

Sustainable Aviation Fuels

Presented to the Commonwealth Transportation Board

by

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with

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Motivation

What are the pathways for supplying SAF at scale and what infrastructure does Virginia need to ensure a supply of SAF to commercial and military facilities?

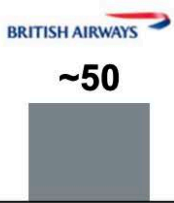
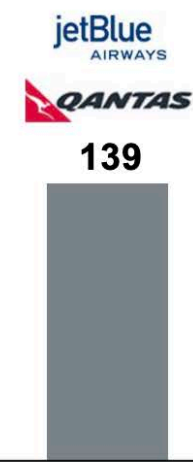
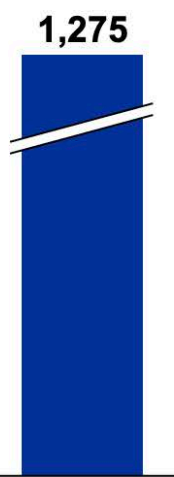
What is the economic potential for Virginia to capture some of this production market for SAF?

What tradeoffs could a Virginia-based SAF sector introduce to food, water, land, and other environmental systems?

- Colonial: 2.6M bbls/day
- Plantation: 0.7M bbls/day



CATHAY PACIFIC
UNITED



Fulcrum BioEnergy, SG Preston, gevo, RED ROCK BIOFUELS, VELOCYS, AltAir Fuels, HAWAII BioEnergy, NESTE

Source: United Airlines, Aaron Robinson, Senior Management for Environmental Strategy and Sustainability, Wood-Derived Aviation Biofuels Summit, Richmond, VA, August 2018

Darling Ingredients Acquires Valley Protein in Move to Target SAF market



Deal gives sustainable energy company low-carbon feedstock that could be used to make sustainable aviation fuel.

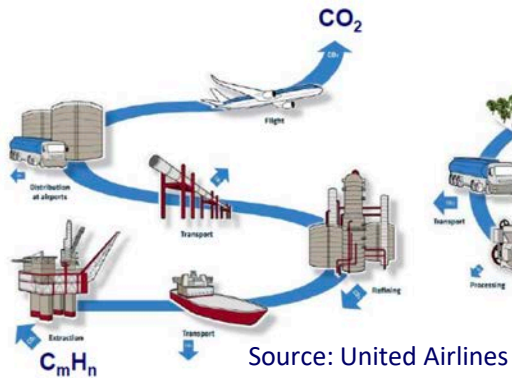
By Michael Wildes

December 29, 2021

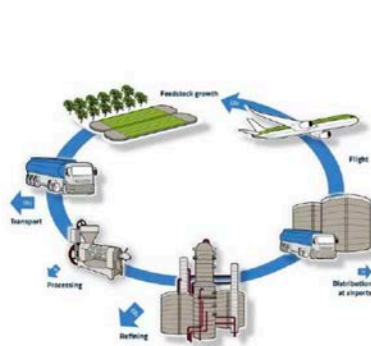


ASCENT – THE AVIATION SUSTAINABILITY CENTER

Petroleum-based fuel



Biofuel



Sustainable Aviation Fuels Supply Chain

Feedstock Production, Harvest, and/or Collection

Transport to Bio-Refinery

Biofuel Production

Blending of Biojet Fuel

Transport to Airport

Storage and Delivery to Aircraft



Disruptive Scenarios

Emergent conditions:
(1) markets, (2) policies,
(3) technologies, ...

| Emergent conditions | Description |
|---------------------|--|
| EC ₀₁ | Competition between airports |
| EC ₀₂ | Shift in customer preferences to favor biofuel-powered flights |
| EC ₀₃ | Change in air traffic mix |
| EC ₀₄ | Entry or expansion of a low-cost carrier |
| EC ₁₅ | Implementation of carbon taxes and/or emissions cap and trade system |
| EC ₁₆ | Introduction of biofuel-related legislation |
| EC ₁₇ | Political factors impede commercial-scale biojet fuel refining |
| EC ₁₈ | Increase in the strictness of emission standards |
| EC ₂₁ | Change in supply or availability of feedstock |
| EC ₂₂ | Advances in conversion technology |
| ⋮ | |



Next Steps

- Capture hardwood residuals, slash, sawmill waste near Tazewell, Virginia*
- Build a **coalition**
 - Cumberland Plateau regional commission
 - Virginia Coalfield Economic Development Authority
 - Appalachian regional commission (multi-state)
 - Trucking associations
 - Others
- Characterize benefits to the economy and manufacturing base of southwest Virginia
- Engage United Airlines and other industry, similar to nationwide ongoing projects
 - Nevada (southern California airports)
 - Indiana (Chicago O'Hare airport)
 - Others
- Compete for national priority--Virginia and IAD have the “wood basket” in southwest Virginia

* Tazewell was identified from hundreds of sites by the University of Tennessee, funded by the US Federal Aviation Administration <https://arec.tennessee.edu/research/beag/ascent/>

Conclusions

For **Sustainable Aviation Fuels (SAF)** in Virginia...there are a major pipeline, affordable feedstock/residuals, transportation capacity, and willing customers.

Conclusions (cont.)

Metrics of success include **job creation** and **wage growth**, anticipated regional **GDP growth**, **reduced unemployment**, workers placed in **quality jobs**, and demographic **equity** of populations benefiting from SAF investments.*

* For the Virginia Economic Development Partnership in 2020, the Boston Consulting Group addressed post-pandemic resilience of Appalachia and other regions of Virginia, with **biofuels a regional priority** for investment.

END
PRESENTATION