



# Alternative Fuel for Diesel and Turbine Engines

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# Background

- One-fuel-forward policy:
  - Necessitated by DoD having to procure “consistent” fuel for warfighters engaged in operations in many parts of the world
  - Requires fuel to have tolerance for varying sulfur content and the need for additives to develop fuel “consistency”
- Introduction of low sulfur fuels:
  - DoD may have to adapt or take the consequences of having specialty manufacturers who will make DoD-only diesels and turbines
  - Escalating costs for customized systems
  - As fossil sources diminish or come from conflict areas and environmental demands increase, renewable low sulfur fuels become more prevalent.



# Objective and Approach

- Objective:

The development of a holistic DoD alternative fuels program focused on the performance of turbine and piston engines.



- Approach:

Leverage Army ground programs with Air Force and the Navy air and sea programs. The combined programs provide scientific and engineering support for DoD policy on the appropriate content of alternative fuels.

# Key Army Program Parameters

- Fuel characterization:
  - Chemical properties
  - Physical properties
  - Blends of alternative fuels in different compositions with fossil fuels
  - Material compatibility
  
- Fuel performance:
  - Large engines and turbines
  - Ground platforms
  - Propulsion and power generation



# Key Army Program Parameters

- Performance tests :

- Initially conducted in lab environments
- Transitioned into field trials on approved DoD test tracks using current or improved drive cycles
- Engines and turbines within electric-hybrid and hydraulic-hybrid configurations to increase fuel efficiency and multi-use



- Durability tests:

- Increasing oxygen content of alternative fuels
- Bio-based alternative fuels currently refined in modified conventional refineries along with their fossil counterparts



# Future Fuel Sources

- Coal / Biomass to Liquid based / blended alternative fuels
- Bio-butanol based / blended alternative fuels
- Algae based / blended alternative fuels
- Cellulosic material to bio-based fuels / blended alternative fuels
- Waste based fuels / blended alternative fuels



*Comprehensive testing with DoD equipment*