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Sustainable Aviation Fuels Program Update

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Port of Seattle®

Sustainable Aviation Fuel Program

- 2008-2014 – Port is early supporter of research & development
- 2015-present – Port shifts to a Market Development role

  exploring:

  - How to support fuel integration & infrastructure
  - How to help with incremental cost of fuel
  - How to help incentivize biofuel production in WA

The Port's role is expanding to support sustainable aviation fuel market development

How Are Aviation Biofuels Produced?

- Hydroprocessed lipids (HEFA)
- Fischer Tropsch (FT & FT/A)
- Alcohol to Jet (AtoJ)
- Biochemical sugars (HFS)

Only one in commercial production

- 15 additional processes going through approval – including HEFA+

Five aviation biofuels pathways approved, only one is in commercial production

State of the Market

Only one in commercial production

Image courtesy: CAAFI

Dozens of off-take agreements signed. Only one facility is in production

State of the Market - cont'd

Image courtesy: CAAFI

State of the market will only improve with stable & reliable feedstocks, technologies, policies, and end markets

First refinery on-line in 2016

- AltAir Facility in Paramount, CA
- First dedicated US production facility for HEFA and renewable diesel fuels
- Repurposing of shuttered refinery
- Tallow feedstock initially

The first aviation biofuel facility in the U.S. took many years to get to production

AltAir Facility Context

- Capacity is 40 M gallons
  - Only 2 M gallons per year of bio-jet, which could increase to 4M
  - Remainder (38 M gallons) is renewable diesel for on-road transportation
  - Bio-jet = <1% of total Jet-A use at LAX

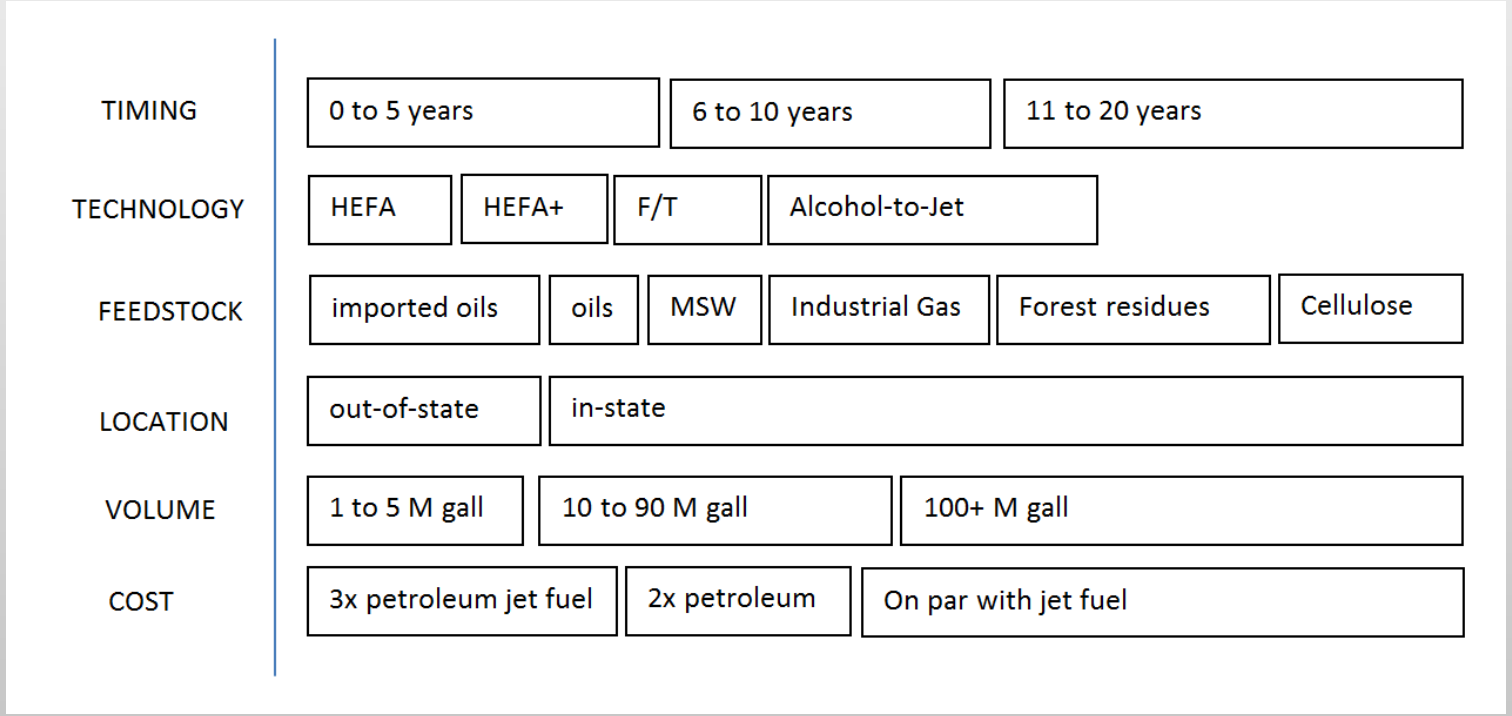
Market dynamics dictate how much jet fuel vs other products to make at a facility

AltAir's Successful Ingredients

- Low Carbon Fuel Standard – renewable diesel price
- Federal and state grants
- Off-take agreement (renewable jet fuel)
- Shuttered refinery
- Availability of feedstocks
- Sales of high value co-products

Some of the successful ingredients are in WA, others are not

Regional Roadmap to Aviation Biofuels Production



If SEA wanted bio-jet in the next 1-5 yrs, it would have to come from non-food oil crops grown outside WA

Innovative Funding Study - Scope

What role the Port of Seattle could play in:

- Covering the incremental cost of sustainable aviation fuels

- Incentivizing or financing sustainable aviation fuel infrastructure

Innovative Funding Study explored support for fuel costs and infrastructure costs

European Model for Airport-based Biofuel Program

European airports along with airlines and corporations have supported aviation biofuels together

Financial Mechanism Evaluation

- Developed list of 14 possible fund sources
- Evaluated based on revenue potential and feasibility
    - legal considerations
    - ease of implementation
    - airline impact
    - neighboring community impact
    - other stakeholder impacts

Financial mechanisms were evaluated based on their revenue potential and feasibility

Biofuel Co-Benefits

Airport Precedent
Pre-conditioned Air
Core Mission of Port
Renewable Energy Credits (RECs)
License to Operate and Grow

While airports can't buy fuel directly, they might be able to use funds to pay for the fuel's co-benefits

Most Viable Funding Sources

To achieve a 1% blend, a combination of four funding sources needed:

1) Corporate Funding Program
2) Tax Levy

Requires FAA approval:

3) Non-Aeronautical Revenue
4) Aeronautical revenue

The most viable funding sources include a combination of Airport and non-Airport Revenue streams

Possible Options for Port

Partnered approach

1% blend ($7 M/yr) paid for via central fund from multiple sources; work with airlines & partners to approach FAA

Larger investment by Port

1 to 5% blend ($7 - 30 M/yr) paid for with Port mechanisms

Legislative-focused approach

Market signal is sent via a WA-based Low Carbon Fuel Standard