



# Alternate Fuel and Power in the Forward Deployed Environment

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# Report Documentation Page

Form Approved  
OMB No. 0704-0188

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1. REPORT DATE <b>MAY 2011</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2011 to 00-00-2011</b>	
4. TITLE AND SUBTITLE <b>Alternate Fuel and Power in the Forward Deployed Environment</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Marine Corps Systems Command, Light Armored Vehicles, 2200 Lester Street, Quantico, VA, 22134-6050</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the NDIA Environment, Energy Security &amp; Sustainability (E2S2) Symposium &amp; Exhibition held 9-12 May 2011 in New Orleans, LA.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>17</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# Agenda

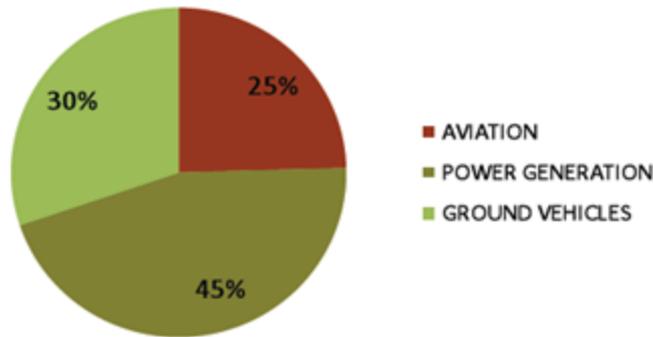


- Why ???
- Some Current Initiatives
  - Solar Power at the FOB
  - Waste to Energy Conversion at the FOB
  - Alternative Fuels in Military Vehicles
  - Improving Fuel Economy
- The Path Forward
- Conclusions

# Why Focus on Energy Conservation



## It Saves Money



### OEF 2010 Strategy Baseline

*~1.7M Bbls / Year*

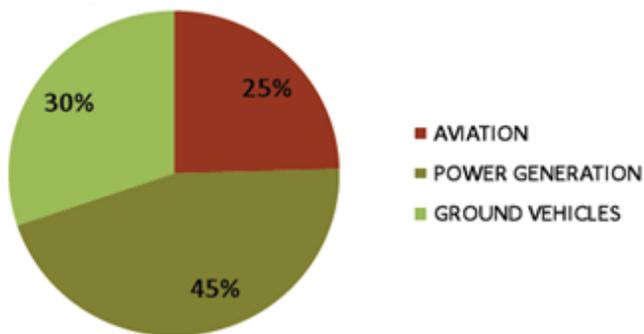
*~\$0.5B / Year*

*(Price/Gal ~\$7.05)*

# Why Focus on Energy Conservation



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## It Saves Lives

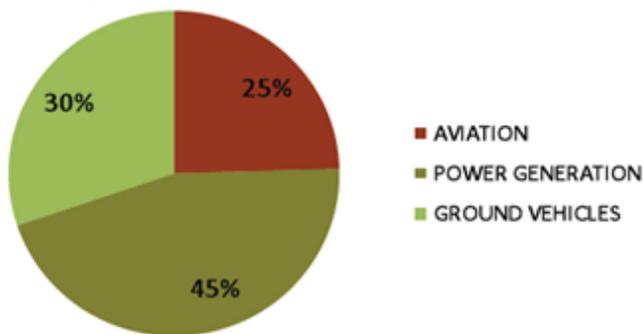


- 299 Fuel/Water Convoys (98 Days)
- 6 Marines WIA hauling Fuel/Water
- 1 Marine WIA per 50 Fuel/Water Convoys

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**We Can't Afford to Continue to Do Business as Usual**

# Current Initiatives



- “Poppies-for-Peace”
- ExFOB
- Individual Initiatives
  - Solar Power at the FOB
  - Waste to Energy Conversion at the FOB
  - Alternative Fuels in Military Vehicles
  - Improving Fuel Economy

## Mission

*By 2025 we will deploy Marine Expeditionary Forces that can maneuver from the sea and sustain its C4I and life support systems in place; the only liquid fuel needed will be for mobility systems which will be more energy efficient than systems are today.*

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# Solar Power



## Scenario #1: Current Doctrine for a 500 man FOB:

- Fifty tents required (1 GP tent billets 10 Marines)
- Three 60 watt light bulbs
- Estimated electrical load: 540 watts per tent x 50 tents = 27 Kw
- The following will be required:
  - (1) MEP 805 Generator = 3006 lbs
  - (1) 30 Kw MEPDS-R Panel = 163 lbs
  - (2) 15 Kw MEPDS-R Panel = 81 lbs
  - (6) 5 Kw O.D. Panel = 44 lbs
  - (5) Field Wiring Harness Set = 764 lbs
  - Miscellaneous cables and reels = 1640 lbs

**Total embark weight = 9055 lbs**

**Fuel for the generator = 5 gal/hr,  
or 120 gal/day**



# Solar Power



## Scenario #2: Solar Powered Lights for 500 man FOB:

- Fifty tents required (1 GP tent billets 10 Marines)
- Four 6.5 watt LED light bulbs
- Estimated electrical load: 26 watts per tent x 50 tents = 1.3 Kw
- The following will be required:
  - Voltage regulator
  - (4) Ultra bright LED lights
  - 12v sealed battery
  - 20w 12v Solar Panel
  - (4) outlets
  - Terminal Block
  - 16/2 AWG wire
  - Support wire
  - Storage box (not shown)
- Weight per light set = 22 lbs.



**Total embark weight = 1100 lbs**

**Fuel for the generator = 0**

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# Solar-powered Tent Lighting System

- **Approximate cost for COTS equipment (not including storage box) = \$357**
- **Embark weight = 88% lighter than current power generation system**
- **Can save 120 gal/day of fuel for a 500 person FOB (Net zero fuel use)**



Solar Collection



Low voltage LED lighting in a standard GP tent

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# Waste to Energy Conversion



## Where are the feedstocks?



Process Wood Waste



Agricultural Based



Wood Chips



Mess Hall Food Waste

**Any low-value biomass with a Carbon Footprint will do...**



Landfill Based Waste

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# Waste to Energy Conversion



Grind and compact it...

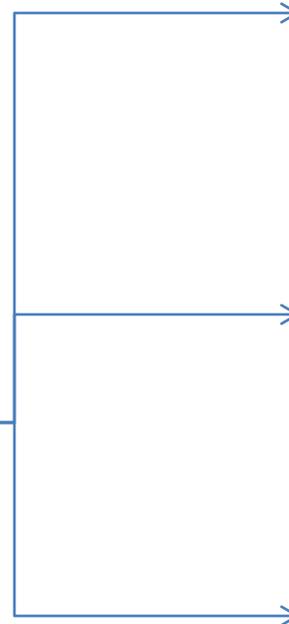
Heat, form and compress it into...

...briquettes, which can be converted (via indirectly-heated pyrolytic gasification\*) and harvested as **SYNGAS**

# Waste to Energy Conversion



**Syngas** is a commodity that can be used similarly to natural gas. Gas is captured and routed to electricity producing generators at the FOB



**Heat** is also a byproduct of the process – can be harvested and used at the FOB



# Alternative Fuels in Military Vehicles

- Use of bio-fuels
  - PM LAV tested B20 for one year in AVGP's
  - No significant degradation of performance/properties found during long term storage (over 1 year) in vehicle tank
  - Slightly improved mileage over JP-8 neat
  - Higher ratios and alternate feedstock testing required
- Hybrid technology
- Evolve to certification



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# Improved Fuel Economy in USMC Vehicles

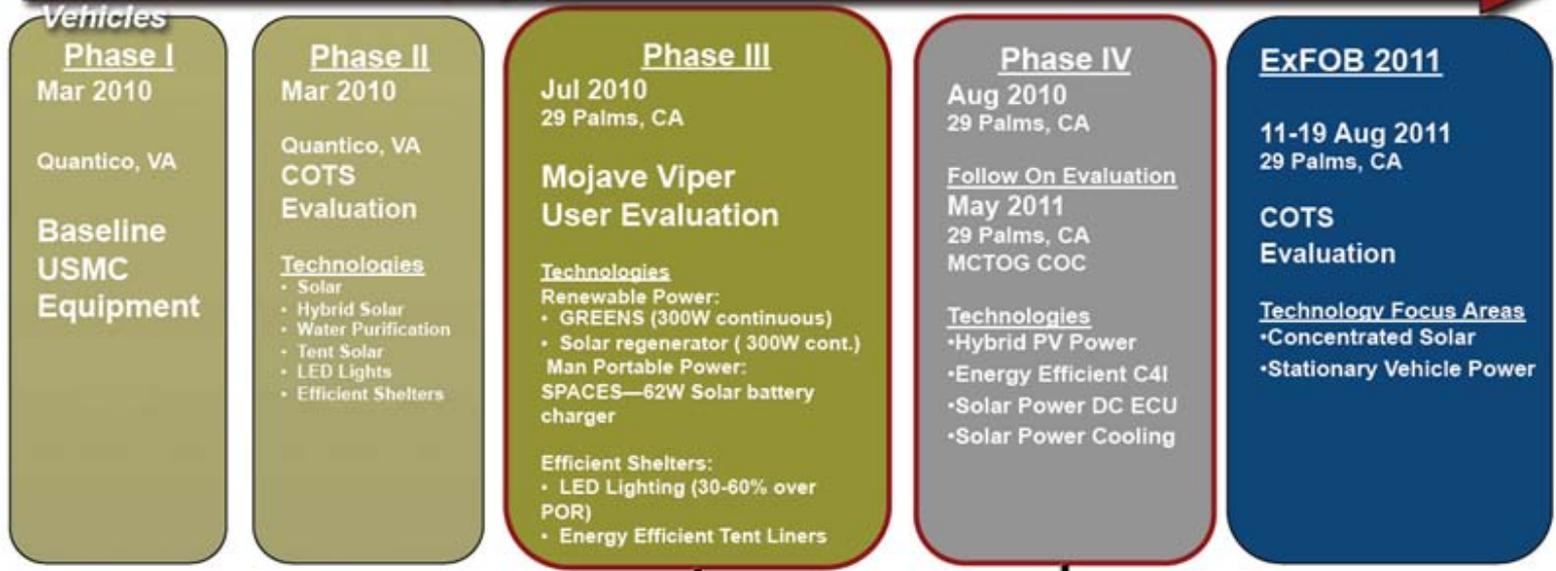


- MARCORSYSCOM Platform PM OPT
  - Establish baseline metrics
  - Determine Key Performance Parameters (KPP)
- Fuel Additives
  - Testing additives to improve mileage
  - Business Case Analysis (BCA)
  - Quantitative testing
- Hardware/Software Improvements
  - On-board power
  - Power distribution

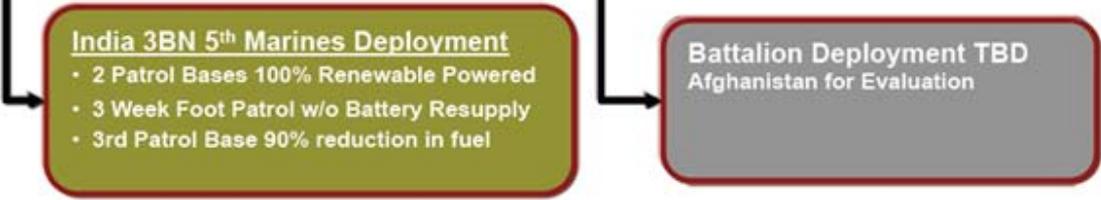


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# The Path Forward



## Multi-Functional Team



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# Conclusions



- There are significant gains to be made
  - Reduction and densification of the FOB waste stream
  - Reduction in dependency on traditional fuel
  - Reduction in costs and casualties
- Self-sufficient FOB's are feasible
- There is no single “silver bullet” solution
- Multifunctional teams developing complementary systems can reduce the energy footprint and lighten the MAGTF

**The USMC is committed to changing the way we use energy**

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# Questions



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