Department of Defense Alternative Fuels Policy, Initiatives, and Opportunities

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Las Vegas, NV
ISCC Regional Stakeholder Committee North America

DISCLAIMER: The views expressed are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government
Key points

• DoD alt fuel policy is driven by broad strategic goals, split between installation and operational “markets”

• Installation vehicles: 2% of fuel energy, primarily gasoline, with initiatives guided by petroleum and GHG reduction goals

• Operations: 98% of fuel energy, primarily jet fuel, with initiatives guided by substitutability and feedstock diversification

• Current programs include support for biofuel production facility construction and drop-in biofuel subsidies
  • Plus alternative fuel and vehicle initiatives at individual domestic installations

• Ongoing work links jet fuel → climate change → human health
Gasoline Dominates Installation Purchases

- E85
- EV
- CNG
- B20
- Diesel
- Gasoline

Jet Fuel Dominates Operations Purchases

- Gasoline
- JP8, JPTS
- JP5
- JP4, JAB, JAA, JA1
- Distillates & Diesel


Gasoline Dominates Installation Purchases

- E85
- EV
- CNG
- B20
- Diesel
- Gasoline

## Example Fleet: Wright-Patterson Air Force Base

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Vehicles</th>
<th>L (or kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline (E10)</td>
<td>108</td>
<td>39,000</td>
</tr>
<tr>
<td>Hybrid EVs (E10)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Ethanol (E85)</td>
<td>247</td>
<td>60,000</td>
</tr>
<tr>
<td>Diesel</td>
<td>37</td>
<td>75,000</td>
</tr>
<tr>
<td>Biodiesel (B20)</td>
<td>118</td>
<td>130,000</td>
</tr>
<tr>
<td>Electric Vehicles</td>
<td>26</td>
<td>130,000</td>
</tr>
</tbody>
</table>

Data from FY2014

*Emery, I, E Mbonimpa and AE Thal. Climate-based policies may increase life-cycle social costs of vehicle fleet operation. Energy Policy 101: 1-9, 2017*
Fuels Policy: Installations

FY 2017: 4% reduction in GHG emissions per mile

FY 2010 – 2015: 30% reduction in petroleum use
- Navy: 25%
- Marine Corps: 45%
- Air Force: 16%
- Army: 41%

Strategies:
- Fleet downsizing
- Electric vehicles
- Flex-fuel vehicles (E85 capable)
- Biodiesel blends (B20)
Fuels Policy: Installations

FY 2017: 4% reduction in GHG emissions per mile

“A major factor driving performance on the new metric is the extent to which a Component’s fleet has been electrified.”

*DOD FY 2016 SSPP*
Alternative fuel investments will be targeted to ensure forces are able to carry out operations using alternative sources of fuel that improve the reliability of our overall fuel supply.

Alternative fuels can be a means to ensure combat effectiveness, logistical flexibility and to mitigate Anti-Access/Area Denial (A2AD) effects.

DOD Alternative Fuels Policy for Operational Platforms
Fuels Policy: Operational Energy

USAF Energy Strategic Goals:

3.1: Increase use of cost-competitive drop-in alternative aviation fuel blends for non-contingency operations by FY2025

3.3: Increase use of alternative fuels in ground vehicles and equipment by FY2020

USAF Energy Flight Plan 2017 – 2036
2007 – 2014:
8 million L alternative fuel (JP8, JP5, naval distillate) purchased for combined $58.6 million

Bulk alternative fuel purchases “will compete with petroleum products... to meet requirements at the best value to the government, including cost.”

DOD Alternative Fuels Policy for Operational Platforms, 2012
Drop-in Fuels Development

- DOD-DOE-USDA Biofuels Partnership ($510M): “to assist the development and support of a sustainable commercial biofuels industry.”

- Supply side: Support production capacity via Defense Production Act Title III biofuels program (DOD & DOE)

- Demand side: Support purchase of biofuels by Navy via “Farm-to-Fleet” program (USDA)

https://www.energy.gov/eere/bioenergy/downloads/memorandum-understanding-between-department-navy-and-department-energy-and
Supply side: Support production capacity

• DPA Title III – Advance Drop-in Biofuel Production Project (ADBPP):
  
  Funding “...to support the design, construction, validation, qualification, and operation of domestic commercial-scale facilities capable of producing at least 10 million gallons per year neat biofuel” (drop-in jet and/or diesel).

• Design phase (2013-2015)
• Construction phase (2015-2017)
  • 3 awards, $210M USG funds
  • >50% private cost share

https://www.energy.gov/eere/bioenergy/downloads/memorandum-understanding-between-department-navy-and-department-energy-and
Demand Side: Alternative Fuel Procurement

• Farm-to-Feet Program (Navy-USDA Partnership)
  • USDA Commodity Credit Corporation (CCC) funds for purchase of F-76, JP-5
  • up to $0.25/gallon of blended fuels containing 10% – 50% biofuel

• Previous success:
  • Great Green Fleet initiative during Rim of the Pacific Exercise June-Aug 2016 used 77.6 million gallons F-76 containing 10% biofuel from HEFA-processed beef tallow (hydro processed esters and fatty acids)

Notice of Funds Availability (NOFA); Farm-to-Fleet Feedstock Program Biofuel Production Incentive (BPI), Federal Register 81(250) 95956-8, Dec 29 2016
Qualifying drop-in technologies

- Based on ASTM International approved pathways for commercial aviation fuel (F-T, HEFA, SIP)

- Fuel blends for DOD Operations must also be tested to match all existing military specifications
  - High altitude / low temperature
  - Ballistic tolerant materials
  - Non-aviation applications (e.g., JP-8 in ground vehicles)

- F-T & HEFA drop-in fuels tested & approved for:
  - Navy aviation and ship platforms
  - Air Force aviation assets
  - Army ground vehicles
## Summary

<table>
<thead>
<tr>
<th>Installation</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market</strong></td>
<td></td>
</tr>
<tr>
<td>0.3 billion L; 14 billion L;</td>
<td>Gasoline substitution; Jet fuel substitution;</td>
</tr>
<tr>
<td>Gasoline substitution; US Domestic</td>
<td>Global</td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td></td>
</tr>
<tr>
<td>Fleet diversification; Installation financial flexibility</td>
<td>Certified conversion pathways; Commercial airline connections; Producer loans</td>
</tr>
<tr>
<td><strong>Guidance</strong></td>
<td></td>
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<tr>
<td>Per-mile GHG reductions</td>
<td>Performance requirements</td>
</tr>
<tr>
<td><strong>Challenges</strong></td>
<td></td>
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<tr>
<td>Competition with EVs; Fuel availability at volume</td>
<td>Cost competitive; Fuel availability at volume; Performance certification</td>
</tr>
</tbody>
</table>
Ongoing Research: \( \text{CO}_2 \) Harms Human Health

6 to 34 million L per life; 1 to 5 minutes of life per L

- Radiative Forcing
- Climate Change
- Tropical Disease
  - Extreme Heat
  - Flooding
  - Malnutrition
- Human Health

- \( \text{CO}_2 \)
- \( \text{NO}_x \)

Fuel Combustion

Fuel Production & Supply

VSL: $0.10 to $3 per L
Resources

• DoD Strategic Sustainability Performance Plans: http://www.denix.osd.mil/sustainability/dod-sspp/


• USAF Strategic Master Plan:


Comments & Questions

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