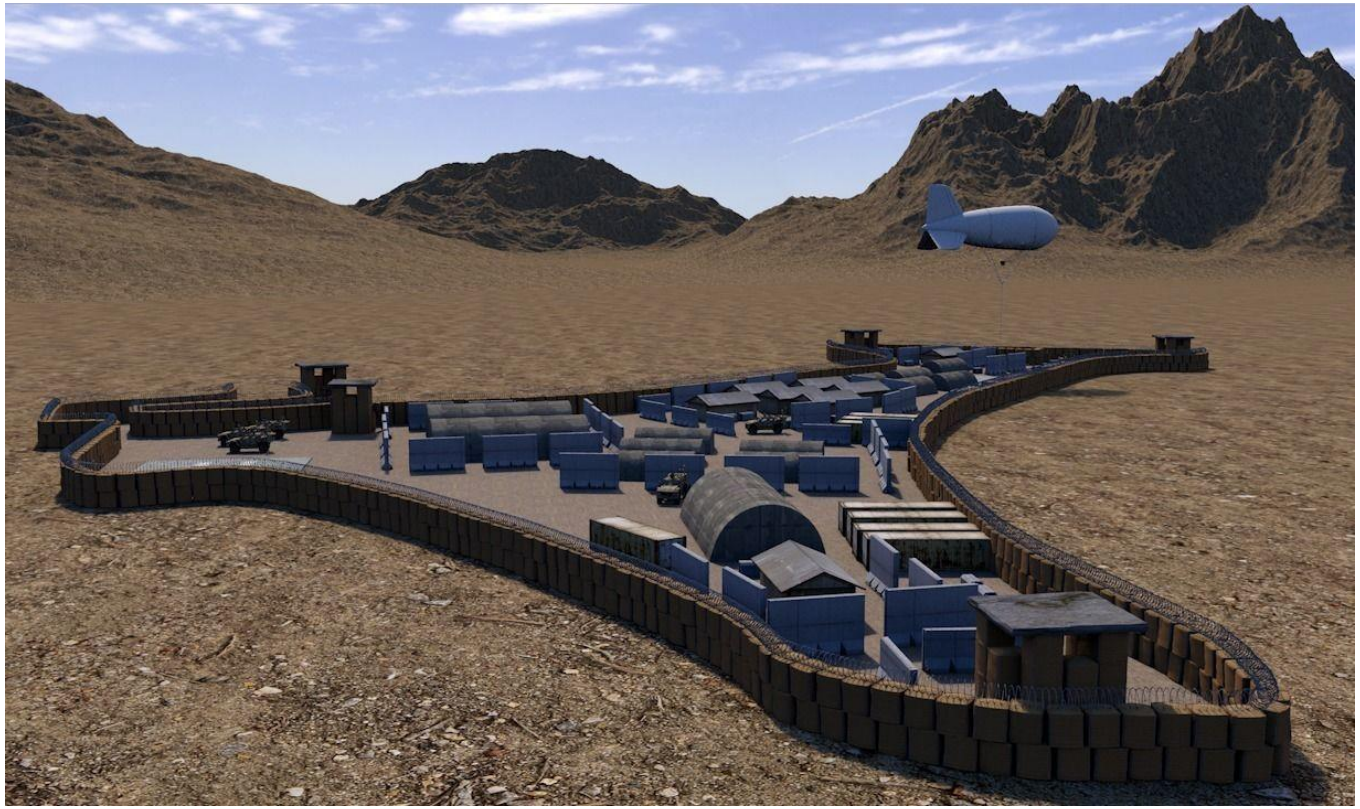


- Black line is fuel consumption with a conventional generator
- Blue line is fuel consumption with a hybrid power system at the same load profile
- **40%** improvement in total fuel consumption

What Moser's Hybrid Solutions can do for the Warfighter

Silent Systems Lower Heat Signature	• Stealth • Survivability
Increased Fuel Efficiency	• Reduced Casualties • Improved Availability
Fewer Pieces of Equipment	• Increased Mobility • Smaller target footprint
Instantaneous Power Delivery	• Power for Advanced Weapon Systems and Medical Equipment
Enhanced Power Quality	• "Clean" Power for Advanced Weapon Systems and Medical Equipment

Modern Battlefield Energy Needs



Since 2001 the forward operating base has seen:

- 250 percent increase in radios
- 300 percent increase in computers
- 200 percent increase in the number of vehicles
- 30 percent decrease in miles per gallon of the vehicle fleet

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Supply Convoy Statistics*

"Studies are establishing a strong relationship between fuel consumption and casualty rates due to fuel and water convoy protection."

"Convoy load allocations are 50% fuel, 20% water, and 30% other supplies."

"The casualty factor for fuel resupplies in Afghanistan is 0.042, which is 0.042 casualties for every fuel-related resupply convoy or *almost one casualty for every 24 fuel resupply convoys*"

* https://www.army-technology.com/features/feature77200/

Moser Hybrid Solutions: METIS

Moser Energy Tactical Inverter System

- Many commands have expressed interest in a hybrid version of their operational energy solutions
- Integrates existing military tactical generators with batteries
- METIS is a platform for hybrid demonstrations to bring advanced power technology to the war-fighter
- Field hospitals, missile defense, and directed energy weapons to name a few

Prototype to successful performance testing in less than 6 months

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MTG250HR Prototype Build Timeline

Our power systems will aid the modern warfighter by providing energy in ways that help to create a more lean and agile fighting force.

Concept to prototype demonstration in 26 weeks

SCAN TO LEARN MORE

March 1st, 2021

Moser recognizes a need in the existing tactical generator inventory

March – May 2021

Moser's design and engineering teams develop unique controls that allow for the ready integration of engine driven generators and battery energy storage and incorporated it as a standard option in the product line

May 25th, 2021

The MTG250HR operates semi-publicly for the first time for a performance and design review with U.S. Army CERL

June – July 2021

Engineering and design team integrates suggested refinements and enhancements from the performance and design review

August 23rd, 2021

Moser first publicly demonstrates the MTG250HR operating at G2 according to ISO8528 in conventional configuration at CBITEC in Fort Leonard Wood, Missouri

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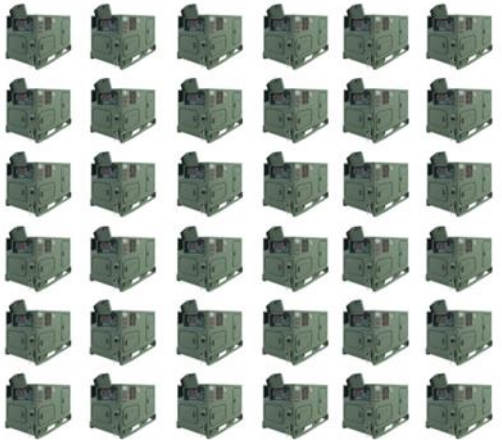
Typical Field Hospital from the Past

- 200kW load
- Minimal life-saving equipment
- Small bed capacity
- Four tactical generators required

Modern 1.8MW Field Hospital



- 1.8 MW load
- Life-saving equipment such as CAT scanners, X rays
- Located near the battlefield
- Requires **36** tactical generators
- Logistics - Set up time, cabling, overall footprint

Modern 1.8MW Field Hospital Hybrid Solution

- 1.8 MW load
- Life-saving equipment such as CAT scanners, X Rays
- Located near the battlefield
- Requires **5** tactical hybrid generators
- Uses 40% less fuel
- Smaller logistical footprint – less set up time, cabling

Lower Tier Air and Missile Defense Sensor (LTAMDS)

Designed to defeat advanced and next-generation threats, including hypersonic weapons (Fly Mach 5+, or +1 mile/second)

LTAMDS is replacing all Patriot missile Defense Systems in the US military and potentially 17 allies that currently use the Patriot system

Phase in begins 2025, completed by 2028

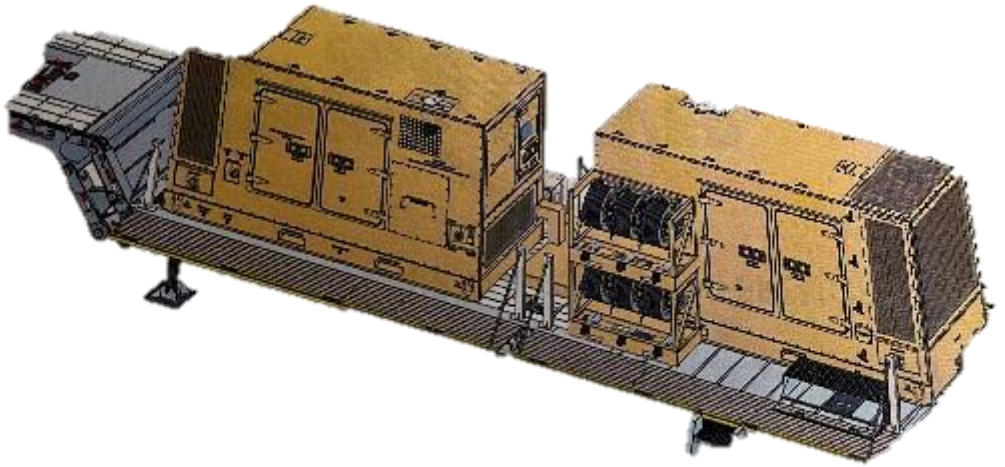
Large Tactical Power Systems (LTPS)

PD Power Systems, LLC
6225 Brandon Ave., Suite 460
Springfield, VA 22150
PH: 1.888.460.7377
FX: 571.327.5103
www.pdpowersystems.com

Patriot missile

Four Patriot missiles can be fired from the highly mobile TEL

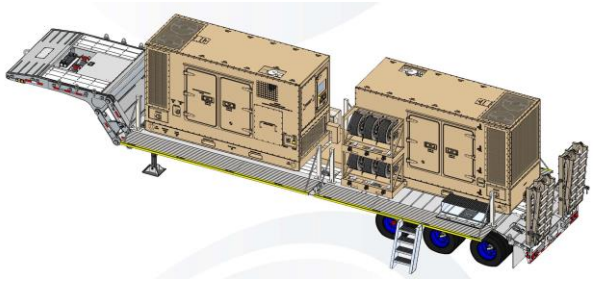
Type	Surface-to-air missile
Place of origin	United States
Production history	
Designer	Raytheon
Unit cost	US$1 to 6 million[15]
No. built	over 10,000[4]
Variants	Standard, ASOJ/SOJC, PAC-2, PAC-2 GEM, GEM/C, GEM/T (or GEM+), PAC-3, PAC-3 MSE, PAAC-4 (SkyCeptor)



- LTAMDS requires a power system not currently in the US operational energy inventory
- LTPS (Large Tactical Power System) is designed to meet the power requirements with 100% resiliency using dual 500kW systems that operate independently
- LTPS is low-voltage (480VAC) that enables the use of lower-tier MOSs for support
- LTPS is expected to support other weapons and deployed loads in the US and allied inventory
- The final number of units deployed is expected to exceed 10,000

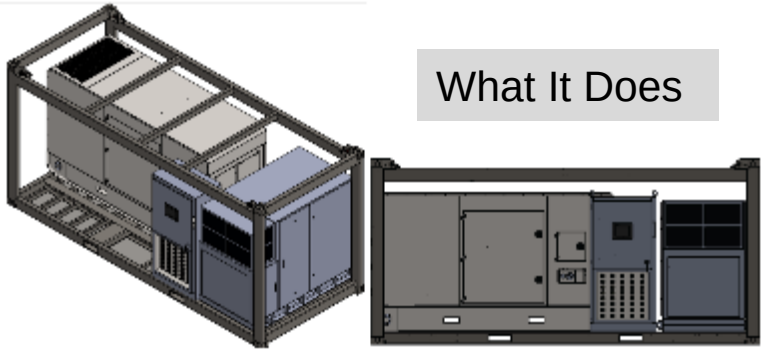
Hybrid LTPS Development

What It Is



- Hybrid version of the LTPS (Large Tactical Power System) used to power radar and weapons systems in the US military
- LTPS uses two 500kW diesel engines to provide 500kW of power

What It Does



- Reduces fuel burn rate by 40% on operational loads.
- Improves engine reliability by optimizing the loading and reducing the run time of the system
- Provides better power quality and more robust power delivery, no latency from power demand to power output

How It Works

- One 500kW engine is removed from the LTPS platform and replaced with a 500kW hybrid module
- For LTAMDS support, dual systems would switch from powering load to standby depending on battery SOC

What Is Needed

- Securing funding to build demonstrators

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Moser REV Station Solutions – Commercial and Military

Fleet REV Station

- Mobile, Level 2 or 3 charging for Commercial EV Fleets
- Adapts to the needs of your Fleet
- Less expensive than Grid-Supplied Power
- Cleaner than grid-supplied Power
- Great Solution when the Grid Interconnection costs too much & takes too long

REV Station

- Mobile, Level 2 or 3 Charging for EV's
- Integrated with Renewable Energy
- No Grid or Pipeline Interconnection Needed
- Great for EV Charging in Rural Areas or areas with Seasonal EV Charging Needs

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REV Station

Pilot Program for National Parks, FEMA

- System can be configured for surge traffic with high volume of charges, or as a multi-purpose mobile microgrid powering aid stations, Wi-Fi, and EV charging
- Deployable solution with flexible resources
- Can be configured as an “energy harvester” to utilize renewable power plants that are stranded assets during widespread outage events
- Emergency response system that can move to and with the need for energy resources

Mobile Power for Microgrids and EV Charging at DoD Installations

Environmental Security Technology Certification Program (ESTCP)[1], DoD

- Currently, DoD installations rely mostly on emergency diesel generators, connected to fixed building loads
- DoD bases transitioning non-tactical fleet to EVs by 2035
- Mobile microgrid (REV Station) provides more reliable NG/propane gensets with integrated solar power, battery storage, Level 2 and 3 charging
- Moved to other locations easily during an emergency
- Supports base energy resiliency, fleet electrification and reduction in electricity costs using demand shifting

[1] Proposal under review.

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Alternative Energy Storage Systems

Small Business Innovation Research (SBIR) for USACE

- Flywheel energy storage in addition to batteries
- Deployed force infrastructure demonstration
- 600kW peak, 425 kW continuous, without generators
- Moser to provide microgrid interconnections and power electronics integration between flywheel, batteries, multiple generators

Summary

Building on our considerable oilfield services capabilities, Moser's future is energy generation, leading and innovating in both fossil and clean technologies

We are striving to provide opportunities for high value jobs, internships, career paths, plus research and cooperation with higher education partners

We are committed to, and will be on the forefront of, a future defined by

energy security,

energy independence, and

prudent environmental stewardship

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