Department of the Air Force

Innovative Energy Solutions for an Optimized Air Force

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Operational Energy
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Air Force Consumption

Air Force uses ~ 2B gallons annually on ~800K sorties

Air Force Blue Budget w/o Energy, $140.80B, 96%

Energy, $5.75B, 4%

Air Force Operational Energy, $4.70B, 3%

Air Force Facilities Energy, $0.91B, 1%

Air Force Vehicles Energy, $0.14B
Our Vision:
Create an energy optimized Air Force that maximizes combat capability for the warfighter.
Optimization Modules for Scheduling
Logistics, Wargaming, Sustainment

Permissive vs Non-Permissive Bulk POL Supply Routes

GE20 - Competition
FG20 - Wargame

Alaska to Japan
Days: 11
W. Coast to Japan
Days: 12
Gulf Coast to Hi
Days: 16 vs 30
Middle East to S. China Sea
Days: 12 vs 36
S. Africa to N. Australia
Days: 22

NDS Priority: Supply and Distribution

LDLW

NDS Priority: Reach and Supportability
Aircraft Modernization
Alternative Energy
Congressional Interest Item

- Hydrogen Refueling Station – Joint Base Pearl Harbor-Hickam, HI

- Utilizes H₂ Proton Exchange Membrane (PEM) Electrolyzer
  - Tied to 146 kW PV array and base utility grid
  - Dispensed over 1,100 kg since 2014
Aerospace Ground Support Equipment

- Hydrogen Heavy-Aircraft Tug
  - Standard diesel U-30 Tow Tractor converted to H₂ fuel cell electric hybrid
  - US Hybrid
  - Eliminates noise/fumes
  - Runs on hydrogen or grid power (battery range is limited)

- Hybrid F-22 weapons loader
  - MJ-1E electric aerial stores lift converted to a H₂ fuel cell electric hybrid by US Hybrid
  - H₂ Fuel Cell Range Extender
Other Ground Support Equipment

- Hydrogen multi-passenger vehicle
  - Designed/built by US Hybrid
  - 30 kW Hydrogenics Fuel Cell
  - 5th year of operations

- Hydrogen drive maintenance van
  - 35 kW \( \text{H}_2 \) fuel cell mobile generator
  - Onboard battery energy storage
  - 16 configurable modes
  - Emergency response exercise-capable
NO FUEL. NO FIGHT.

Are you energy aware?
#EnergyAbleMissionCapable