Alternative Fuels Developments

ABLC

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United's approach to alternative fuel initiatives

- **United's strategy is focused on cost-competitive opportunities**
  - Ultimately cost still matters – airlines are not willing to pay more for biofuel on a net basis
  - Marketing benefits are limited and ultimately the fuel needs to offer other attributes to make it business-viable

- **Opportunity lies in solving the fuel cost and volatility problem by addressing the supply side with projects that deliver:**
  - Costs competitive with traditional jet fuel
  - De-coupled from crude volatility
  - Fuel to an airport (or purchase rights pre-refining)
  - Hedge against carbon risk

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Current status of AltAir project

- **AltAir is nearing mechanical completion and expects to be producing fuel in mid-2015**
- **Renewable fuel will generate RINS and EPA certification is expected in time for first delivery**
- **Renewable fuel will be blended on-site with conventional jet A prior to transporting it to the airport**
- **United is finalizing plans for mid-2015 launch out of LAX**
  - Kick-off event at LAX will celebrate the inaugural flight of United's regularly scheduled flights on biofuel from the airport

United is analyzing three delivery options with the goal to reduce cost, complexity, and eventually help drive an industry standard

1) Blended Truck Delivery

- Blend on-site at refinery
- Ship blended fuel to airport by truck

- Workable solution for temporary campaigns but not optimal for regular commercial operations because of complexity and cost
- Allows for tracking of molecules to the airport and into wing

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2) Blended fuel via pipeline

- Blend on-site at refinery
- Ship blended fuel to airport by pipeline

- Mostly likely outcome in near to mid-term
- Less costly than truck transportation; reduces liability
- Fortunate that pipeline infrastructure exists between refinery and LAX
- However, no tracking of molecules possible; relies on book-and-claim for credits

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3) Neat fuel via pipeline to blending location

- Ship neat fuel to blending location by pipeline
- Ship blended fuel to airport by pipeline

- *Potentially lowest cost option in the long-term as it avoids expense of bringing conventional jet A to the refinery*
- *Allows for molecule tracking to the blending location*
- *Requires further industry work to facilitate transportation of neat alternative fuel*

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Tracking alternative fuel molecules

- **Well-defined accounting mechanisms and sustainability criteria needed to support airlines use of alternative fuels**
  - Quantify and allocate greenhouse gas emissions savings in a transparent and consistent way
- **Multiple organizations (e.g., A4A, IATA, CAAFI, etc.) working to ensure consistent rules are developed and mechanisms can be implemented by airlines**
- **IATA is leading discussions on fuel tracking mechanisms and sustainability criteria with the goal of informing the development of a market-based mechanism framework at ICAO**
  - Representatives from several airlines (e.g., UA, Qantas, BA) heavily involved in this process

While the aviation alternative fuel industry shows promise, more work must be done to ensure it remains a viable alternative to traditional fuels

- **Support the ASTM alternative fuel process to accelerate approvals**
  - Investigate potential for co-processing of renewable feedstocks alongside conventional crude in existing refineries
  - Develop documentation (e.g., COAs for D7566 Annexes) to facilitate more transportation option for neat alternative fuel
- **Work with states (e.g., California, State of Washington) to implement low-carbon fuels legislation similar to RFS2 that allows alternative jet fuel to generate credits**
- **Focus on re-development of stranded assets with infrastructure designed for scaled volumes of production and delivery**
  - Altair will create 75+ jobs in the Paramount area and add significantly to the tax base
- **Ensure alternative fuel tracking mechanisms and carbon reduction schemes appropriately allow companies to take credit for renewable fuel purchases**


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