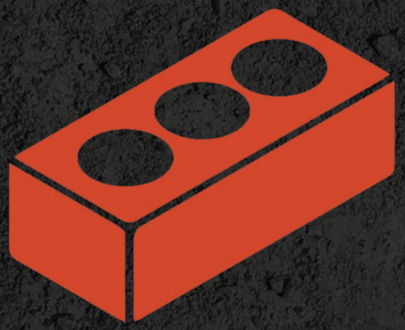
CONSTRUCTING THE FUTURE

Construction

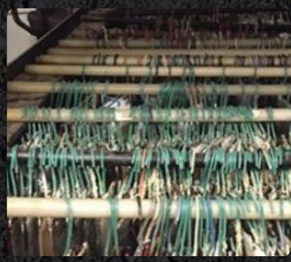
Engineering

Research

Laboratory







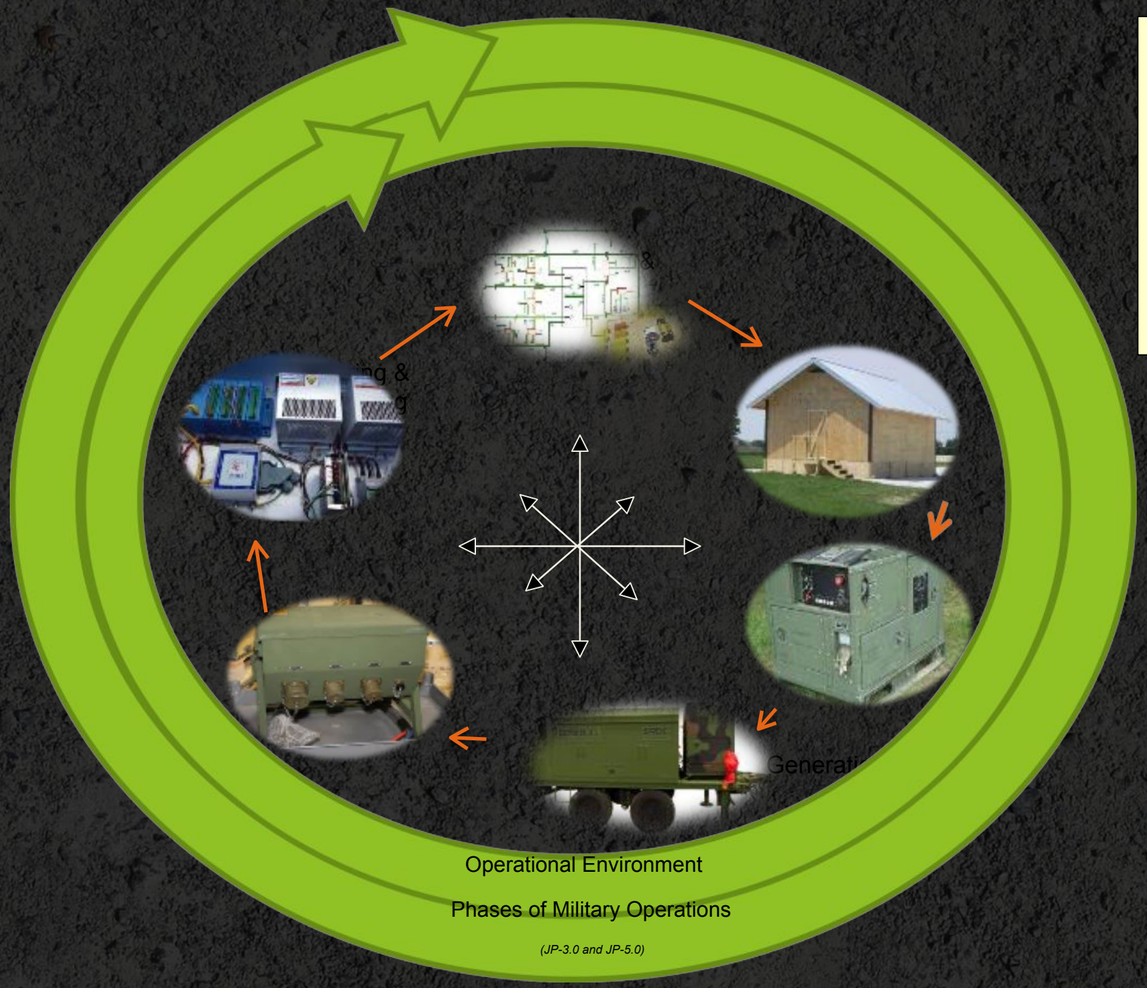





Power Operations and Microgrids in Austere Environments

Bjorn Oberg

Operation Energy Analysis



Phases of Operations

Phase I Shape
Phase II Deter
Phase III Seize the Initiative
Phase IV Stabilize
Phase V Enable Civil Authority

Metering and Monitoring

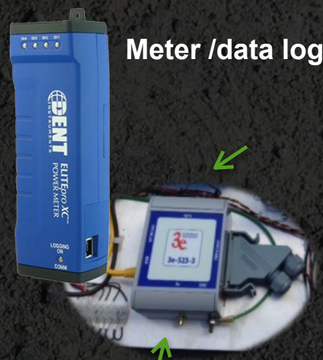
External Plug and Play

First Prototype

Improved

Current

External installed

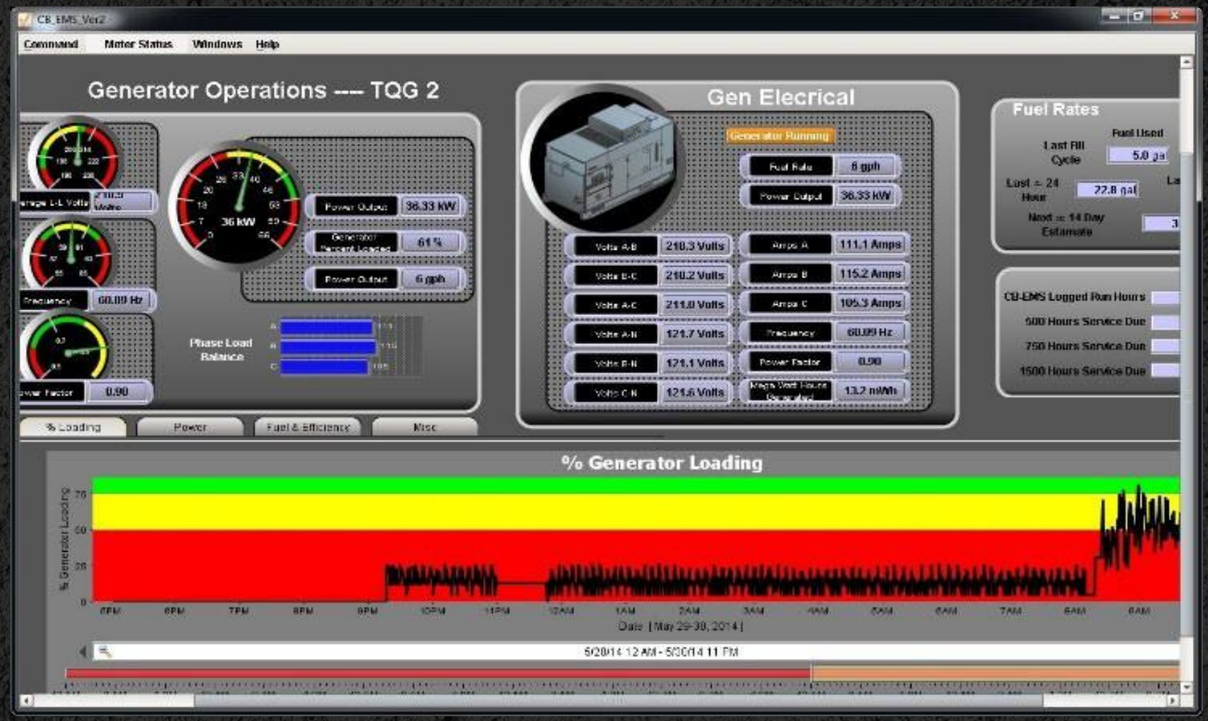


Meter /data logger

Wireless Radio

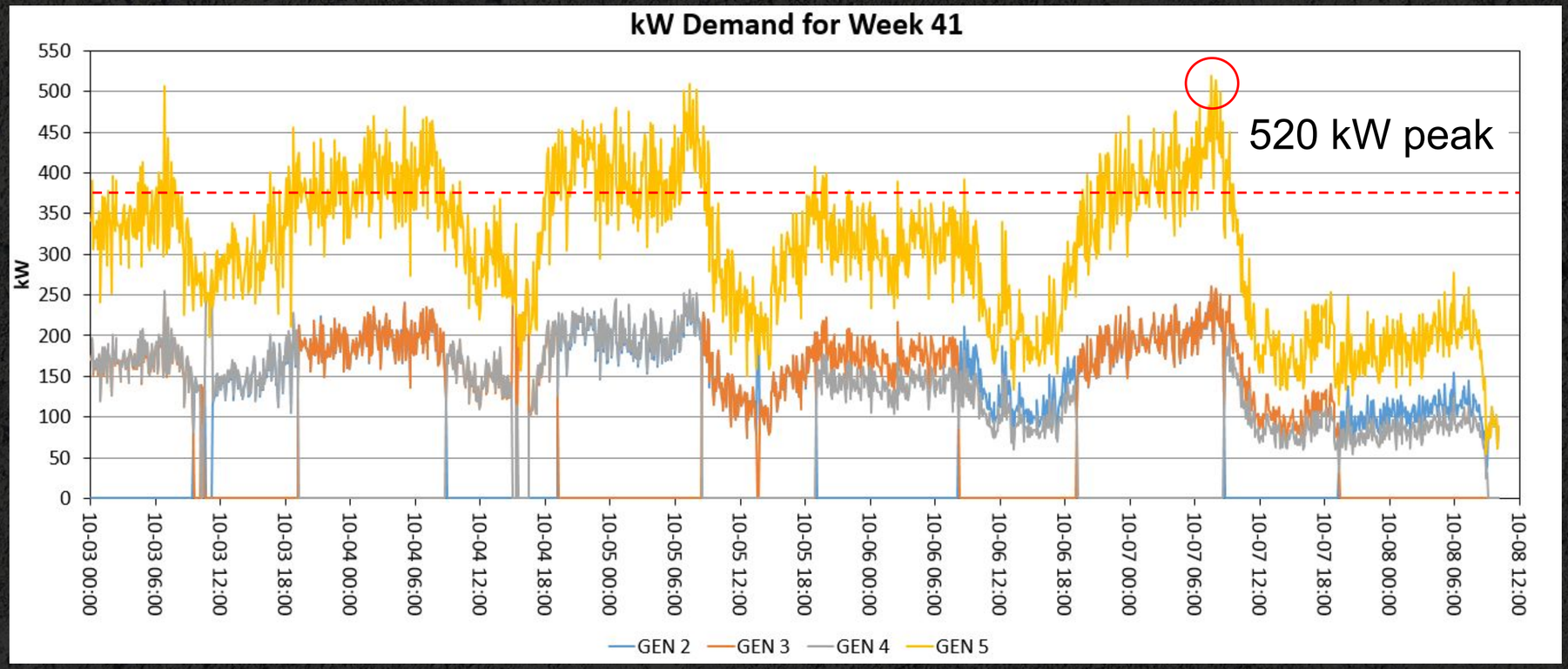
NATO

DMMS Dashboard

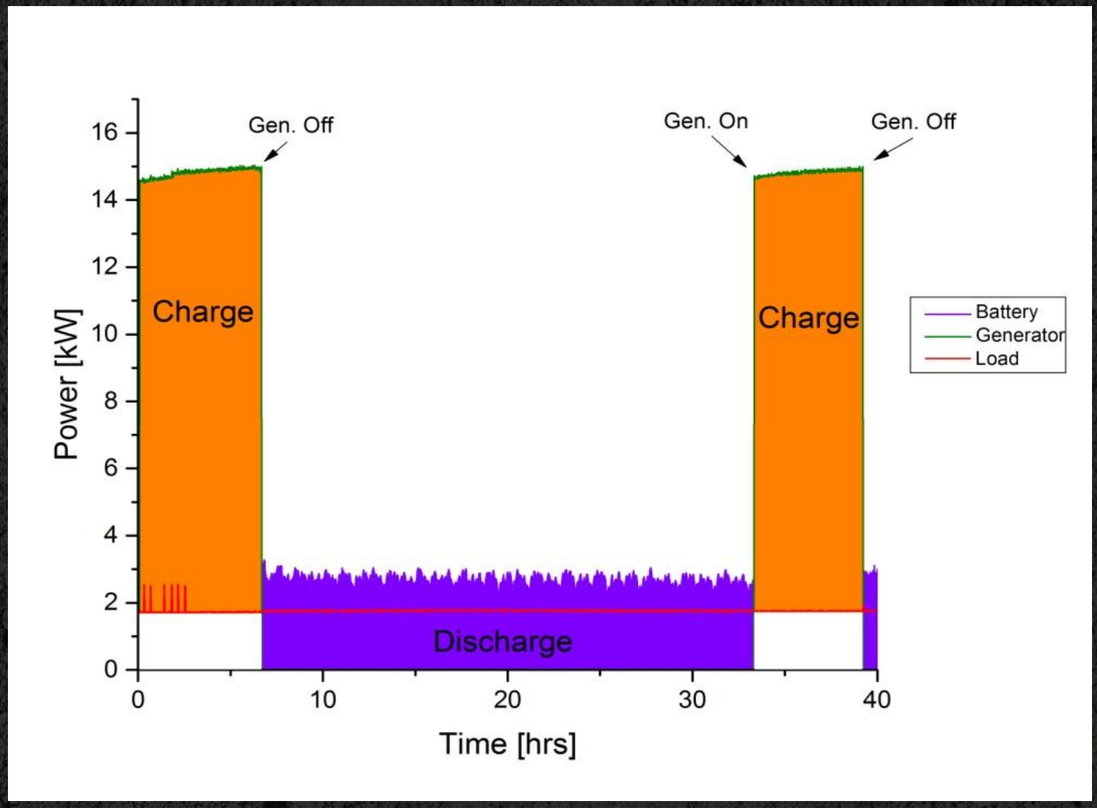


METERING/MONITORING – ENERGY REQUIREMENTS

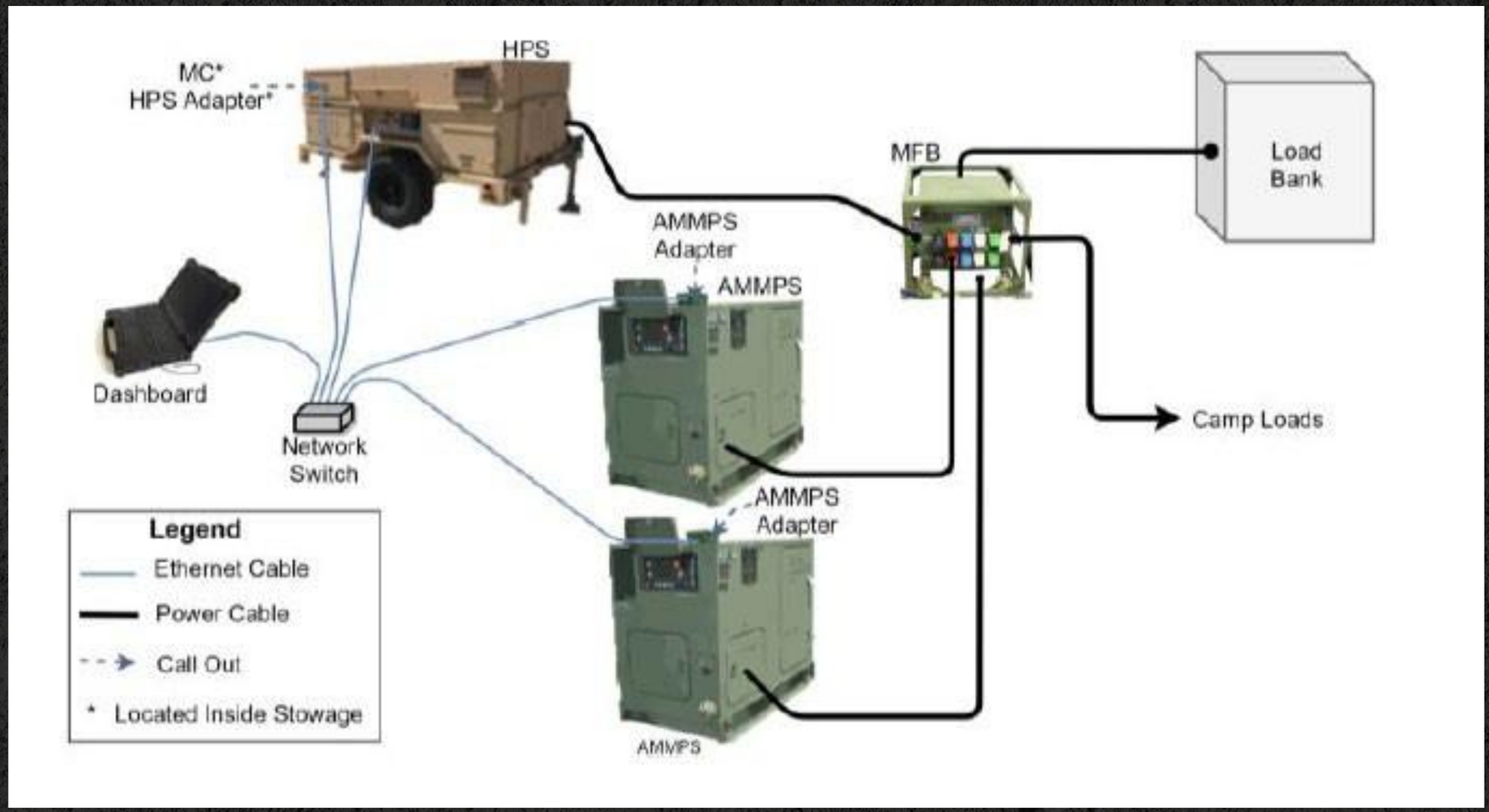
NATO-EX NIGHTHAWK – CAPABILITY PACKAGE 156



Hybrid Power System



HPSMicro Grid



Expeditionary Portable Power Unit
Partnering with AFRICOM

All-in-one

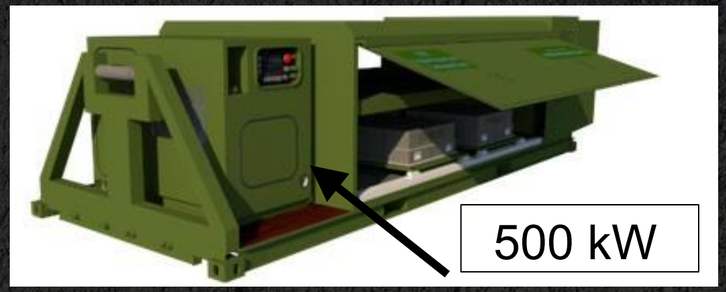
Larger Energy Storage Requirements

AMMPS MicroGrid
- 6 can only produce 360kW
- No Energy Storage
- Bulky to transport

?

DoD Missing
100-500kW
Solution

DPGDS (Prime Power)
- 840kW, High Voltage
- No Energy Storage
- Limited Transportability



- Mature and demonstrate novel energy storage with POR power generation
- Mature and demonstrate intelligent power management in CB environments
- Lead advance rapid prototype development at ERDC test sites
- Prove contingency components and subsystems maturity before integration into Warfighter formations
- Serve as reach back SME support for 249th others as needed

ERDC-CERL Test / Demo Sites

EFOB-L Champaign, IL

A pilot-scale test center for Contingency Basing/Operational Energy (CB/OE) components. Includes the capability for individual component testing, both in isolation and within a CB systems, with a focus on minimizing resource consumption and waste generation.

CBITEC Ft. Leonard Wood, MO

To conduct physical integration, demonstration, assessment and evaluation of contingency basing capabilities and technologies on a full-scale base camp in order to identify potential technologies/capabilities (power, water, waste, construction) for further development in support of Army requirements and future acquisition decisions.

MK Air Base Hybrid Support

BLUF: From 17OCT23-21NOV23, TF MTN DMAIN and USACE Engineer Research & Development Center (ERDC) conducted training and fielding on a prototype Expeditionary Portable Power Unit (EPPU). The EPPU is a hybrid power system that optimizes generator efficiency, reduces maintenance requirements, and enables silent TOC operations off battery power. This period was a proof of concept for future use at MKAB (TF All American DMAIN) and FDNY. Operators had positive experiences with the system and all parties involved agreed on the benefit of future cooperation. The EPPU will remain in theater and support powering TF All American's DMAIN.

Training & Operation

The EPPU arrived at MKAB on 17OCT23, USACE conducted training 18-19OCT23, and by 20OCT23, the system was powering DMAIN. In total, 3x SMEs from USACE travelled to MKAB, Romania, to train 23x TF MTN Soldiers and 6x DA Civilians from ASA-BS. Many more Soldiers observed and participated outside of formal blocks of training. For the past four weeks, the EPPU has been the primary source of power for critical tactical loads within the DMAIN. The team has observed 2x faults during this period, one of which was a generator fault vice EPPU.

24HR Period	Generator Power	Battery Power
31OCT23	7hr 56min	16h 4min
19NOV23	5hr 6min	18h 54min

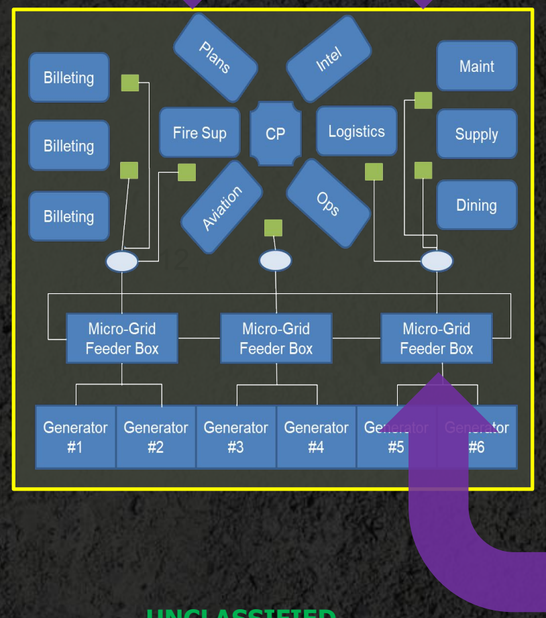
Takeaways: Load decreased in NOV23 because HVAC systems were no longer required. Extrapolating an average for the period, the **generator was completely off 73% of the time, resulting in fuel savings of over 50%. Fuel runs went from 3x a week to 1x a week**. Additionally, generator services are normally required every 750 hours of operation, or almost 12x a year when operating 24/7. With the EPPU in place and a similar energy requirement, the service requirement would reduce to 3x a year.

10 DAY AVERAGE	Generator Operating Hours	Fuel Usage (Gallons)	Estimated Fuel Costs (US Average $4.20 gal)	Estimated Fuel Costs (ROM Average $6.30 gal)
16-25 DEC 23 (Generator)	**240**	**792**	**$3,326.40**	**$4,997.52**
20-29 JAN 24 (EPPU)	**37.5**	**123.75**	**$519.75**	**$780.86**

Expeditionary Island Power (DEMO) FY24 PDM

Current Tactical Microgrid and Distribution Network Structure

Bridge Low and Medium voltage



Integrate Metering and Monitoring Capabilities

Energy Storage Capabilities

Points of Contact

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CONSTRUCTION ENGINEERING RESEARCH LABORATORY

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