
REPORT
OF THE

**DEFENSE SCIENCE BOARD
TASK FORCE ON
DOD ENERGY STRATEGY**

November 3, 2008

Task Force Leadership

- Study Co-Chairmen
 - Dr James Schlesinger
 - Gen Michael Carns, USAF (Ret)
- Policy Panel Chairman
 - Mr. James Woolsey, BAH
 - Ms. Gueta Mezzetti
- Platform Panel Co-Chairs
 - ADM Greg Johnson, USN (Ret)
 - GEN Greg Martin, USAF (Ret)
- Facilities Panel Chairman
 - VADM Al Konetzni, USN (Ret)
- R&D Panel Co-Chairs
 - Dr. Ed Reedy, GTRI
 - Dr. Jeff Tester, MIT
- Executive Secretaries
 - Mr. Chris DiPetto ODUSD (A&T)
 - Mr. Jack Taylor ODUSD (S&T)

77 Task Force members and government advisors
May 2006 to March 2007: 10 months, 37 meetings, 143 briefings
March 2007 to February 2008: 11 months of deliberations and writing

DoD Energy Space

Grand Strategy View – preserving US interests, resource competition, climate impact, etc.

Operational System Fuel

Supply

- Assured Supply
- Synthetic Fuels
- Coal to Liquids
- Agro-Chemistry
- Domestic Production
- Creating a Market

Demand

- Fuel Productivity
- Reducing “Tail” to Enhance “Tooth”
- Disruptive Tech Options

Installation Energy

Supply

- Grid Dependence
- Adequate Back-Up Power
- More DoD critical missions conducted from CONUS, MOBs
- Alternatives: sustainable on-base power

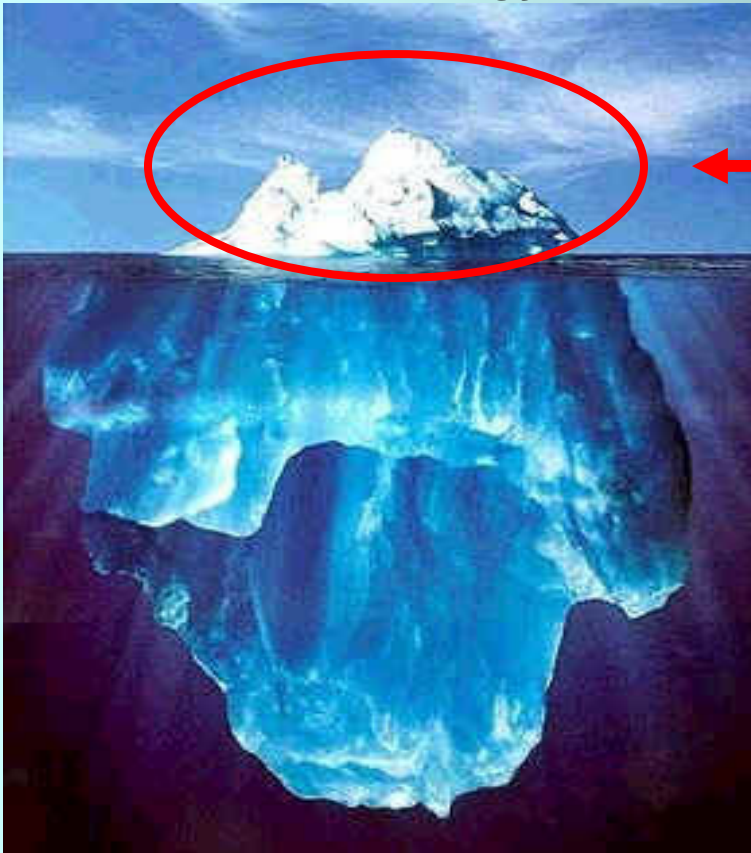
Demand

- Facility Inefficiency
- Green Building Principles
- Treat Buildings as Systems in Planning
- Exploit Commercial Technologies & Practices

Out of Sight, Out of Mind

Fuel for Forces

~75% of DoD energy demand



*But, no one in charge above
or below the waterline*

VS.

Energy for Installations

~25% of DoD energy demand



No Invisible Tail

- 4-Star Equivalent in charge
- Facilities are easy to count
- Virtually no invisible tail
- Clear focus
 - Energy Policy Act of '05
 - Executive Order 13423
- ~\$3B to purchase in FY06
- Numerous award programs - incentives
- Easy COTS solutions to exploit

Key Findings

- Two primary energy risks to DoD
 - **Unnecessarily high and growing operational fuel demand increases mission risk**
 - Critical missions at fixed installations are at unacceptable risk from extended power loss
- DoD lacks the strategy, policies, metrics, information, and governance structure necessary to properly manage its energy risks
- There are technologies available now to make DoD systems more energy efficient, but they are undervalued, slowing their implementation and resulting in inadequate S&T investments.
- There are many opportunities to reduce energy demand by changing wasteful operational practices and procedures.

Effects of High Energy Demand

- Impairs Operational Effectiveness
 - Vulnerability to forces and mission
 - Increases casualties
 - Constrains maneuver, limits endurance
 - Dilutes combat effectiveness by increasing force protection demands
- Increases Logistics Force Structure
- Increases Cost
 - Increases budget effects of volatile energy prices
 - Funds used for energy are not available to buy capability

High Operational Fuel Demand

Gen James Mattis, USMC

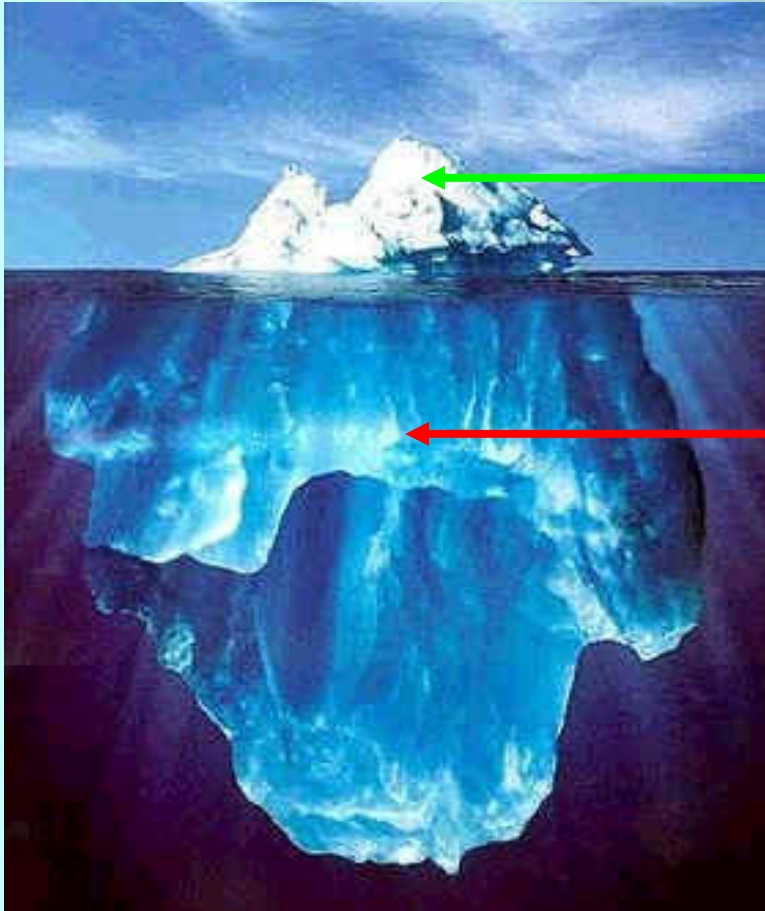
- “Unleash us from the tether of fuel”

Lt Gen Richard Zilmer, USMC, Al-Anbar Commander

- Urgent request to reduce military dependence on fuel*
- Road-bound convoys, supply lines vulnerable to insurgent attack by ambush and IEDs
- Personnel loss rates, continued casualty accumulation can to jeopardize mission success

“Price” is not “Cost”

Fuel for DoD Operations



Direct Price

Commodity Cost



Indirect Costs

Huge “tail” to deliver

- Airborne tanking
- Refueling trucks & helos
- Navy oilers
- Personnel
- Force Protection

Fiscal and Operational Costs from DoD’s fuel demand are significantly larger than we appreciate

...delivery is the real cost



\$42/gal*



\$15
or ???/gal
w/ escorts & helo
protection?

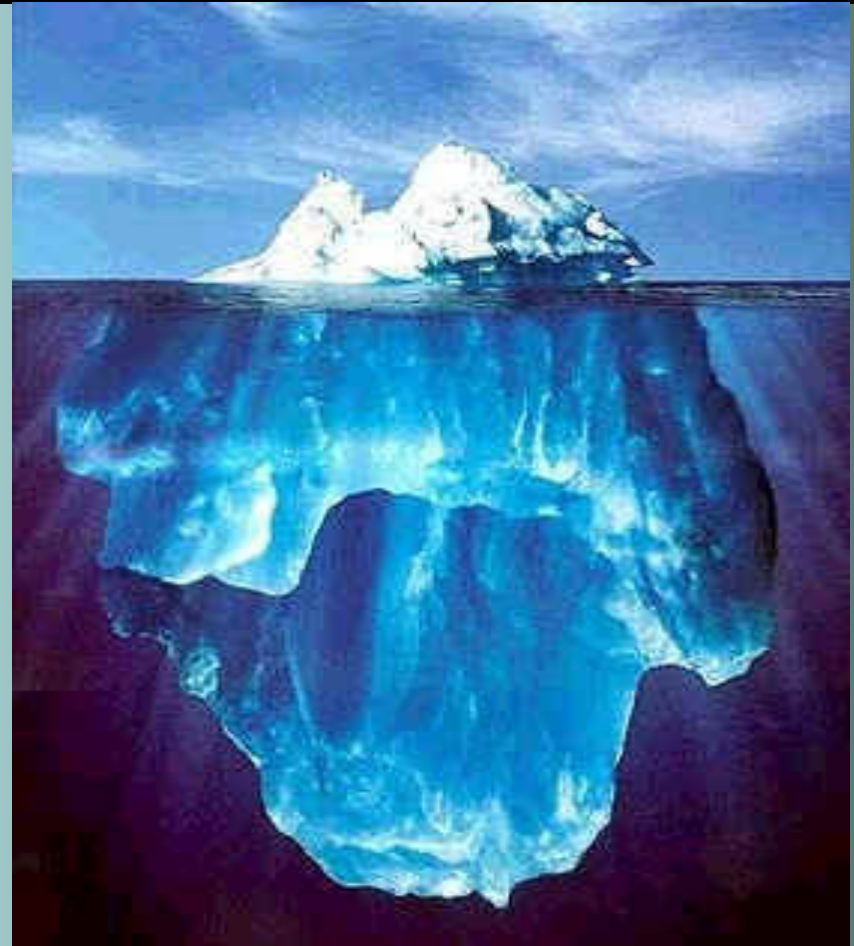
~7/gal ship-to-ship
??? by airborne tanker



* Consistent FBCF results
from 2001 DSB task force,
PA&E, JASONS and IDA

The Fully Burdened Cost of Fuel

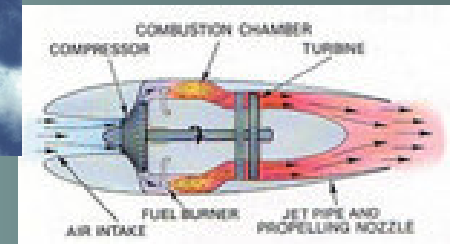
FBCF is the commodity price plus the total life-cycle cost of all people and assets required to move and protect fuel from the point of sale to the end user.



FBCF is a decision tool for giving delivered fuel due consideration in the operational & risk tradespace

New “Energy” Technologies

- Land Systems
 - Lighter, more resilient materials
 - Control systems
 - Innovative design concepts
 - More efficient propulsion systems
 - Stirling cycle opposed engine
 - Hybrid drive
 - Electric drive
- Fixed Wing Systems
 - Blended wing body
 - Lightweight materials
 - Novel actuator technologies
 - Populated flatwire
 - Adaptive propulsion systems
- Soldier Systems
 - Higher density batteries
 - Power starved electronics designs
 - More efficient solar charging



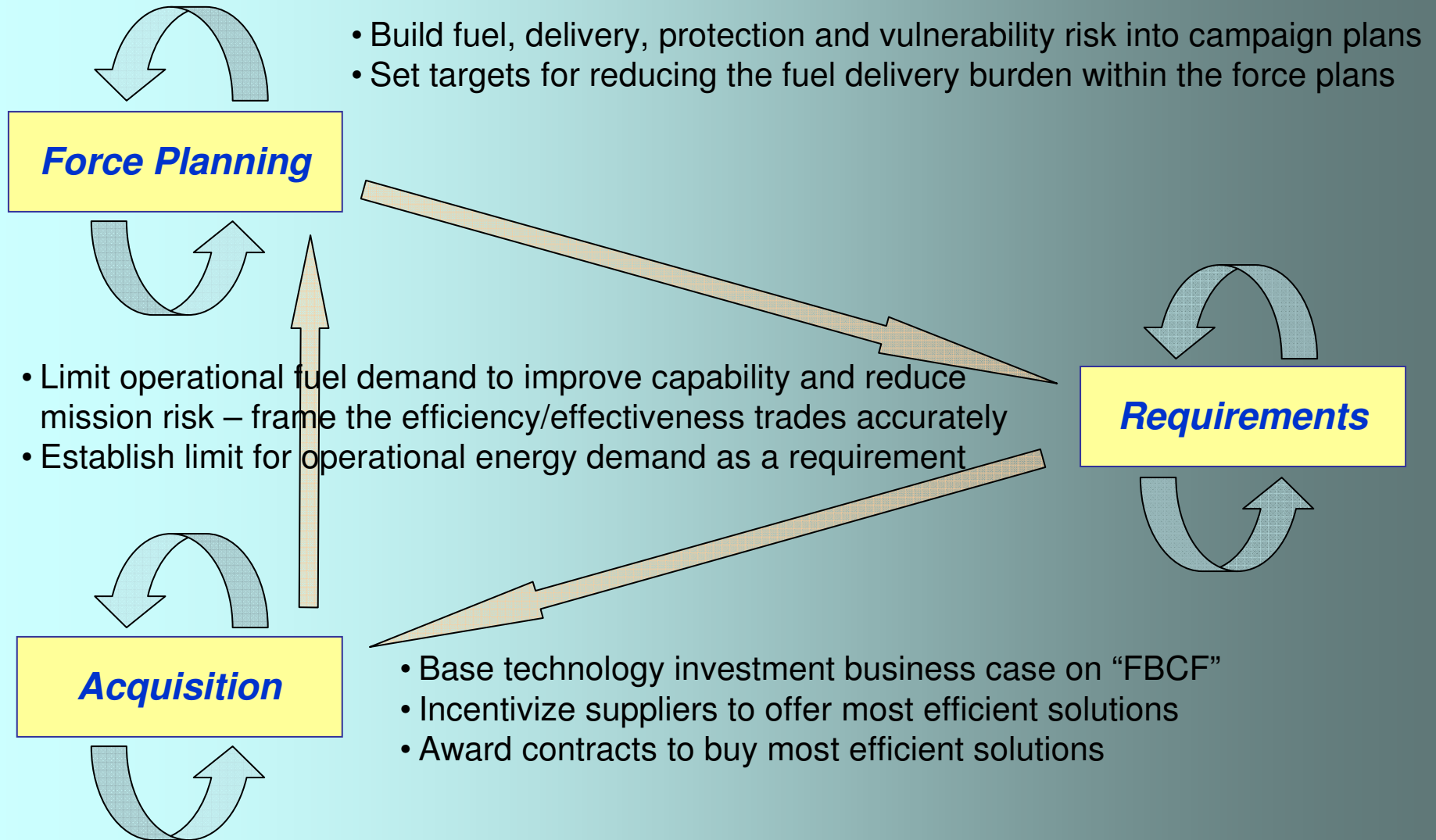
But....

DoD Planning ***Processes*** Undervalue Fuel
And Its Delivery Costs

and

DoD Business ***Practices and Culture***
Disincentivize Strategic Investment or Savings

What We Want DoD to *Change* – 3 Processes



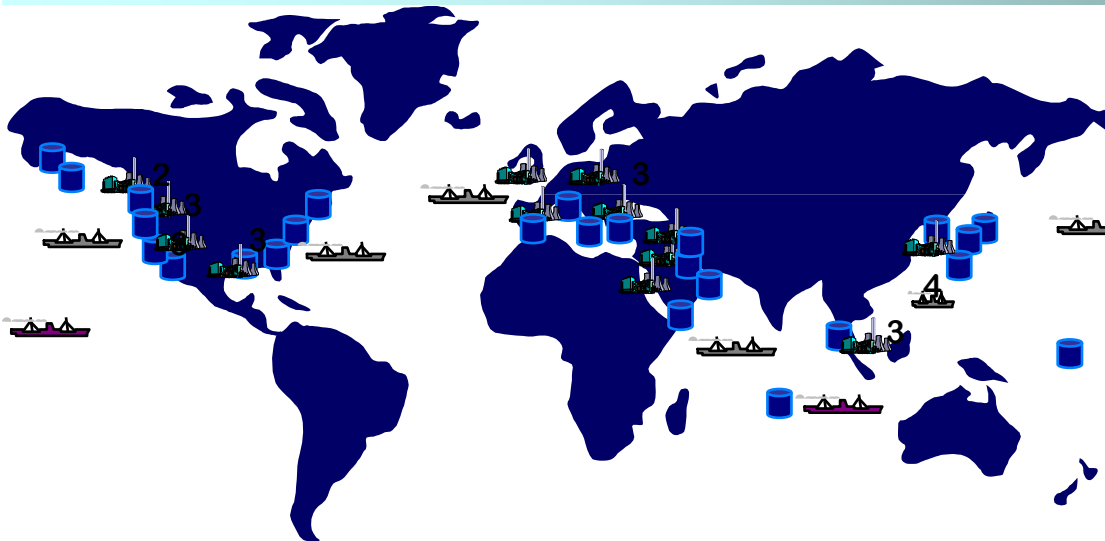
Current Actions

- Implementing FBCF
 - 3 Pilot programs to test FBCF
 - Developing FBCF methodology for use by all programs/suppliers
- Building energy into force planning process
 - Examining means for building energy into campaign plans
 - Introducing energy into wargames
- DoD-wide Strategic Plan under development
 - Operational energy with focus on demand reduction and renewable energy for forward bases
 - Higher efficiency and renewable energy at fixed bases for more resilient energy supplies
 - Specific assignments, timelines, accountability

Backup

Perspective on Fuel for DoD

- Petroleum-based fuels will remain the primary energy source for DoD mobile platforms for the next 25+ years
- DoD use: ~ 0.3million barrels per day (bpd) compared to >80m bpd globally and ~21m bpd domestically
- DoD has eminent domain over fuel contracts
- DESC maintains robust global network of supply points and sources for all types of DoD fuels



MILSPEC Petroleum Products
Worldwide Tanker Supply Chain