

SAJF demand and supply status

An update on the development and commercialization of Sustainable Alternative Jet Fuel (SAJF)

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First flight from continuous commercial production of SAJF, 10Mar'16
Fuel from AltAir Fuels, Paramount, CA (HEFA-SPK 30/70 Blend)
Now being delivered to LAX fuel farm for everyone's upload

Summary (from 2016 presentation)

Approaching 2020 CNG aviation commitments

- * Activity needed in next 2-3 years for SAJF to have a material impact against goal and expected carbon monetization

Making progress on multiple fronts, but challenges remain

Working a full range of activities targeting commercialization

Opportunities to contract seed oils at large scale are pending

- * Emerald, SG Preston, Neste, ...



Observations

Aviation still a committed offtaker

- * CNG 2020 codified in international agreement at ICAO (CORSIA)
- * Fuel coming into the system from AltAir and Neste
- * Challenge is getting to petro price point “parity” - policy is still enabling
- * Continued progress: technical, FSRL, FRL, commercial

US Fuel Demand

- * **Gasoline:** growth declining from 1.5% to flat
 - * Big changes over next decade?
- * **Diesel:** flat (renewable displacing petroleum)
- * **Jet Fuel**
 - * Surpassed 24B gpy production in 2016
 - * < 3M gal HEFA (0.1%)
 - * 3.5+% continued traffic growth rate in US, greater abroad

SAJF offtake agreements

Beyond numerous demonstration programs

neat quantities



SAJF offtake agreements

Beyond numerous demonstration programs

neat quantities



48 A350 deliveries
10% blend



10M gpy, 10 yrs



Up to 40M gal
Over 5 yrs (MOU)



(Bioport on demand)



(Salvage MSW work?)



(HBE defunct, focus on
new engagement)

SAJF approved production pathways

Added one in 2016

Approved	* Gasification & FT (FT-SPK)	50% max blend
	* Hydroprocessing F.O.G. (HEFA-SPK)	50% max blend
	* Biochem sugars (HFS-SIP)	10% max blend
	* FT-SPK/A	50% max blend
	* ATJ-SPK	30% max blend

ASTM approval pipeline

Next 3 ('17-'18 approvals) have implications for lipids

In-Process Task Forces

- * Refinery Co-processing 5% max incoming blend
- * Catalytic Hydrothermolysis 50%+ max blend
- * HEFA+ (wider-cut HEFA with HDRD) modest max blend
- * ATJ-SPK (expansion to C2-C5 alcohols)
- * SK/SAK (CCS - APR)
- * ATJ-SKA

Low FRL

- * 15 additional processes
- * 3 specifically applicable to lipids

Commercialization in-development

Renewable Diesel & Jet

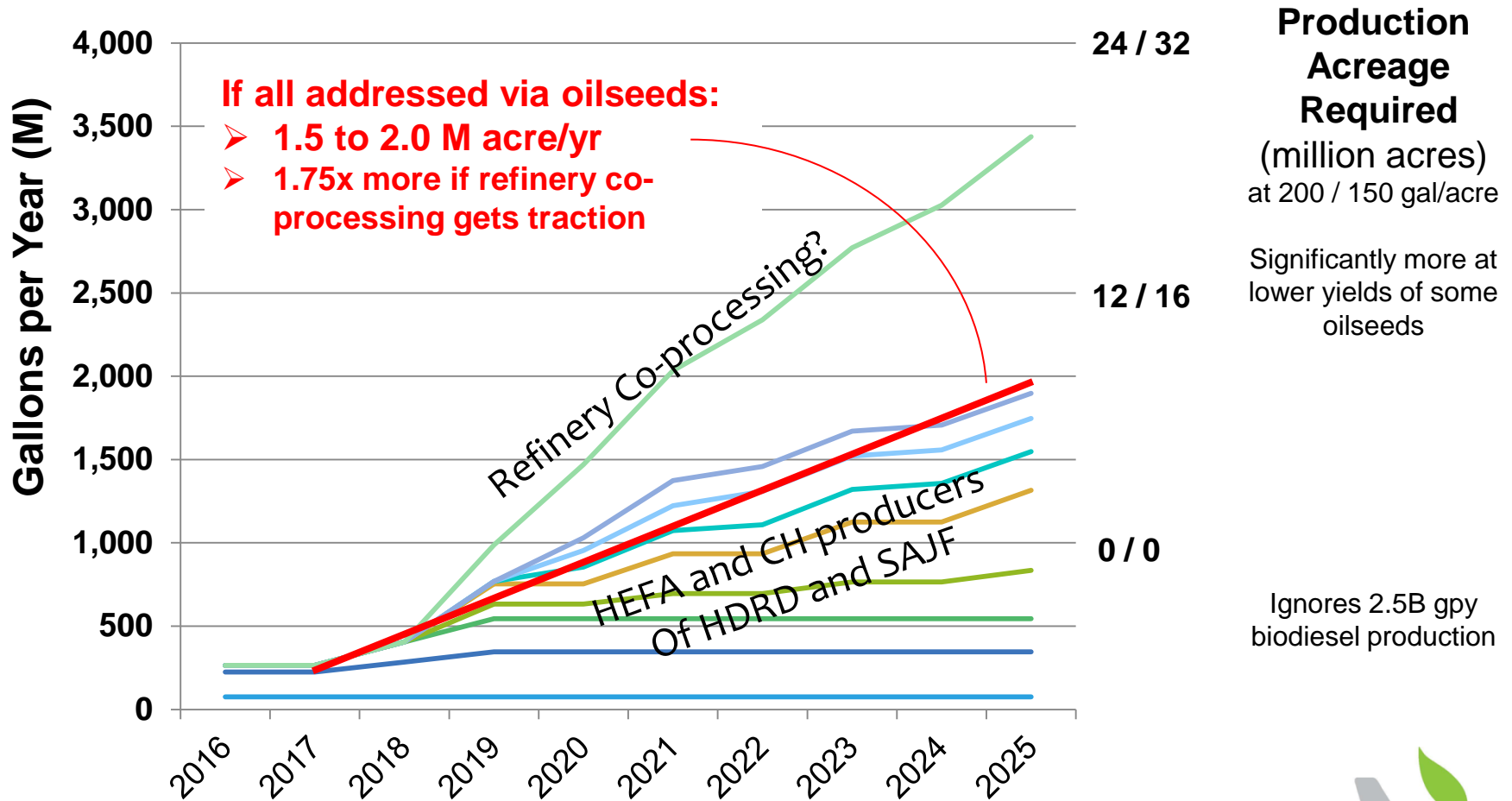
- * Existing DPA Awardees
 - * Red Rock, Fulcrum
 - * Emerald
- * AltAir Build out (~5X)
- * Diamond Green expansion
- * SG Preston (5 facilities in first tranche)
- * ARA licensing and build-out
- * UOP licensing for refinery retrofit
- * Neste, REG, UPM, ... potential pivots
- * Unlocking of renewable diesel and refinery co-processing

Necessitates serious engagement with purpose grown oilseed & FOG development / expansion

Commercialization intent

“Declared” nameplate capacities: significant opp’ty

Independent CAAFI assessment



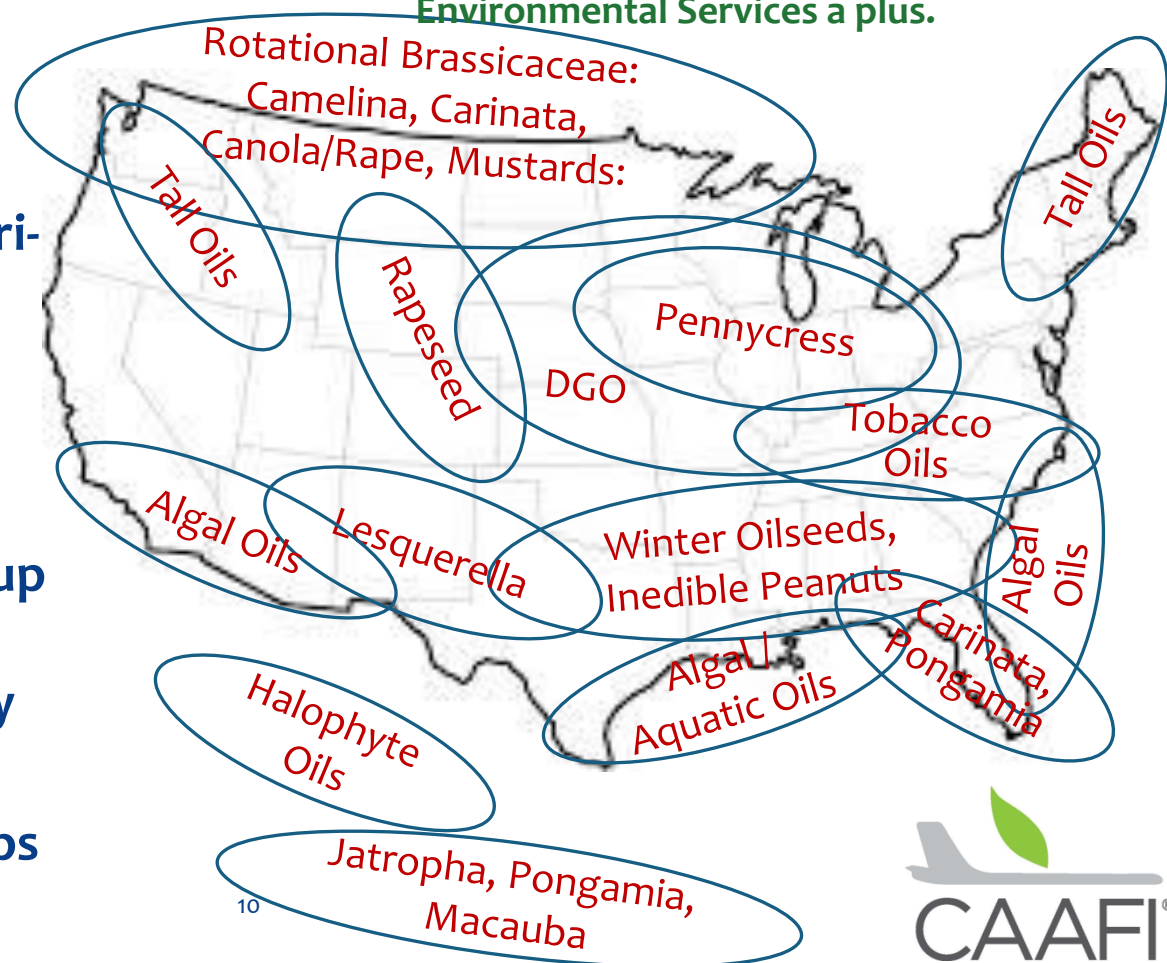
Ignores 2.5B gpy biodiesel production

Lipid feedstocks

Potentially enabling of significant production ...

- * Multiple conversion processes
- * Multiple feedstock developers
- * Multiple producers
- * Multiple low LUC/ILUC agri-based feedstocks, **plus:**
 - * White Grease, Poultry Fat, Tallow
 - * UCO / Yellow Grease
 - * Brown Grease, Biosolids
- * Easier supply chain scale-up leveraging biodiesel and HDRD production capacity
- * Lowered H₂ cost & availability (from NG) helps

Targeting most sustainable solutions:
Low, or Zero, impact LUC/ILUC & F-v-F solutions;
Environmental Services a plus.



Summary

- * **SAJF a large, stable, and growing market (24B gpy US, 80B worldwide)**
- * **Offtake / commercialization impeded by:**
 - * Risk, lack of supply chain maturity & poor capital availability
 - * Desire for price parity, with depressed price of oil
 - * Uncertain, unstable, inequitable policy
- * **Still ... potentially enabled by today/tomorrow's policy**
- * **Commercial aviation can offer long term contracts of significant volume, enabling financeability**
 - * Potential for supply chain investment, with upside/downside sharing
- * **Aviation acknowledges that we may need to settle for having SAJF as a biorefinery “byproduct,” until such time as oil price, policy, other fuel markets, and technology mature**
 - * Allows for very robust business-growth models for some scenarios
- * **Production from purpose grown, inedible, sustainable oilseeds (e.g. Carinata) viewed as being a big, high-potential part of the solution**

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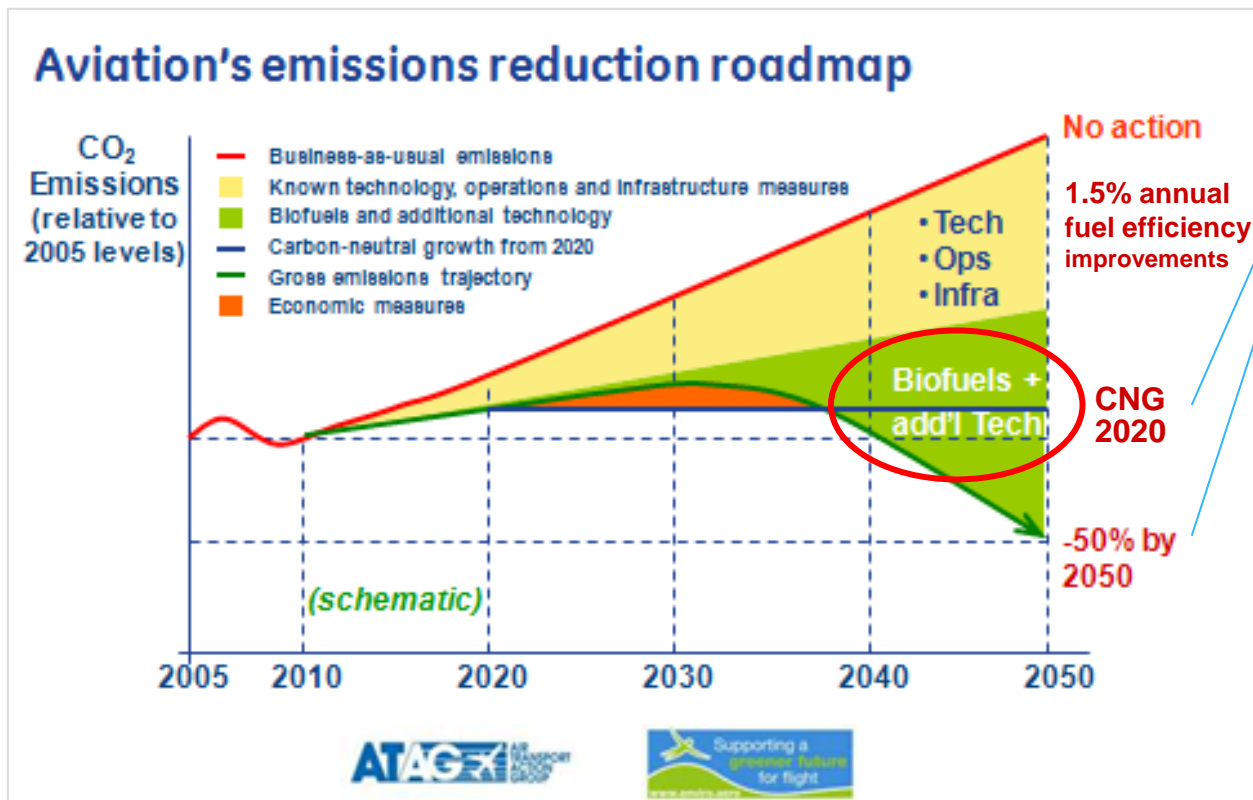
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Commercial Aviation's CO₂ commitments

To decouple carbon growth from demand growth

Biofuels a key component of GHG containment strategy



These 3 industry commitments are currently being converted into regulation through an ICAO/CAEP “basket of measures”:

- * CO₂ Standards
 - * MBMs – will monetize carbon
- Similar commitment from BizAv & DOD