

ENERGY AND NATIONAL SECURITY

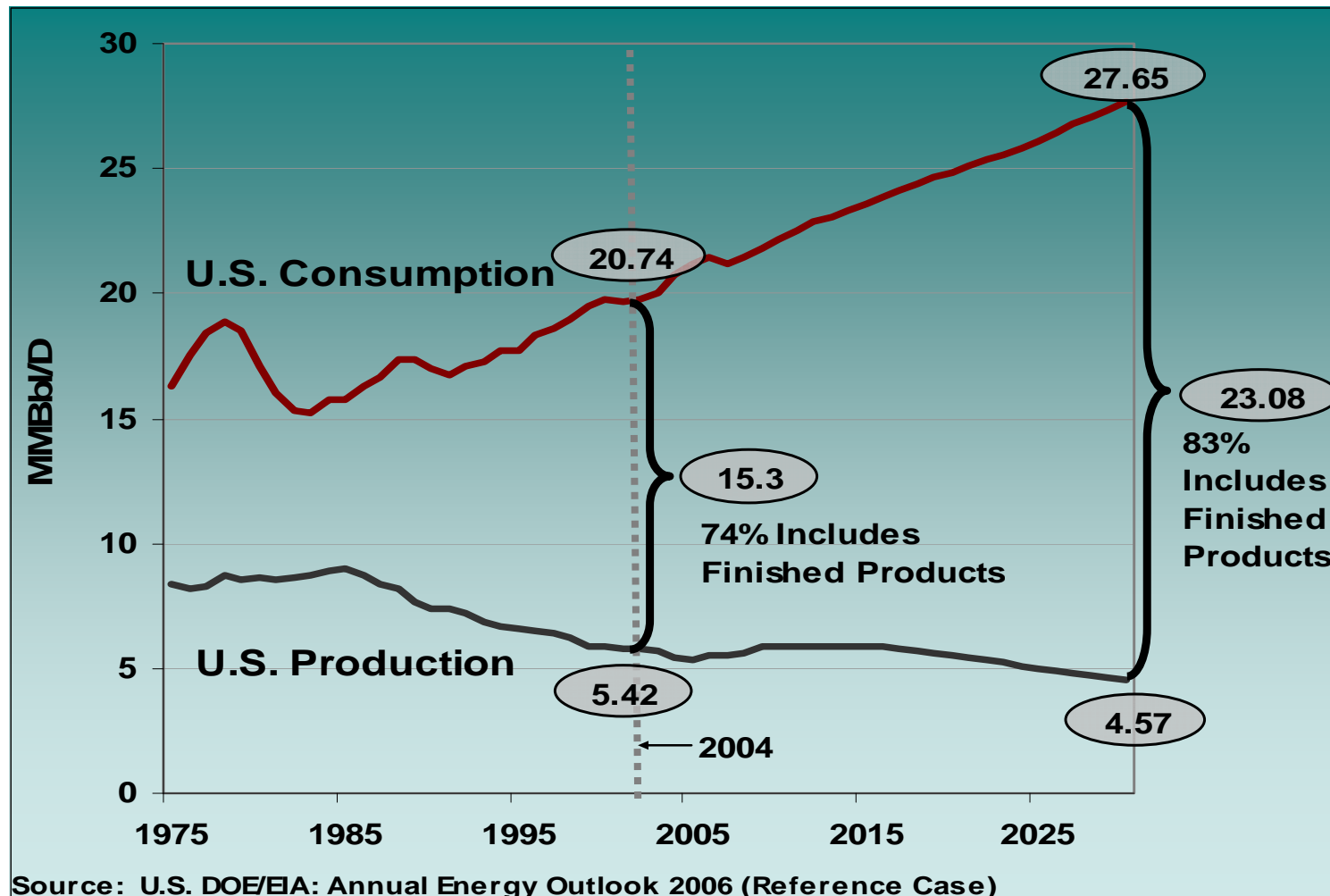
ISSUES AND OPPORTUNITIES

Recent DoD Energy Studies



- Naval Research Advisory Committee
- Air Force Scientific Advisory Board
- Naval Strategic Studies Group
- DoD Energy Security Task Force
- Defense Science Board Energy Task Force

U.S. Dependence on Foreign Oil

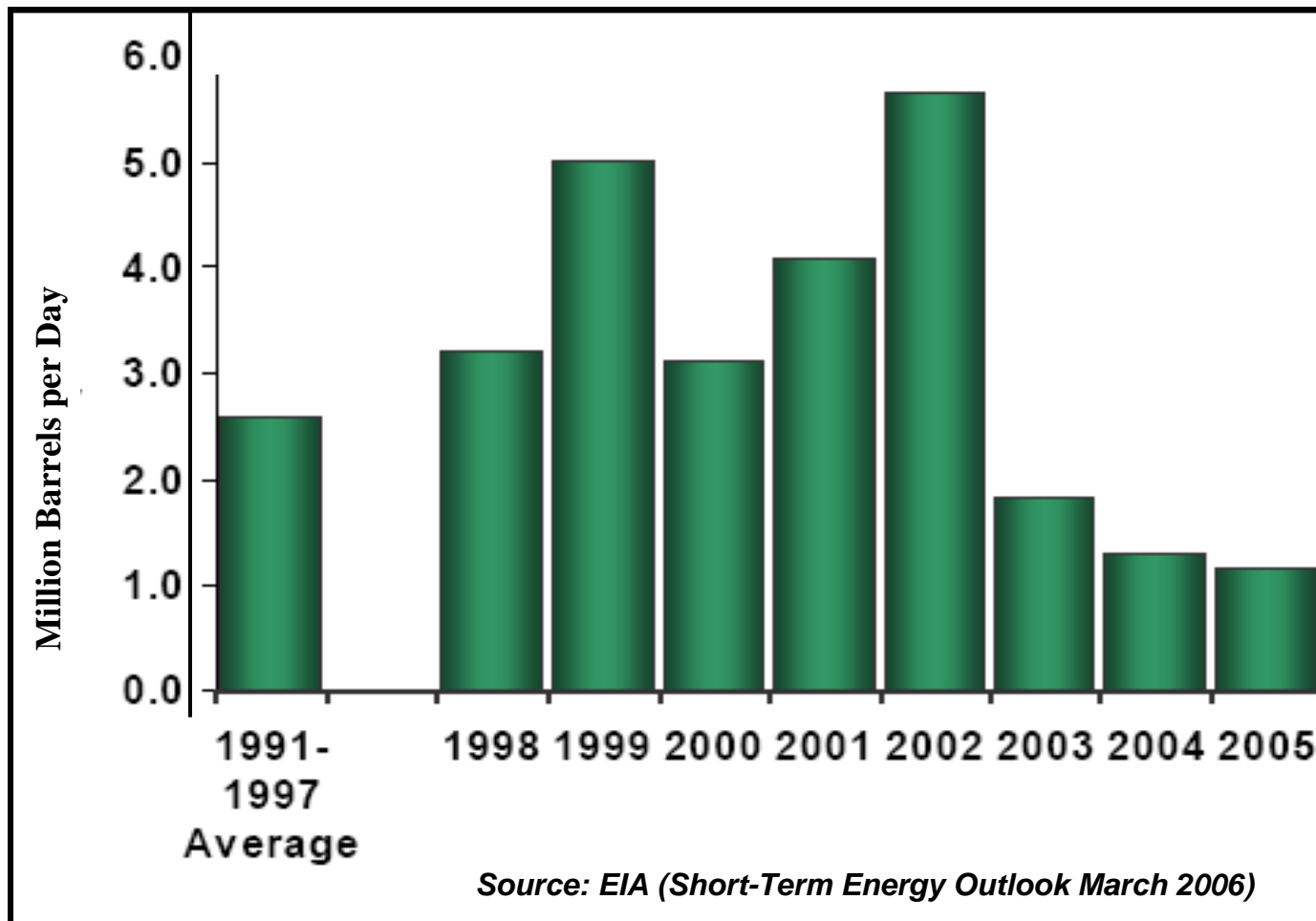


Petroleum Factoids

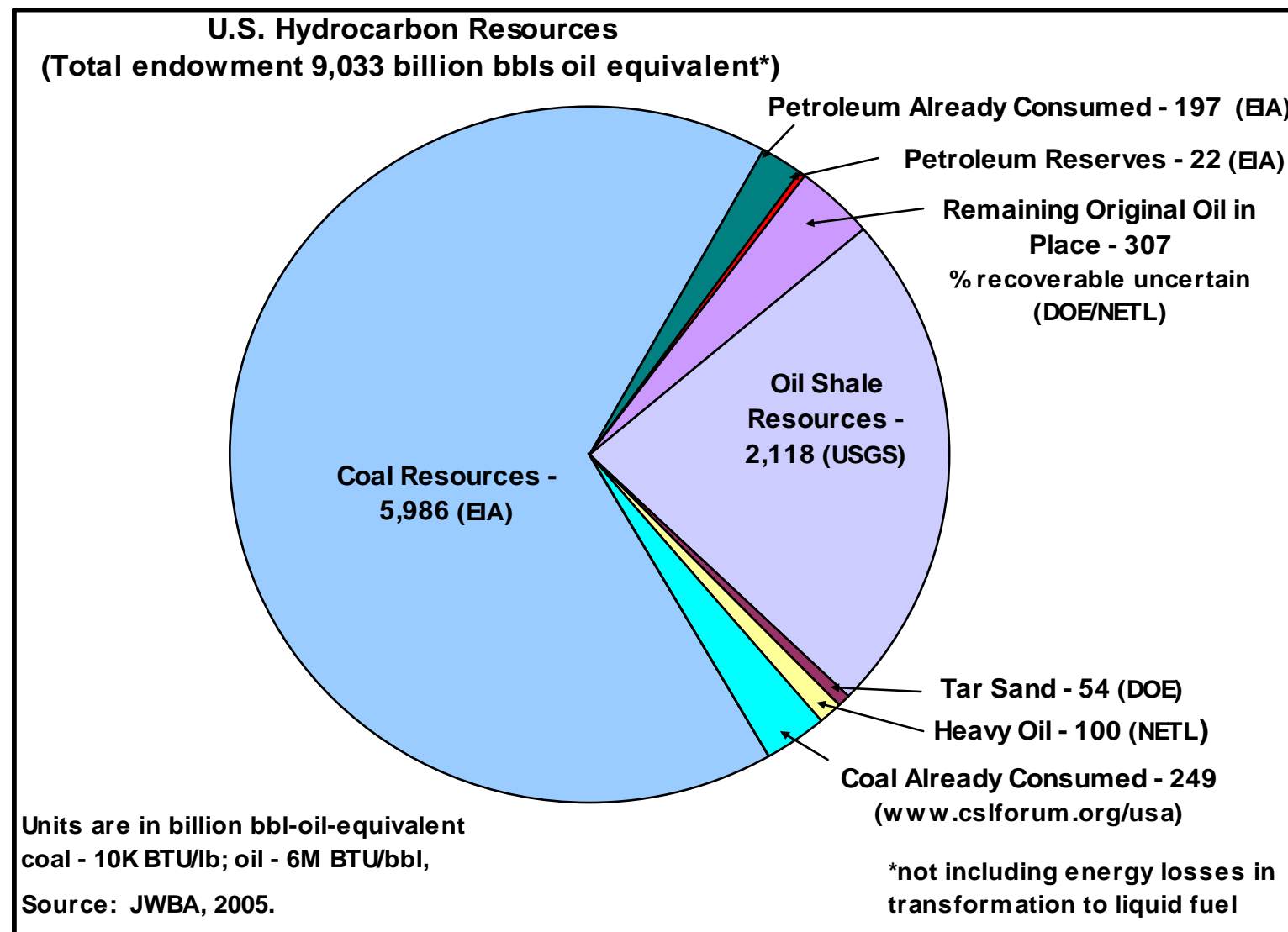


- The percentage of US oil imports is increasing primarily because foreign oil costs less.
- The world has had a “40 year supply of oil” for more than four decades.
- The principal suppliers of oil to the US are Canada, Mexico, Saudi Arabia, Venezuela and Nigeria.
- The US has a 200+ year supply of coal – provided the rate of coal consumption does not increase.
- A gallon saved is many gallons earned.
- Refining capacity drives fuel prices.

World Oil Spare Production Capacity



US Solid and Liquid Fuel Resources

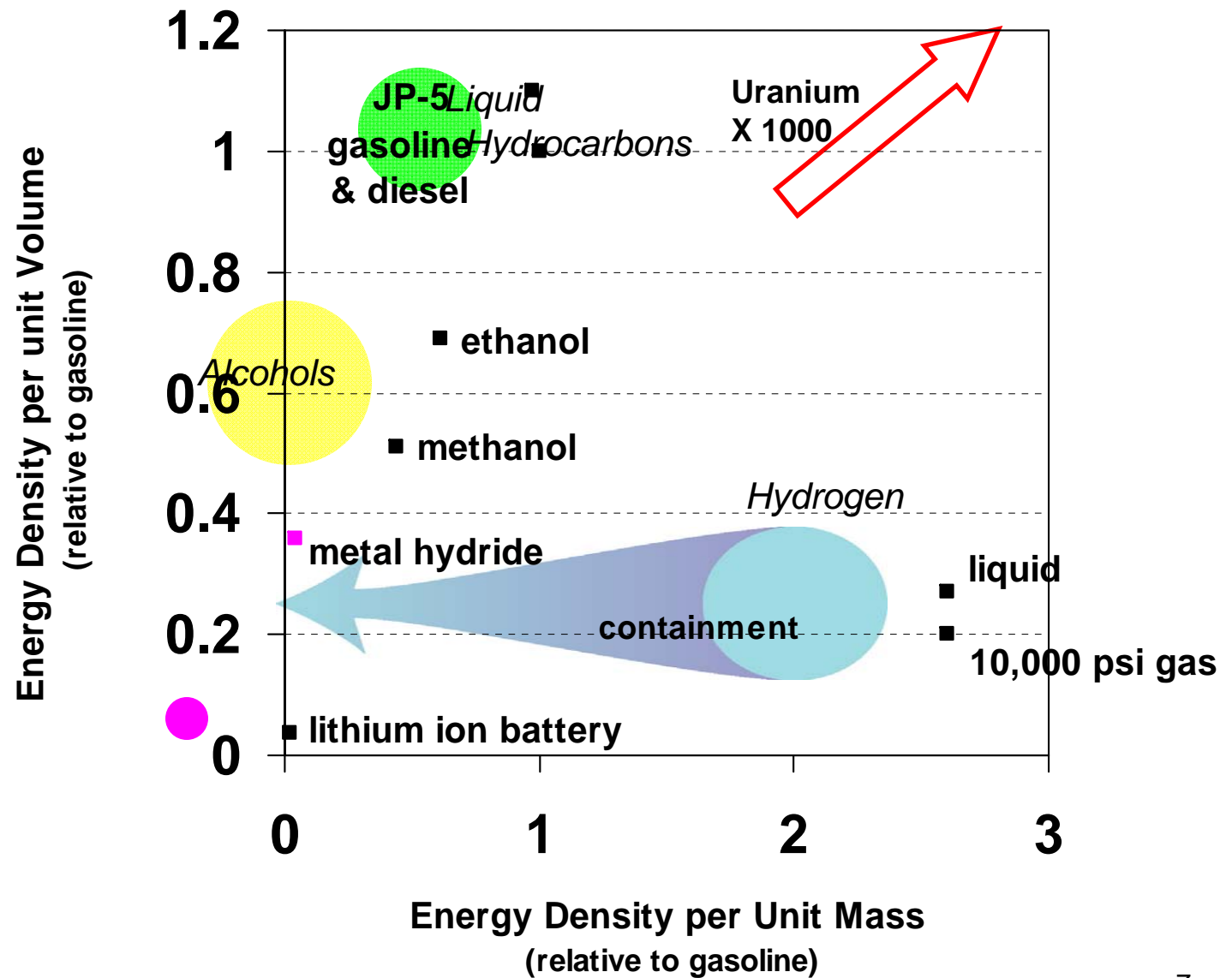


Approximate Liquid Fuel Yields



- Coal to Liquids: One ton of coal can yield approximately 2 barrels of premium liquid fuel - and lots of carbon.
- Gas to Liquids: 10,000 standard cubic feet of gas can yield approximately 1 barrel of premium liquid fuel.
- Tar Sands: One ton of material can yield approximately one barrel of “oil.”
- Oil Shale: One ton of material can yield approximately 25 gallons of “oil.”

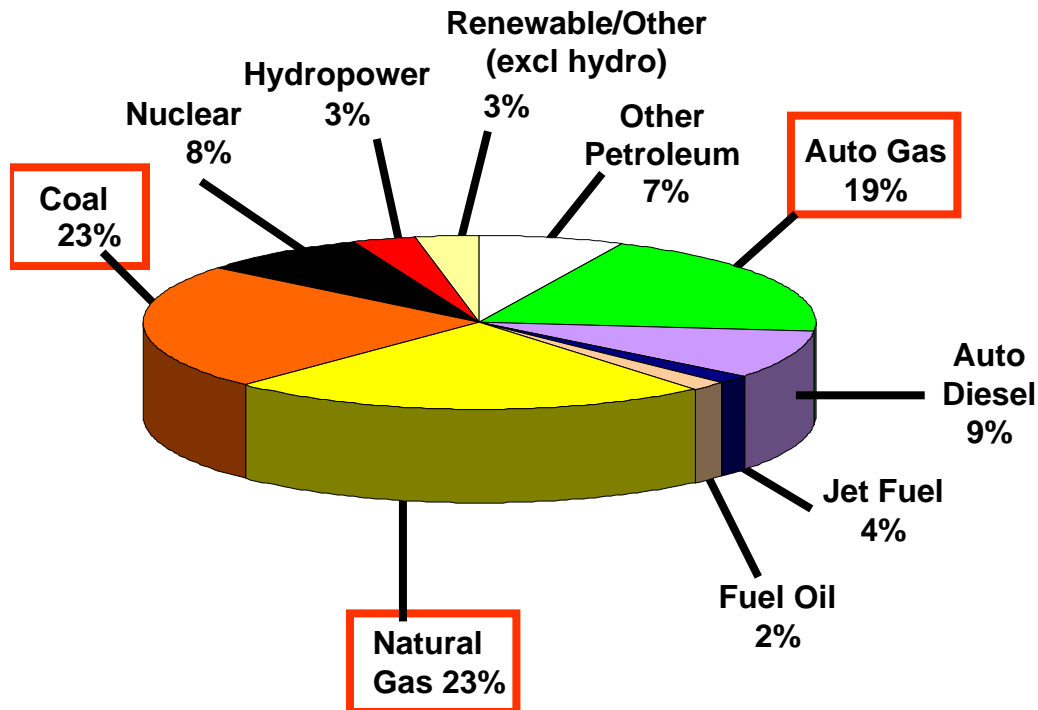
Energy Density of Fuels



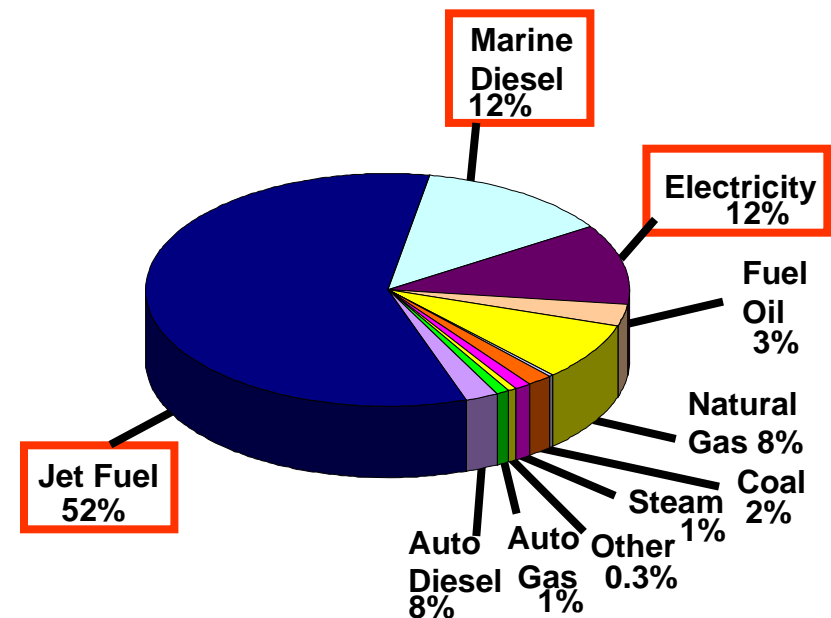
National vs DoD Energy Consumption



US Energy Consumption by Type (DoE Focus)



DoD Energy Consumption by Type (DoD Focus)



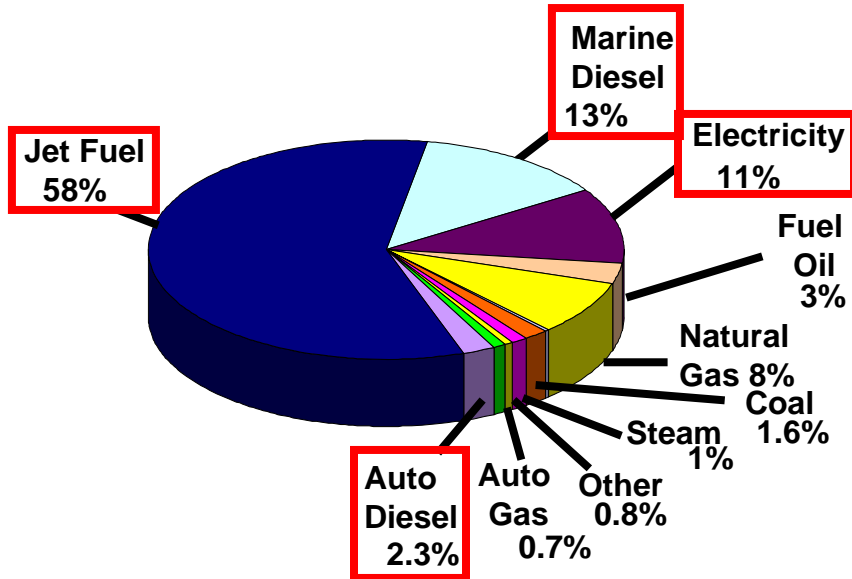
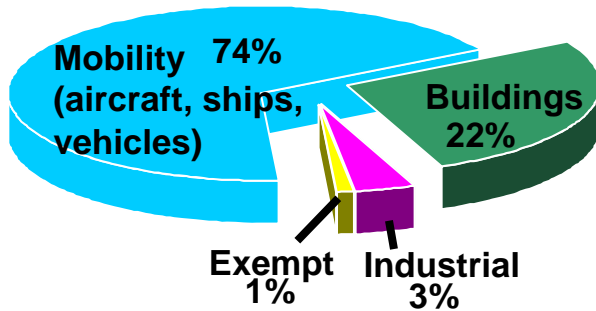
Sources: EIA 2005 consumption data
DoD Annual Energy Report, 2006

DoD Energy Consumption FY05 - 06



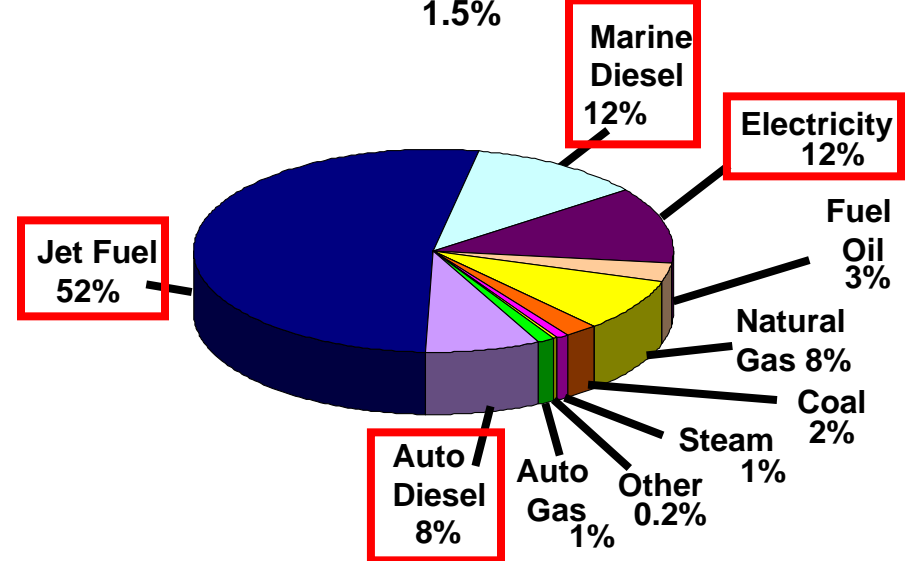
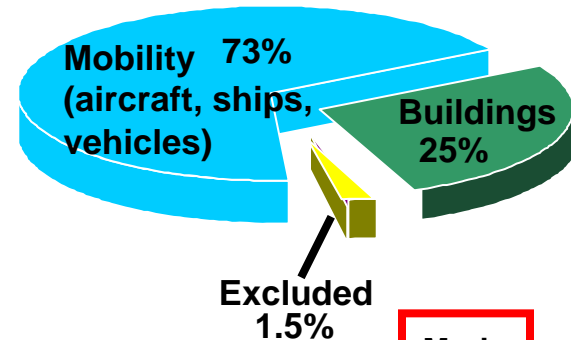
Energy use as a percent of consumption

FY05 Consumption



FY05 Total Energy Cost: \$10.9B
Total BTUs: 919.3 trillion
Standard price per barrel: \$61.88 (avg)

FY06 Consumption



FY06 Total Energy Cost: \$13.6B
Total BTUs: 832.5 trillion
Standard price per barrel: \$91.52 (avg)

DoD Energy Issues



- DoD is largest US energy user
 - Cannot drive, but can influence market
- #2 energy user - Wal-Mart
 - Very active energy conservation program
- DoD fuel requirements
 - Aircraft fuels (70-75%)
 - Mobility fuels (20-25%)
 - Installations (<5%)
- DoD near-term energy thrusts
 - Cost reduction
 - Combat capability multiplier

Pakistani Delivery Truck



Supply Convoy



DoD Energy Security Progress



- Energy initiatives - DoD top transformation priority
- Solar energy farm - contract awarded at Nellis AFB
 - Largest in US when complete
- Renewable energy hybrid-electric generators for Forward Operating Bases
- USAF flight tests with 50/50 blend of synfuel, JP-8
- Fuel logistics considerations in war games
- Increased energy-related Science and Technology funding (in decreasing budget)
- Net Zero Plus Joint Concept Technology Demonstration (JCTD)

Personal Predictions - Next Five Years



- Energy security accepted as major national goal
- Energy recognized as #1 national security issue
- Power grid recognized as #1 US vulnerability
- Increased emphasis on conservation, waste to energy, jatropha, algae, solar, nuclear fusion (?)
- Decreased emphasis on ethanol, fuel from food sources, “conventional” coal and nuclear (?)
- Visible impacts of climate change
- Strict carbon emission/sequestration requirements

Defense Science Board Energy Study



- Feb 2008 Report - www.acq.osd.mil/dsb/reports.htm
 - *“Critical national security ... missions are at an unacceptably high risk of extended outage from failure of the grid.”*
 - *“[DoD] lacks the strategy, policies, metrics, information, and governance structure necessary to properly manage its energy risks.”*
 - *“There are many opportunities to reduce energy demand by changing wasteful operational practices and procedures.”*
- Recommendations:
 - Energy Czar - Strategic plan
 - Reduced dependence on commercial power
 - Energy technology investment
 - Policies to encourage conservation
 - Net Zero energy military bases by 2025

Net Zero Base Opportunity – Guam



- Marine Corps moving from Okinawa
 - Guam dependent on imported energy
- Energy opportunities from solar, wave, waste, wind
- Demonstrate and prototype technologies on US mainland and Hawaii, implement in Guam
- Potential energy technology opportunity for Virginia
 - Major military presence
 - #2 trash importer in US

Virginia Energy Assets



- Waste
- Coal
- Uranium
- Energy crops
- Wind
- Algae
- Two nuclear plants, one refinery
- Military presence
- Virginia Energy Plan - excellent baseline
- General Assembly opportunity to take ownership
 - Execution timeline too long for Administration
 - Turn Energy Plan “should dos” list into legislative action

Energy Independence R&D Park



- VA opportunity for national lead - #2 trash importer
- Aging landfills offer attractive sites
- Waste to energy (electricity, diesel, ethanol, ...)
- Non-profit umbrella
- Energy sale provides funding for energy R&D
- New paradigm for sustaining non-federal energy research and development funding

Easy to Forget

