

**DoD Core Mission**

- Rising Peer Competitors
- Violent Extremists / Non-State actors
- Weapons of Mass Destruction
- Security of the Global Commons (Cyber/Piracy)
- Natural Disasters
- U.S. Troops Deployed

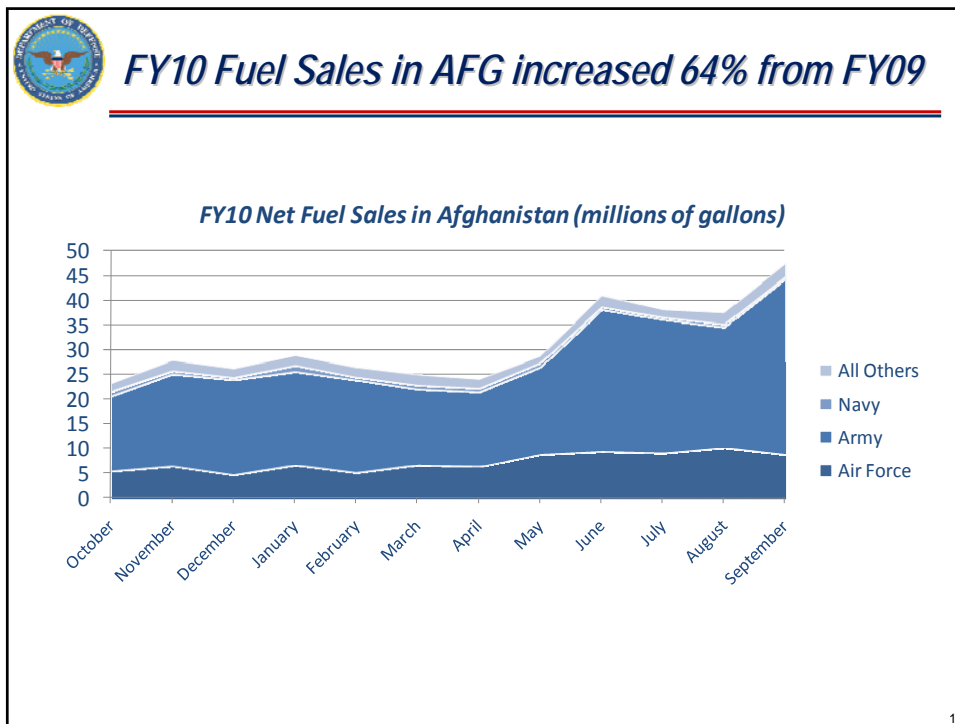
An Uncertain Dynamic Environment That Spans the Range of Military Operations

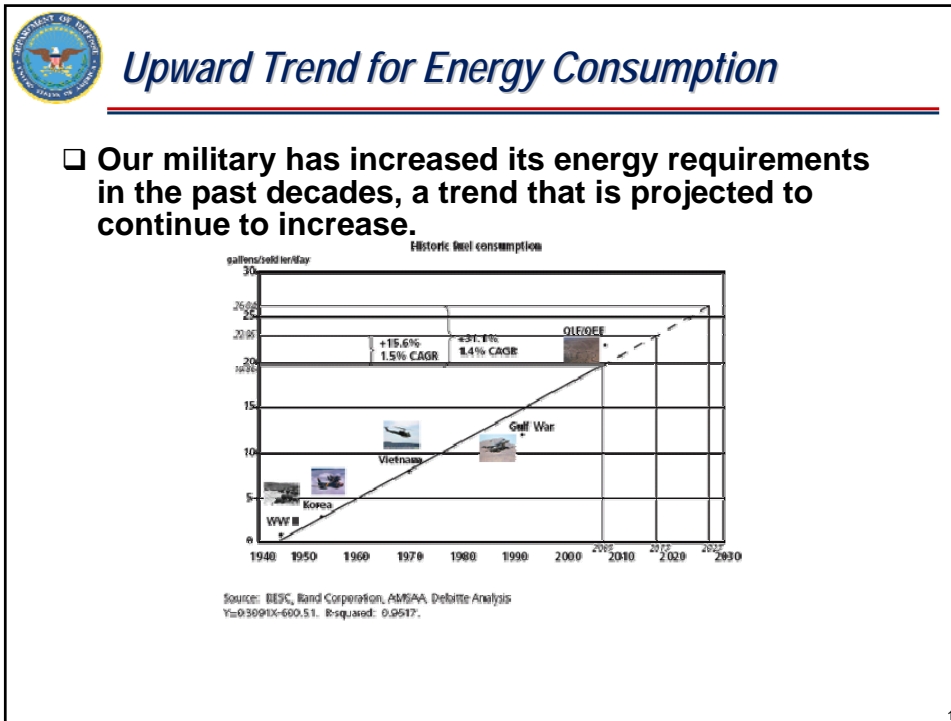
**DoD's Core Mission Requires Energy**

Total U.S. Energy Use <sup>1</sup> Operational Use <sup>4</sup>	Federal Energy Use <sup>2</sup>	DOD Energy Use <sup>3</sup>	Service
Federal Energy Use 1% Rest of United States 99%	DOD Energy Use 80% Other Federal 20%	Operational Use 75% Installations Use 25%	Army 16.9% Navy/MC 28.0% Air Force 54.6% Other DOD .5%



<sup>1</sup> EIA Annual Energy Report 2009, Figures by consumption  
<sup>2</sup> FY 09 EIA U.S. Government Energy Consumption by Agency, figures by consumption  
<sup>3</sup> FY 09 DOD Annual Energy Management Report, figures by site delivered BTUs  
<sup>4</sup> FY10 DLA Energy Net Fuel Sales, figures by sales

**Operational Energy – “The energy required for training, moving, and sustaining military forces and weapons platforms for military operations.”**






**Example: Tactical Wheeled Vehicles**

	
<b>HMMWV</b>	<b>MRAP</b>
<b>4-6 tons</b>	<b>9-40 tons</b>
<b>75 mph</b>	<b>55-65 mph</b>
<b>4 people</b>	<b>5-10 people</b>
<b>190 hp</b>	<b>330 hp</b>
<b>Bolt-on Plating</b>	<b>V-shaped Hull</b>
<b>275 miles</b>	<b>420-600 miles</b>
<b>8-16 mpg</b>	<b>2.3-4.4 mpg<sup>1</sup></b>


<sup>1</sup> AMSAA Pilot Data Study



## Mandate for Change


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- ❑ **2011 National Military Strategy**
  - “Joint Forces must become more expeditionary in nature and will require a smaller logistical footprint in part by reducing large fuel and energy demands.”
- ❑ **Quadrennial Defense Review**
  - “Energy security for the Department means having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs.”




“Our military leaders recognize the security imperative of increasing the use of alternative fuels, decreasing energy use, reducing our reliance on imported oil, making ourselves more energy-efficient.”

President Obama, March 31, 2010




## Why DoD Needs to Change

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- ❑ **Financial Costs**
  - ❑ Fuel Delivery Platforms
  - ❑ Over 5,040,000,000 gallons of fuel in 2010
- ❑ **Strategic Consequences**
  - ❑ Geostrategic
  - ❑ Regional fuel procurement
- ❑ **Mission Effects**
  - ❑ Logistics Burdens & Vulnerabilities
  - ❑ Limits Range and Endurance
  - ❑ Diverts Combat Forces

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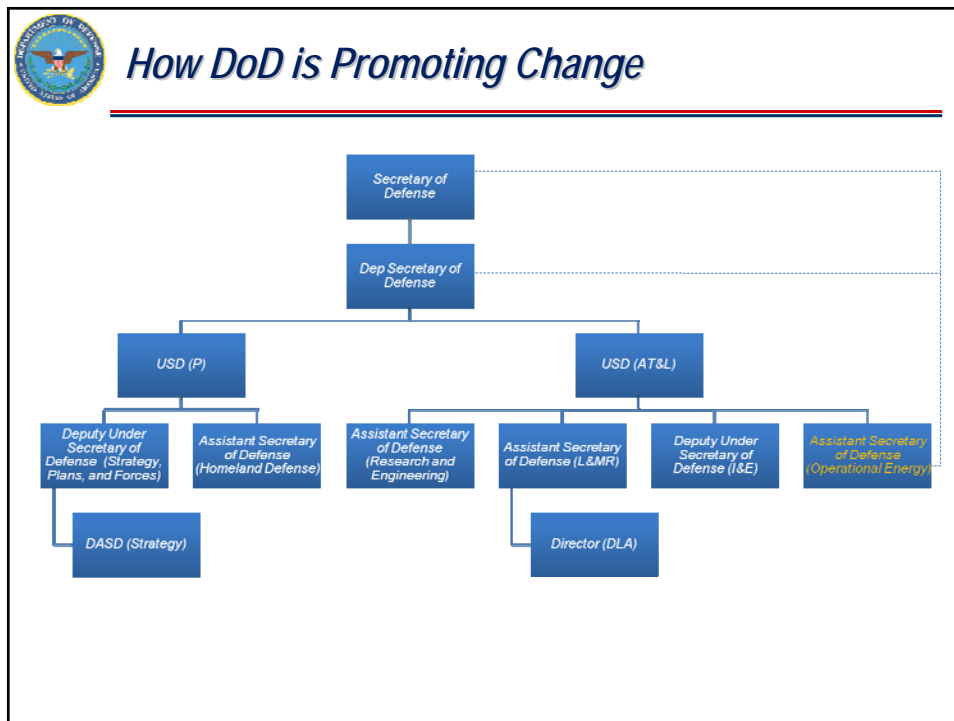



## The Highest Price

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- ❑ Iraq & Afghanistan – 3,000 Army personnel or contractors killed or wounded between FY03-07 in attacks on water and fuel convoys
  
- ❑ Afghanistan – One Marine wounded for every 50 convoys in 2010

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 **Energy Security for the Warfighter**

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- Improve End Use of Operational Energy*
- Expand Supply of Operational Energy*
- Build Operational Energy into Force Planning*





**Current Force → Future Force**

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 **End Use at Today's FOBs**

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- Technologies to Reduce Fuel Demand**

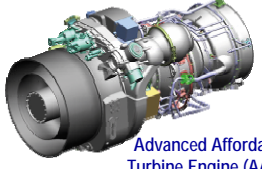
	<b>SMART GENERATION</b>
	<b>HVAC</b>
	<b>TENT SHADING</b>
	<b>TENT LINING AND LIGHTING</b>


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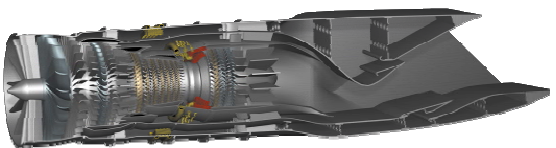
 **End Use in the Force**

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Advanced Affordable Turbine Engine (AATE)

  
Adaptive Highly Efficient Embedded Turbine Engine (HEETE)

  
Adaptive Versatile Engine Technology (ADVENT)

 **Expanding Supply in Current Ops**

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**Technologies to Increase Supply**

**MAN-PORTABLE** 




**OUTPOST SIZED** 



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## Expanding Supply - Innovation

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*Better Energy Management to Improve Military Effectiveness*

Power Generation / Energy Conversion

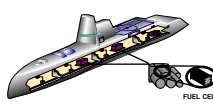
Power Control and Distribution

Thermal Transport and Control


Energy Storage

Electromechanical Conversion

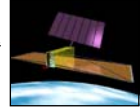
Advanced Fuels



Fuel Cell Applications




More Efficient Aircraft




Advanced Satellites


Unmanned Systems



Air





Underwater



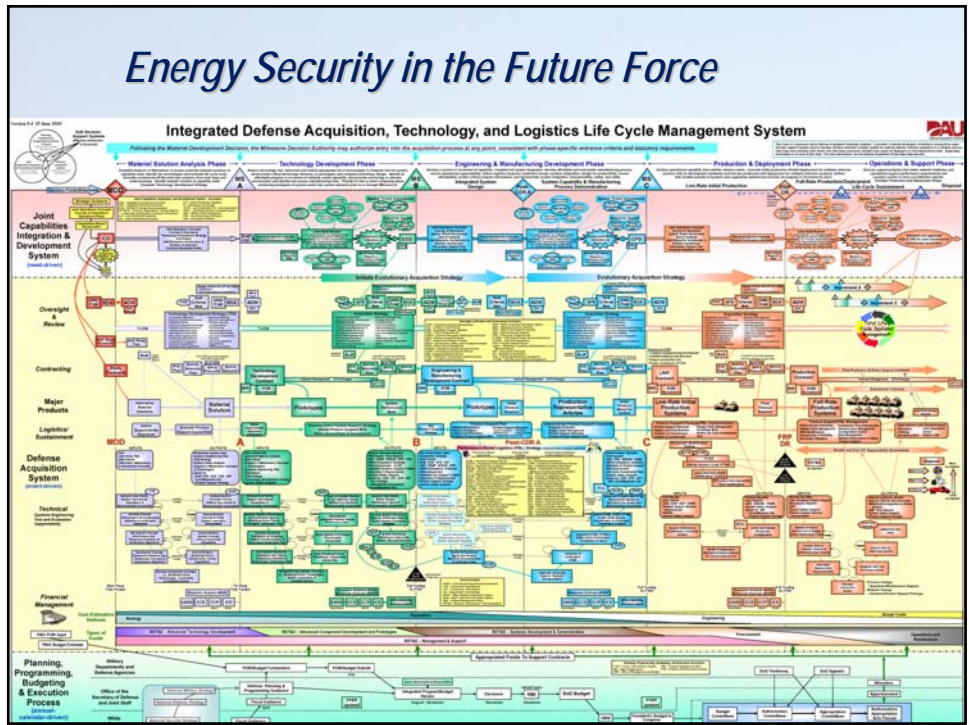
Ground

Warfighter Power

Hybrid / Electric Combat Vehicle

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 ***What Does Success Look Like?***

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**Energy as a Strategic Advantage for the Warfighter**



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 ***National Security Implications of Climate Change***

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**2010 QDR**

- “Climate Change will shape the operating environment, roles, and missions that we undertake.”
  - > Significant geopolitical impacts
- Impacts of Climate Change at DOD facilities and on our military capabilities
  - > Extensive coastal infrastructure
  - > Climate adaptation

**Improving Operational Energy Security will result in reduced GHGs**





## *Transforming DoD Energy*

- Bottom Line: By improving the way we use and value energy, we can make our warfighters more effective.**
  
- Lower Costs to the Taxpayer**
  
- Innovation for the Nation**



*Marine Wing Support Squadron 273 assesses technology in Morocco as part of African Lion 2010*

**Improving Energy Improves Effectiveness, Cost, Innovation**

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