USMC Initiatives
in
Energy and Power

Michael Gallagher
Program Manager - Expeditionary Power Systems
Marine Corps Systems Command
<table>
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Discussion Topics

- USMC Organizations in Power & Energy
- Key Power and Energy Drivers
- Naval Lithium Battery Safety Program
- Business Opportunities
- Acquisition Programmatic Considerations
USMC Organizations in Power and Energy

Assistant Secretary Of the Navy Research, Development & Acquisition

Chief of Naval Research

Program Executive Officer Land Systems

Commander Marine Corps Systems Command

Assistant Commandant of the Marine Corps

Deputy Commandant Installations & Logistics

Deputy Commandant Combat Development & Integration

Director Expeditionary Energy Office

Marine Corps Warfighting Lab

Office of Naval Research
USMC Power Generation Capability

- 1,564 MW in 2008 (OIF tactical & commercial)
- 303 MW
- 120 MW
- 64 MW
- 14 MW (OIF deployed)
- 40 MW
- 8 MW
- Centrally Managed Inventory within the USMC

May 2010
Individual Power Needs

- AN / PRC - 148 or 152 Unique Batteries
- AN / PVS-17 AA Battery
- AN / PVS-14 AA Battery
- AN / PEQ-16A DI-123A Battery
- AN / PAS-13D AA Battery
- Hand-held flashlight AA Battery
- MIOX Water Purifier AA Battery
- AN / PSC-13 D-DACT Unique or AA Battery
- AN / PVS-14 Unique Battery
- Quiet Pro Headset Unique Battery
- AN / PRC-153 Unique Battery
- Squad Digital Camera Unique Battery
- DAGR AA Battery
- Rugged Laptop Unique Battery
- AN / PRC-117F BA-5590 / BA-5390 / BB-2590 Batteries
- AN / PVS-14 AA Battery
- AN / PAS-13D AA Battery
- Hand-held flashlight AA Battery
- MIOX Water Purifier AA Battery
- AN / PSC-13 D-DACT Unique or AA Battery
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- Squad Digital Camera Unique Battery
- DAGR AA Battery
- Rugged Laptop Unique Battery
- AN / PRC-117F BA-5590 / BA-5390 / BB-2590 Batteries
Pre-OIF Radio Density

T/O 6 Officer/176 Enlisted

- VHF-V (VRC-88): 1
- VHF-M (PRC-119): 7
- UHF-M (PRC-113): 1

Radio Weights
PRC-119 - 22.5 lbs
PRC-113 - 16.7 lbs
* w/batteries

Co HQ (x3/Bn)

RFL Plt (x3/Co x9/Bn)

Mounted in M998A1

WPNS Plt (x3/Bn)

May 2010

MG Sect  Mortar Sect  Assault Sect
Tactical Communications Modernization

Co HQ (x3/Bn)

RFL Plt (x3/Co x9/Bn)

WPNS Plt (x3/Bn)

Mounted in M1123A2s

T/O 6 Officer/176 Enlisted
- MBR-V (VRC-103): 1
- MBR-M (PRC-117): 6
- HFMR (PRC-150): 5
- DVA (VRC-110): 2
- THHR (PRC-148/152): 35
- IISR (PRC-153): 176

Radio Weights
- PRC-150 - 15.7 lbs
- PRC-117 - 15.9 lbs
- PRC-152 - 2.4 lbs
- PRC-153 - 1 lbs
* w/batteries

*Corpsman IISR counted in H&S

May 2010
Vehicle Power Needs

Alternator Amperage Rating on HMMWV / MRAP at 28 VDC

Initial Fielding – 60 Amps

Post Desert Storm – Start of Digitization

OEF / OIF / Digitization / Networking

Second Generation Vehicle Deliveries

MRAP Cat I & II

RG-31

RG-31 Upgrade

COUGAR / JERRV

MRAP Follow-on
Vehicle Power Needs

- JLTV OBVP (O)
- JLTV OBVP (T)
- JLTV Export (T)
- MPC
- MRAP
- ATV
- HMMWV

Amps at 28 VDC

- 5 kW
- 10 kW
- 15 kW
- 20 kW
- 25 kW

Year

- 1980
- 1990
- 2000
- 2010
- 2020
Renewable Energy Investments

- **Internal**
  - < 10 Watts

- **Carried**
  - 10 - 100 Watts

- **Portable**
  - 100 - 1000 Watts

- **Generator**
  - 1 – 100 kWatts

- **Stationary**
  - > 100 kWatts


- Not Tactical: Not Feasible, Not Tactical
Secretary of the Navy Energy Goals

New Requirements for Acquisition Processes

• Mandatory evaluation factors used when awarding contracts for platforms, weapon systems, and buildings will include: Lifecycle energy costs, Fully-burdened cost of fuel, Contractor energy footprint

Sail the “Great Green Fleet”

• DON will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016

Reduce Petroleum Use in Non-Tactical Vehicles

• By 2015, DON will reduce petroleum use in the commercial fleet by 50%

Increase Alternative Energy Ashore

• By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources

Increase Alternative Energy Use Navy-wide

• By 2020, 50 percent of total DON energy consumption will come from alternative sources
Mobile Electric Power

DOD Standard Generators

USMC Unique Generators

Tools / Customer Support

Integrated Trailer
ECU - Generator

Power Distribution

Floodlight Sets
Environmental Control Equipment

Environmental Control Units

Special Customer ECUs

Field Refrigeration

In-Field Ice Making
(food service, mortuary affairs)

Tools / Customer Support

May 2010
Advanced Power Sources

Radio Power Adaptors

Power Supplies

Renewable Energy

On-Board Power

Battery Management / Sustainment Systems
Expeditionary Power Systems Reset

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<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
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- PRODUCTION: Production
- RDTE C: RDTE C
- Evaluation: Evaluation
- Family of ECUs (USMC): Environmental Control Units (1st & 2nd Gen)
- Family of FRS (USMC): Field Refrigeration Systems (1st & 2nd Gen)
- AMMPS 5-60 kW (Joint): Advanced Medium Mobile Power Sources (3rd Gen)
- 2/3 kW MTG/TQG (Joint): Military Tactical Generator / Tactical Quiet Generator
- 100 kW TQG (Joint): Tactical Quiet Generator (2nd Gen)
- MMG 25 MTG (USMC): Military Tactical Generator (UUNS / POR)
- ITEG (USMC): Integrated Trailer-ECU-Generator (1st Gen)
- ITEG II (USMC): Integrated Trailer-ECU-Generator (2nd Gen)
- MEPDIS (USMC): Mobile Electric Power Distribution (1st & 2nd Gen)
- Family of ECUs (USMC): Environmental Control Units (3rd Gen)
- Support Equipment (USMC): Toolsets / Loadbanks / Modification Kits (continual buy)
## Expeditionary Power Systems Reset

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### Military Battery Chargers
- Vehicle Mounted
- Ruggedized Garrison
- Special Purpose

### Lead Acid Battery Mngt
- Chargers / Analyzers
- On-site training

### Radio Power Adaptors
- Hand-held
- Man-portable
- Multi-radio

### Family of Power Supplies
- Garrison / Benchtop
- Ruggedized

### On-Board Vehicle Power
- HMMWV Upgrade
- APU
- HMMWV 30 kW
- MTVR 120 kW
- DC-AC Inverters

### Renewable Energy Sources
- Man-portable (SPACES)
- Modular (GREEN)
- Trailer Mounted (DREAM)
Experimental Forward Operating Base

• Intent:
  – Design and build scalable small to large FOB prototype
  – Test, evaluation, operational experimentation with various configurations

• First Round ExFOB Demonstrations:
  – February – March 2010
  – Conducted in Quantico VA
  – 90 proposals evaluated / 27 demo’d
    • Power Generation
    • Water purification, packaging, storage
    • Shelters and shelter efficiency

• Second Round ExFOB Demonstration:
  – August 2010 in 29 Palms, CA (RFI to be released by ONR)
  – Desire to address:
    • Microgrids
    • Alternative cooling methods in desert environments
Naval Lithium Battery Safety Program

• Applies to Every Program in Department of Navy / USMC which has a lithium battery
  – No matter how small or how large.

• Approval must be obtained before the systems is:
  – Used by DoN/USMC personnel.
  – Tested with or on DoN/USMC equipment and facilities

• Approvals are specific to:
  – A battery design
  – A system (certain vehicle, type of radio, etc.)
  – A platform (surface ship, ground, sub, air)
Naval Lithium Battery Safety Program

- What governs the Naval Lithium Battery Safety Program
  - Naval Sea Systems Command Instruction
    - NAVSEAINST 9310.1b / Defines the Process
    - Technical Manual S9310-AQ-SAF-010 / Latest version of 19 Aug 04
    - Guidelines for Design, Review and Testing
  - MCSC Acquisition Policy Letter
    - Policy Letter No. 3-04 / Implements the Department of the Navy LBSP

All documents available at www.marcorsyscom.usmc.mil/sites/pmepe
Who Are The Players?

• Approvals Granted by – NOSSA
  – Naval Ordnance Safety and Security Activity, Code N841

• Special Authority for Specific Platform Use:
  – NAVSEA Code 07T2 for Submarine Carriage
  – NAVAIR 4.4.4.1 for Aircraft Carriage

• Primary Testing and Evaluation Sites
  – Carderock Division, NSWC, Code 616
  – Crane Division, NSWC, Code 609

• PM-Expeditionary Power Systems (EPS) is USMC focal point
Exceptions and Exemptions
(TM-S9310 Section 1.3)

• Exemption - Lithium Ion Batteries Used in COTS
  – UL listed, unmodified electronics using OEM charging device
  – No more than 18 V (≤ 4 series cells)
  – No more than 100 Wh

• Exemption - Coin Cells (Naval Msg 011731Z MAR 06)
  – Commercial available cell, in unmodified device
  – Single primary cell configuration
  – ≤ 3 volt
  – ≤ 1 Ah capacity

• Exception - Small ≤ Two Identical Primary Cell Applications (non-rechargeable)
  – No more than 1.5 Ah/cell
  – COTS Item:
    • must be UL listed and unmodified
  – Navy Specific item:
    • No other source of power or electrically protected (i.e. diodes)
 Acquisition Opportunities

- Next Generation, Self-contained, Tactically Deployable Floodlight
- Mobile Electric Power Distribution System Rebuy
- Family of Environmental Control Units
- Ruggedized Suitcase Battery Chargers (military batteries)
- Special Purpose Battery Charger (AN/PRC-152 battery in storage)
- Lead Acid Battery Chargers / Analyzers
- AN/PRC-117F/G Radio Power Adaptors
- Commercial Benchtop / Lab Power Supply
- Ruggedized Power Supply with Worldwide Power Input
- Improved Battery System (large format, high energy density)
- On-Board ship battery storage / charging / self-containment
- Tactical Renewable Energy Program (TREP - Trailer Mounted) – ONR BAA
- Tactical Generator Microgrid - ONR BAA
- ExFOB Hardware Demonstration - ONR RFI – Late May
Acquisition Opportunities

• Keep your eyes on FedBizOpps and GSA Advantage

• Sources Sought / RFI notices will precede official RFP

• Will follow Acquisition Guidelines for source of supply
  – Mandated sources
  – Federal Schedules
  – Small Businesses / Disadvantaged Businesses
  – Open Competition
  – Limited Competition
# Acquisition Strategies

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<th>USMC Non-Dev’l</th>
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<td>Generator Loadbank</td>
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<tr>
<td>Lithium Battery Systems / Safety Systems</td>
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Acquisition Phases

Possible Transition Points to Acquisition Programs

M/S A

Concept Refinement

SRR
TRL – 3/4
Technology Development

Science & Technology

CDR
TRL – 4/5/6

Engineering and Manufacturing Demonstration

PDR
TRL – 6/7

System Integration

CDR

SRR

FCA
TRL – 7/8

System Demonstration

PDR

TRL – 8/9

Production & Deployment

PDR

LRIP/IOT&E

IOT&E - Initial Operation Test & Evaluation

PDR - Preliminary Design Review

FRP - Full Rate Production

LRIP - Low Rate Initial Product

SRR - System Requirements Review

LD - Logistics Demonstration

LD - Low Rate Initial Product

S&T - Science and Technology

L/RIP - Post Award Conference

TRL - Technology Readiness Level

S&T - Science and Technology

UE - User Evaluation

PAC - Post Award Conference

UE - User Evaluation
Technology Readiness Levels

TRL 1
Basic principles observed and reported

TRL 2
Technology concept and/or application formulated

TRL 3
Analytical and experimental critical function and/or characteristic proof-of-concept

TRL 4
Component and/or breadboard validation in laboratory environment

TRL 5
Component and/or breadboard validation in relevant environment

TRL 6
System/subsystem model or prototype demonstration in a relevant environment (lab or field)

TRL 7
System prototype demonstration in a field environment

TRL 8
Actual system completed and “field qualified” through test and demonstration (Ground or Flight)

TRL 9
Actual system field-proven through successful mission operations

Research to Prove Feasibility

Technology Development

Technology Demonstration

System/Subsystem Development

System Test, Launch & Operations
Acquisition Planning

- **Business Strategy**
  - How fast are items needed?
  - How defined, understood and available is the end item?
  - How often are items needed (One-time-buy, Life-of-item buy, Interim solution)?
  - Who is the customer? (defined, varied, unpredictable)
  - Joint Service interests / Other service lead / USMC lead

- **Acquisition Strategy**
  - Market Research should define / focus the strategy
  - Method for Performance Specification
  - Method for Work Scope Specification

- **Contracting Strategy**
  - Streamlined Acquisition
  - Commercial Item procurement
  - Competitive vs Sole Source Procurement
  - Federal Supply Schedule procurement (GSA)
  - Military Interdepartmental Procurement Request (MIPR)
Specifications / Statements of Work

Specification Types

– Performance Specification (MIL-PRF)
– Program Unique Specification
– Military Standard (MIL-STD)
– Purchase Description
– Commercial Item Descriptions (CIDs)

Work Statement Types (MIL-HDBK-245D for guidance)

– Statement of Work - Do as I say
– Statement of Objectives - You tell me
– Broad Agency Announcement - You tell me
In Closing.....

• Points of Contact:
  – Program Manager: michael.a.gallagher@usmc.mil
  – Mobile Power / ECU Team Lead: robert.h.mckenzie@usmc.mil
  – Advanced Power Team Lead: malar.motley@usmc.mil
  – Lead Engineer: jonathan.carpenter@usmc.mil
  – Capabilities Officer: clifton.harris@usmc.mil

Questions?