

# Fuelling the NZDF

## CURRENT & FUTURE REQUIREMENTS

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# DTA Overview

Part of the NZDF

63 research staff (62 Auckland – 1 Wellington)

Scientific and Technical Support to



- Applied Vehicle Systems
- Human Systems
- Network Systems
- Sensor Systems

# DTA Overview

Operational Support

Engineering Expertise

Prototype Development / Industry Partnerships

Participation in International Defence Research Fora

- The Technical Cooperation Panel (TTCP) US, AS, UK, CAN & NZ
- Bilateral Agreements (AS and Singapore)

Technology Watches

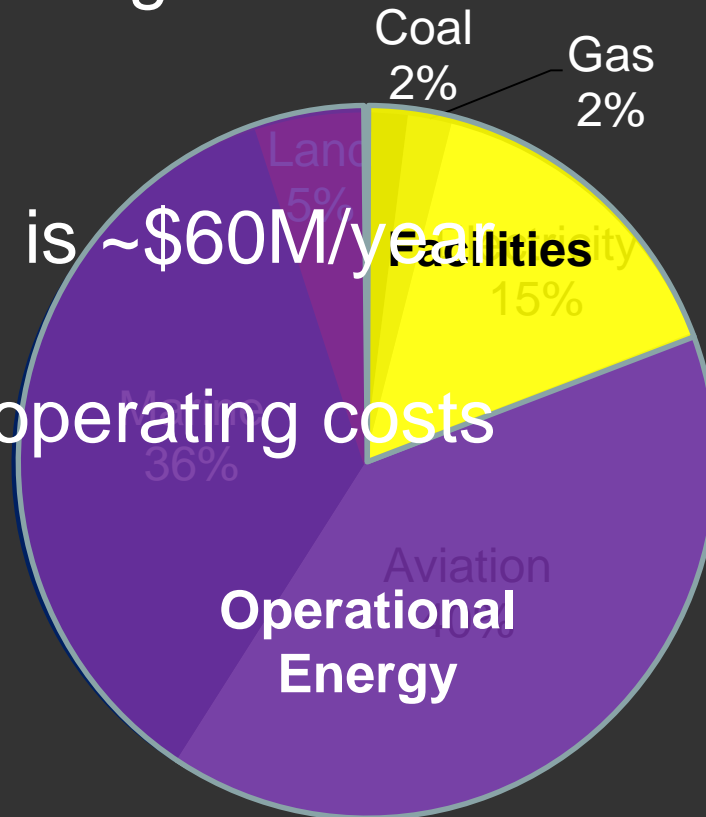
Advice on Future Acquisitions

# CURRENT USAGE

NZDF Largest Single Consumer of Energy in Public Sector

Energy Spend is ~\$60M/year

~10% of total operating costs



# Aviation 2009 Domestic Usage

F-44 : 200,000L



F-34: 11,350,000 L



AVGAS: 400,000L



Military Fuel Specifications for Aviation Kerosene:

- (UK) Defence Standards 91-86 & 91-87
- (Aus) DEF(AUST) 5240D
- F-34 = Jet A1 + Additives
- F-44 = High Flash Kerosene (>61.5°) + Additives

AVGAS specifications Military = Commercial

# Marine 2009 Domestic Usage

Marine Diesel: 12,500,000 L



Predominantly Commercial Marine Diesel (MGO)

Virtually identical to (AGO)

Small Batches of F-76 (Naval Distillate Fuel)

- (UK) Defence Standard 91-4
- Tighter specification to commercial MGO
- Improved storage and cold weather properties

# Ground Fuel 2009 Domestic Usage



Automotive Diesel: 3,000,000 L

Petrol 368,000 L

- Largely for NZDF vehicle fleet in NZ
- Equipment (tools + generators)
- Limited use operationally due to high flammability

All to Commercial Standards

# Summary of Current Fuel Usage

All Petroleum Based

Predominantly Middle Distillate

- Diesel
- Kerosene

Largely to Commercial Standards

Issues with 1<sup>st</sup> Gen Biofuels (FAMEs)

- Incompatible with Gas Turbines
- Lacking Infrastructure



Naval Fuel Installation

# Near Future Requirements



Replacement Platforms Likely to be Powered by Piston and Turbine Engines

- conventional fuels?
- some tolerance for synthetic and bio derived fuels?

# Near Future Biofuel Issues

## Possible Barriers to Biofuel Uptake

- Fuels must be qualified for each engine type (expensive for small fleets)
- Warranty issues for fuel trials
- Poor properties for temperature extremes
  - Antarctic operations
  - Fuel as a coolant for aircraft components

## Potential Incentives for Biofuel Uptake

- Reduced costs (c.f. petroleum)
- Reduced greenhouse gas emissions (Government targets)
- Security of supply (domestic)
- Improved temperature properties



US Navy to sail 'Great Green Fleet'  
by 2016 (50:50 blend)

# Future Energy Requirements



Increased use of  
electrical energy

Personal Devices  
(batteries)

Base Infrastructure  
(generators)

Naval Propulsion  
(induction motors)

Fuel Cells?

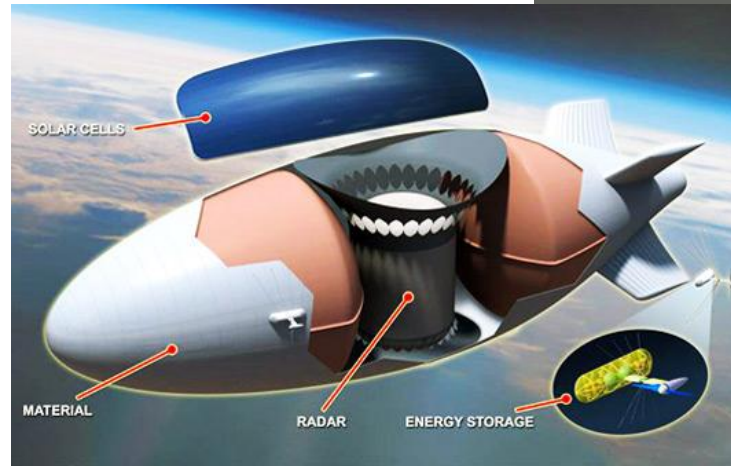


# Efficient Future Platforms

Unmanned Vehicles (UAVs and UUVs)  
Increasing in use and variety of roles

- Combat
- Reconnaissance / Intelligence
- Resupply

Low Risk  
Reduced Costs



# Future Fuels and Acquisitions

Need to consider through life energy costs of platform

- Platform service life 30 – 55 years
- Fuel cost
- Fuel availability

Domestic Fuel Supply

- security of supply
- NZ isolated position

Flexible Engines and Powerplants

# Questions?