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## *Alternative Fuels Infrastructure*

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**Our Mission** -*Manage Army installations to support readiness and mission execution – provide equitable services and facilities, optimize resources, sustain the environment and enhance the well-being of the Military community*

***Leading Change for Installation Excellence***



# FEDERAL REQUIREMENTS



## • Energy Policy Act of 1992 (EPAAct)

- 75% of Vehicles Purchased/Leased Must Be Alternative Fuel Vehicles (AFV)
- Within MSA With Population > 250,000
- Light Duty Vehicles (Sedans/Trucks <8,500 lb Gross Vehicle Weight (GVW))

## • Executive Order 13149 (April 2000)

- Federal Automotive Statistical Tool (FAST)
- Reduce 2005 Non-Tactical Vehicle (NTV) Petroleum Use by 20% from 1999 Baseline
  - Use Alternative Fuels in AFV 51% of Time
  - Increase NTV Fleet MPG

## • Energy Policy Act of 2005

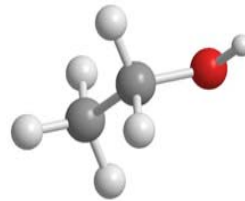
- AFVs purchased under EPAAct must use alternative fuels, unless waiver is granted
- Waivers - only if fuel not readily available or too expensive
- GSA to spread incremental cost of AFVs across all vehicles



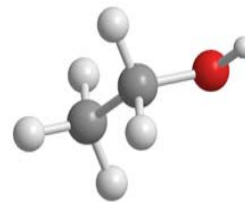
# ALTERNATIVE FUELS



## ETHANOL: What is it?



- Pure ethanol (ethyl alcohol) – derived from grain and other renewable resources
- Ethanol blends (Exx) - alcohol fuel blends designated by E and the percentage of alcohol by volume in the blend
- Examples:
  - E10 is 10% denatured ethanol blended with 90% gasoline
  - E85, commonly called *fuel ethanol*, is 85% denatured ethanol blended with 15% gasoline
  - E100 is 100% denatured ethanol





## Advantages of E85

- Reduces CO emissions
- Reduces or eliminates need for MTBE (methyl tertiary butyl ether)
- AFVs run on either E85 or gasoline; computers in vehicles determine blend and adjust accordingly
- Highly oxygenated
- Can convert existing tanks to E85 use
- Price is ordinarily less than unleaded gasoline
- Excellent user acceptance



## Limitations of E85

- Requires special infrastructure
  - If converting existing tank, must meet EPA codes (metal or fiberglass)
  - Piping, pump and dispenser components containing some soft metals and rubber material may not be compatible with E85
  - Recommended conversion technique is to remove gasoline tank and attendant piping and replace with certified E85 dispenser and piping
- Slightly lower fuel economy
- Seasonally & geographically adjusted to meet different climate conditions (impacts on vehicle operations and emissions)
- Need special signage (and sometimes special access cards) to prevent customers from putting E85 into non-AFVs



# ALTERNATIVE FUELS



## What is an E85 Flexible Fuel Vehicle?

- FFVs are specially designed to run on all ethanol blends up to 85%
- FFVs can use any mixture of gasoline or E85
- FFVs observe a mileage reduction on E85 vs. gasoline
- FFVs have fuel sensors which monitor ethanol/gasoline ratios



**E85 cannot be used in a non-Flexible Fuel Vehicle**





# ALTERNATIVE FUELS



## BIODIESEL - What is it?

- **Biodiesel (B100)** is a fatty acid derived from vegetable oil or animal fats (renewable resources)
- **Biodiesel Blends (BXX)** - are blends of Biodiesel fuel with Petroleum Diesel products



### Examples:

***Biodiesel Blend (B20) - B100 fuel blended with 80% petroleum diesel fuel oils, grade low sulfur number 1-D or grade sulfur 2-D (ASTM D-975)***



# ALTERNATIVE FUELS



## **Advantages of Biodiesel**

- **Use with standard, existing non-tactical equipment**
- **Reduces CO2 emissions**
- **Can be used in conventional diesel engines**
- **Fewer particulate emissions of CO and sulfur dioxide**
- **Limited impact on infrastructure**
- **Helps increase lubricity of low-sulfur diesel**





## Limitations of Biodiesel

- **Limited quantities available**
- **Cold weather quality concerns**
- **Stability in minimal use applications (e.g., generators)**
- **Biodiesel, like JP8, may have a scrubbing action if introduced into equipment that has contaminated fuel; equipment filters may require changing after initial introduction**



## Compressed Natural Gas (CNG) What is it?

- **CNG is Natural Gas** - the same fuel used by home heating equipment, stoves, water heaters and clothes dryers; stored in cylinders at pressures of 2,000 to 3,500 pounds per square inch
- **CNG is used** in light-duty passenger vehicles and pickup trucks, medium-duty delivery trucks, and in transit buses
- **Two types of fueling systems:**
  - “**Quick fill**” system that fuels vehicle in five minutes
  - “**Slow fill**” system that can fuel an entire fleet overnight





# ALTERNATIVE FUELS



## Advantages of CNG

- **Clean burning**
- **Excellent for fleet use where vehicles travel specified routes, to a central yard where they can be slow-filled overnight**
- **Good candidate for shared fueling stations through Clean Cities programs**



# ALTERNATIVE FUELS



## **Limitations of CNG Fuel and Support**

- **Compressor stations expensive to install and maintain**
- **No funding support available through Fuels MRE Program**
- **Movement confined to areas where CNG is available**



# Eight Focus Posts

**Ft Lewis**

**Ft Carson**

**Aberdeen Proving Ground**



**Ft Bliss**

**Ft Hood**

**Ft Knox**

**Ft Bragg**

**Ft Belvoir**



# Alternative Fuels at Installations



EXISTING STATIONS	FUEL TYPE/BLEND	STATUS
Aberdeen Proving Ground	CNG	E
Fort Benning	E85	E (AAFES - completed Dec 05)
Fort Gillem	E85	E
Fort Carson	E85	E
Fort Leavenworth	B20	E
Fort Leonard Wood	E85	E
Fort Leonard Wood	B20	E
Fort Lewis	E85	E
Fort Lewis	CNG	E
Fort Lewis	B20	E
Fort Bliss	E85	E (completed Dec 04)
Fort Sam Houston	E85	E (outside gate - Clean Cities Coalition fueling point)
Fort Sill	B20	E

**E=Existing**

**C=under construction**

**P=Planned**



# Alternative Fuels at Installations (continued)



EXISTING STATIONS	FUEL TYPE/BLEND	STATUS
Fort Campbell (SE)	E85	C (Completion due Apr 06)
Aberdeen Proving Ground (NE)	E85	P
Aberdeen Proving Ground (NE)	B20	P
Fort Belvoir (NE)	E85	P
Fort Bragg (SE)	E85	P
Fort Jackson (SE)	E85	P (POL)
Fort Knox (SE)	E85	P (AAFES Shoppette - construction starts Spring 06)
Redstone Arsenal (SE)	E85	P
Fort Riley (NW)	E85	P
Fort Hood (SW)	E85	P
Fort Hood (SW)	B20	P

**E=Existing**

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# Recipe for Success for Your Installation

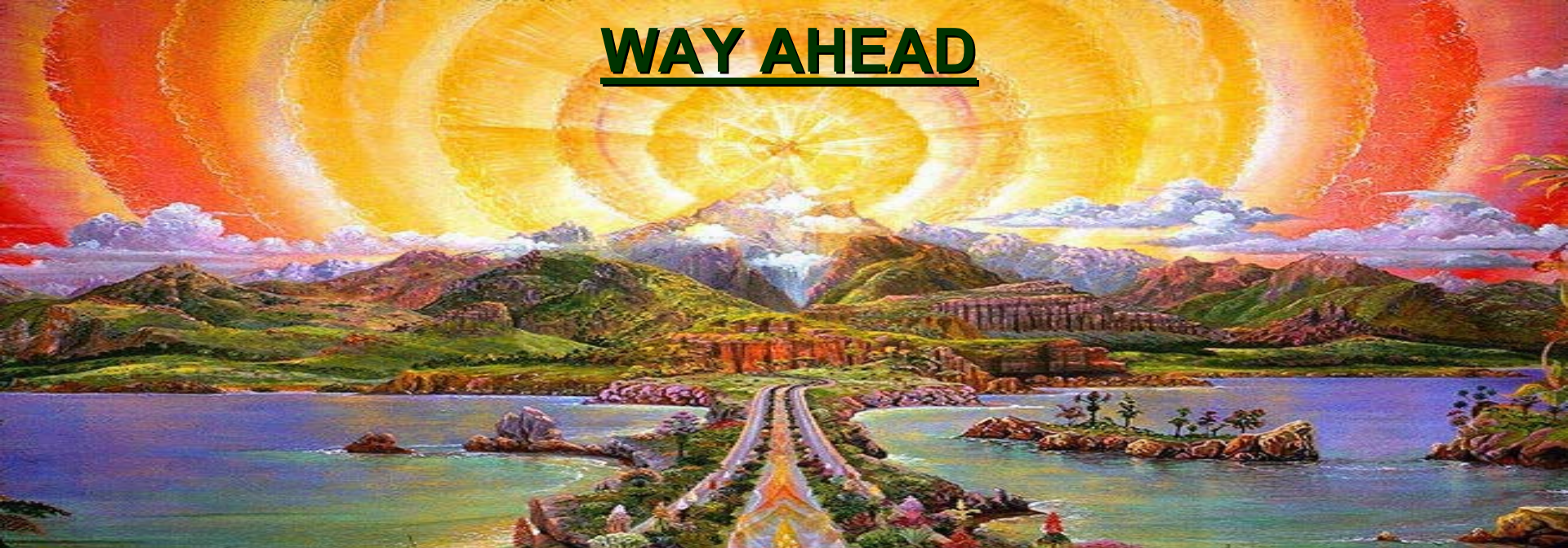


## Be sure to keep Army Petroleum in the loop!

- Success requires cooperation between:
  - Directorate of Logistics (DOL)
  - Directorate of Public Works (DPW)
  - Environmental Branch or Directorate (ENV)
  - Public Affairs Office (PAO)
- Alternative fuels program is really an environmental/energy program that **MUST** be executed through DOL and DPW, with help from ENV.
- You can make a difference with just a few people! Getting started needs only one or two people who can carry this program forward. (It has been done at some of our installations already!)



# WAY AHEAD



- **Establish availability and capacity**
- **Three courses of action:**
  - **Use commercially-available sources (outside the gate)**
  - **Contract with AAFES (inside the gate)**
  - **Construct DOL alternative fuel facility (inside the gate)**
- **Identify & pursue partnering opportunities and funding sources, e.g.:**
  - **Dept of Energy (DOE) Clean Cities program**
  - **National Ethanol Vehicle Coalition**
  - **Biodiesel Board**



# Useful Links

- Army Petroleum Center:  
[http://usapc.army.mil/alt\\_fuels/altfuel.asp](http://usapc.army.mil/alt_fuels/altfuel.asp)
- National Biodiesel Board: <http://biodiesel.org>
- DOE Clean Cities Coalitions:  
<http://www.eere.energy.gov/cleancities/coordinators.html>
- Defense Energy Supply Center:  
<http://www.desc.dla.mil/DCM/DCMPage.asp?pageid=591>
- National Ethanol Vehicle Coalition: <http://www.e85fuel.com>
- Energy Policy Act of 2005:  
[http://www.eei.org/members/US\\_Shareholder\\_Owned\\_Electric\\_Companies/Washington\\_Reps\\_Online/energybill.htm](http://www.eei.org/members/US_Shareholder_Owned_Electric_Companies/Washington_Reps_Online/energybill.htm)
- Army Public Involvement Toolbox:  
[http://12.109.149.4/tool\\_guides.html](http://12.109.149.4/tool_guides.html)



# Contact Information

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**<http://www.ima.army.mil/sites/log/fuel.asp>**



# INSTALLATION MANAGEMENT AGENCY



***“Sustain, Support and Defend”***