

Biofuels in Aviation

About myself

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Agenda

- Alternative fuels for aviation
- Biofuel Sustainability
- Future Planning
- Question time

What are biofuels?

- A fuel that is derived from plant or animal feedstocks
- Avgas biofuel substitutes are primarily alcohol fermented from sugar derived from biomass
- Jet biofuel substitutes are primarily vegetable oils pressed from nuts and seeds

Bio-alcohol feedstocks

- Current sources: Corn, Sugar Beet, Sugar Cane, Sorghum
- Future sources: Cellulose (switchgrass, lawn cuttings), Algae
- Pros: Easy to produce, higher yield per area
- Cons: Production uses lots of energy and produces carbon dioxide

Avgas and Substitutes

Fuel	Energy Density MJ/Kg	Hygroscopic	Volatility	Octane Number	Solvent
Avgas	43.2	No	Low	100	No
Ethanol	29.7	Yes	High	116	Yes
ETBE	36.4	No	Low	110	No
Butanol	36.6	No	Low	94	No

Bio-Diesel Feedstock

- Current Sources: Rapeseed, soybean, Palm oil, waste vegetable oil, animal fats
- Future stocks: Jatropha seeds, Algae
- Pros: Less energy to produce and refine
- Cons: Lower yield per area, some methods of refinement produce substantial by-products, product can spoil

Jet Fuel and Substitutes

Fuel	Energy Density MJ/Kg	Freezing/Gelling Point C	Solvent
Jet-A1	42.8	-40	No
Bio-Diesel	42.2	-10 to -38	Moderate
NExBTL	43.0	-40	No

Biofuels are not a panacea

- Current feedstocks compete with the food on our tables
- Increases in agriculture for fuels is increasing pressure on our ecosystem
- It is physically impossible to grow enough biostocks to make a sizable dent in our petroleum use
- Biofuels for the most part aren't remotely sustainable or green

So why are we using them?

- Farmers want a more competitive market for food crops
- Government sees them as a “quick win”, satisfying 2 powerful lobby groups
- The media bandwagon combined with a lack of public awareness of the systems involved

How's this matter to me as a pilot?

- Any change in fuel standards could have huge effects on private aviation both regulatory and monetarily
- Different standards can change the missions your aircraft can fly
- Agencies frequently make decisions without adequate consultation and expert advice, or that favour one segment of aviation
- A better fuel standard can save you money

So where do we go from here?

- Focus on developing clean electricity as using oil to produce biofuel is counter-productive.
There's no green fuel without green electricity
- Support an aviation advocacy group
- Support an unleaded avgas standard

Questions Please

- For the slides please see my website:
www.tetsui.net
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