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ICAO SEMINAR ON  
ALTERNATIVE FUELS 2017  
ICAO Headquarters, Montréal, 8-9 February 2017



# Alternative Jet Fuels: Factors that Have Enabled Success

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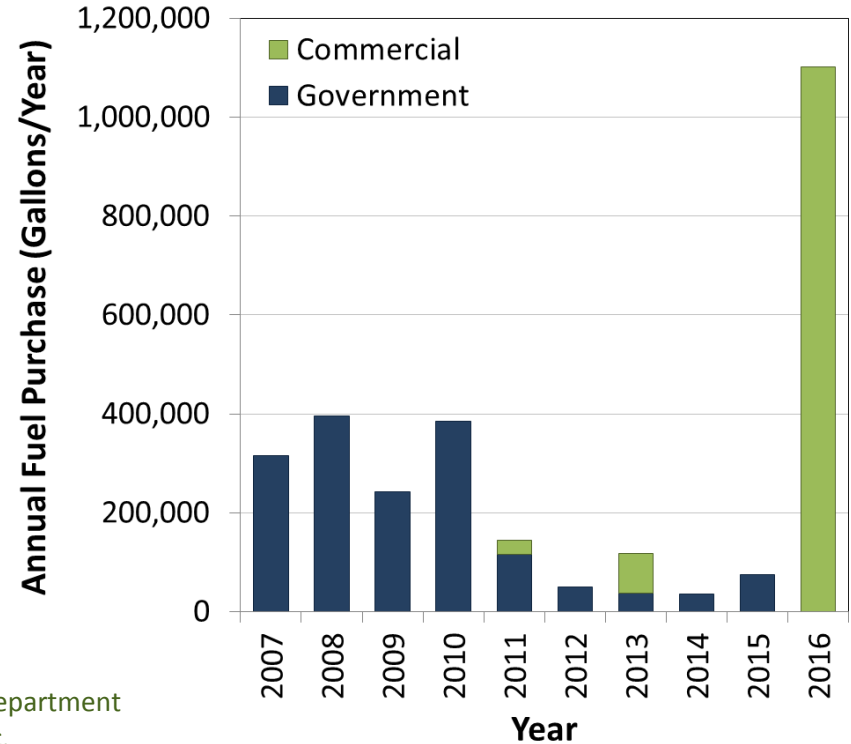




# Where We Stand Today

- Commercial flights on AJF are taking place!
- 1.1 million gallons in 2016 from one commercial producer

### U.S. Alternative Jet Fuel (AJF) Procurements<sup>1</sup>



Notes:

1. Based on voluntarily reported data from Airlines for America (A4A), Department of Defense (Defense Logistics Agency, DLA-Energy) and Gulfstream Inc.



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## Where We are Going: AJF Purchase Agreements (1 of 3)

|   |          |   |          |   |
|---|----------|---|----------|---|
|   | <b>+</b> | <b>UNITED</b>    | <b>=</b> | <b>5 M gpy</b><br>from 2016                       |
|  | <b>+</b> |    | <b>=</b> | <b>3 yr agreement</b><br><b>30/70 blend</b>       |
|   | <b>+</b> |   | <b>=</b> | <b>3 yr agreement</b><br><b>Enabling LAX flts</b> |
|  | <b>+</b> |  <b>CATHAY PACIFIC</b>   | <b>=</b> | <b>375M usg</b>                                   |
|   | <b>+</b> | <b>UNITED</b>    | <b>=</b> | <b>90-180 M gpy</b><br><b>Over 10 yrs</b>         |



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## Where We are Going: AJF Purchase Agreements (2 of 3)



3 M gpy  
3 M gpy



48 A350 deliveries  
10% blend



Supply  
from 2018



SG Preston



10M gpy, 10 yrs



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## Where We are Going: AJF Purchase Agreements (3 of 3)



**Lufthansa**



Up to 40M gal  
Over 5 yrs (MOU)

**NESTE**



**OSLO**  
OSLO AIRPORT



Lufthansa Group

**KLM**

**SAS**



(Bioport on demand)



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## Instrumental Factors that have Enabled Success

- Work through Public-Private Partnerships
- Leverage expertise and resources across government agencies and internationally
- Consider the entire supply chain
- Identify and address key barriers





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# Commercial Aviation Alternative Fuels Initiative

- Public-Private coalition for commercial aviation to engage the emerging alternative fuels industry
- Enable development of alternative jet fuels
- Four teams for key issues:
  - Certification-Qualification Team
  - Business Team
  - Environment Team
  - R&D Team
- State and Regional Rural Development
- International Cooperation

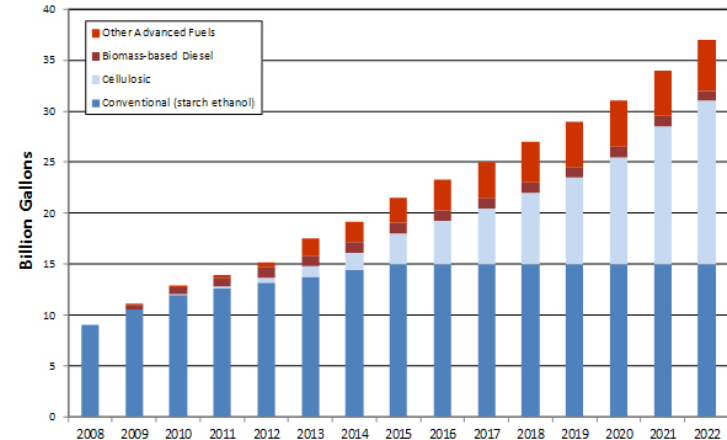




# Production Incentives

- U.S. Renewable Fuel Standard (RFS2)
  - Requires fuel producers to blend volumes of renewable fuel in fuel supply
  - Primarily designed to replace surface transportation fuels
  - Jet fuel qualifies under program for incentive
- State of California Low Carbon Fuel Standard (LCFS)
  - Incentivizes alternative fuels for ground transportation
  - Does not currently include alternative jet fuels
  - Instrumental to the development of the Alt Air facility

Renewable Fuel Standard Volumes by Year







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# Assisting Initial Facility Construction (1 of 2)

Defense Production Act (DPA) Initiative

Agriculture, Energy and Defense Departments Cooperation

- \$510M (\$170M from each agency) agreement to support alternative jet and diesel production
- Three commercial scale facilities to produce 100M g/y
- Support Navy fuel demand of 1.26 B g/y
- Domestically produced with non-food feedstock
- Reduce risk for commercial scale up












# Assisting Initial Facility Construction (2 of 2)

Defense Production Act (DPA) Initiative  
Agriculture, Energy and Defense Departments Cooperation

Three projects were selected for construction and commissioning

| Company   | Location     | Feedstock               | Conversion Pathway                           | Off-Take Agreements  | Capacity (MMgpy) |
|---|--------------|-------------------------|--|--|------------------|
|  | Gulf Coast   | Fats, Oils, and Greases | Hydroprocessed Esters and Fatty Acids (HEFA) | TBD  | 82.0             |
|  | McCarran, NV | Municipal Solid Waste   | Gasification – Fischer Tröpsch (FT)          | <br> | 10.0             |
|  | Lakeview, OR | Woody Biomass           | Gasification – Fischer Tröpsch (FT)          | <br> | 12.0             |



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# U.S. Military Procurements of Alternative Fuels

- Farm to Fleet

## U.S. Navy and Agriculture

- Large fuel purchases by Navy -- tens of millions of gallons
- Subsidy for feedstock from Agriculture

- Great Green Fleet

- Navy flights on 50% and 100% alternative fuel
- Large fleet operations demonstrated





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# Airports Transitioning to Alternative fuel

Biofuel Infrastructure Study by Boeing and SEA-TAC airport

- Complete Infrastructure Feasibility Study in 2016
- Continue to support regional research and development initiatives
- Examine airport role in covering incremental cost of alternative fuel
- Stated goal: 50 million gallons of alternative fuel delivered annually in Seattle





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# Summary

- Commercial flights on alternative fuels are taking place today
- Industry plans in place for 100 million gallons
- Public private partnerships have played key role:
  - Industrial commitment is crucial
  - Need to reduce financial risks associated with initial facility construction
  - Production incentives are helpful
  - Important to identify and overcome barriers to production
  - Comparable cost fuels are the goal





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