



Quest for Bio-fuels in the Aviation Industry

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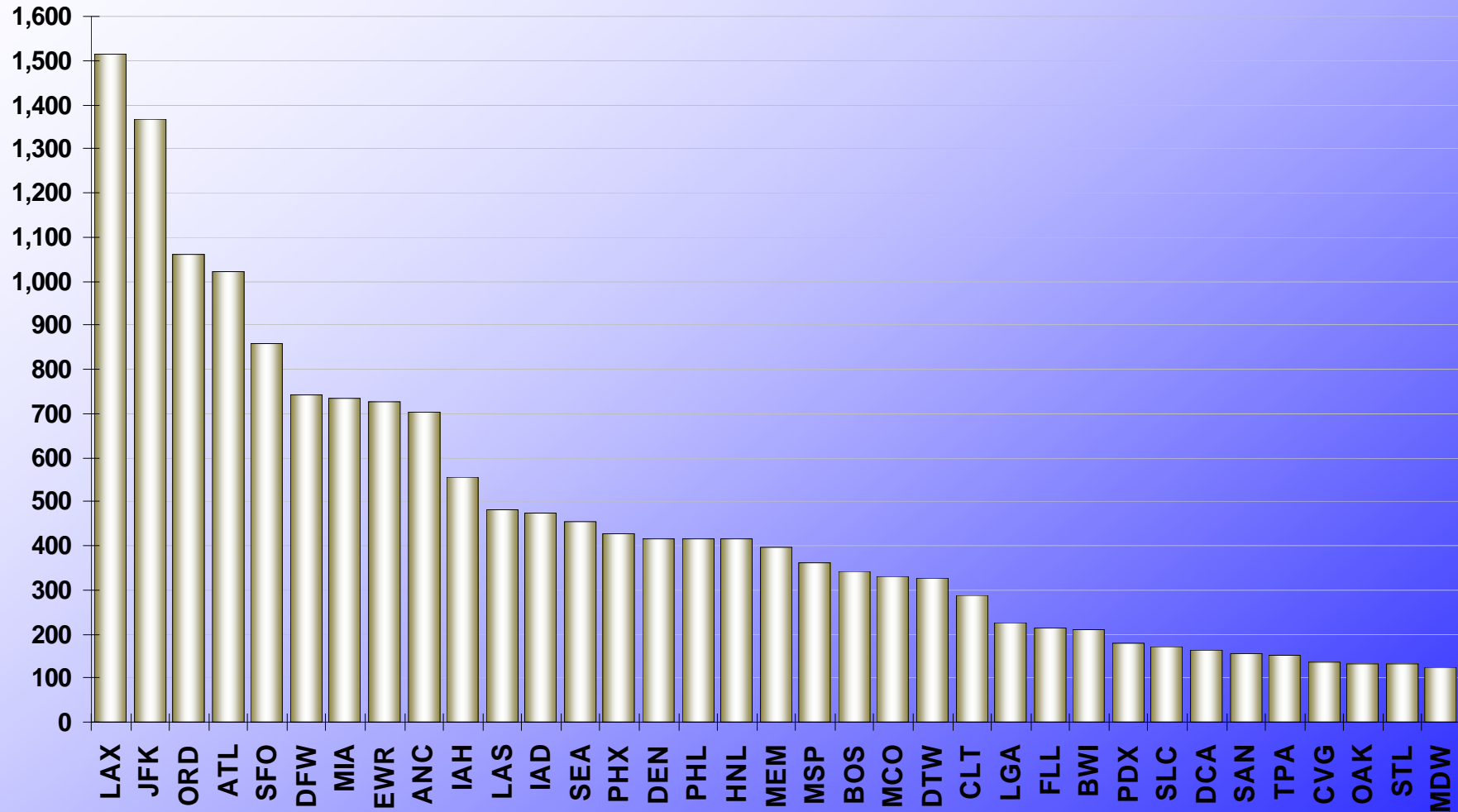
Aviation is a Ready Made Market for Bio-Fuels.

- **Highly concentrated demand nodes**
- **Highly concentrated users**
- **Aviation has no alternative source of energy**
- **Economic benefits**
- **No changes needed for airplanes/airports/pipelines**
- **Environmental benefits**



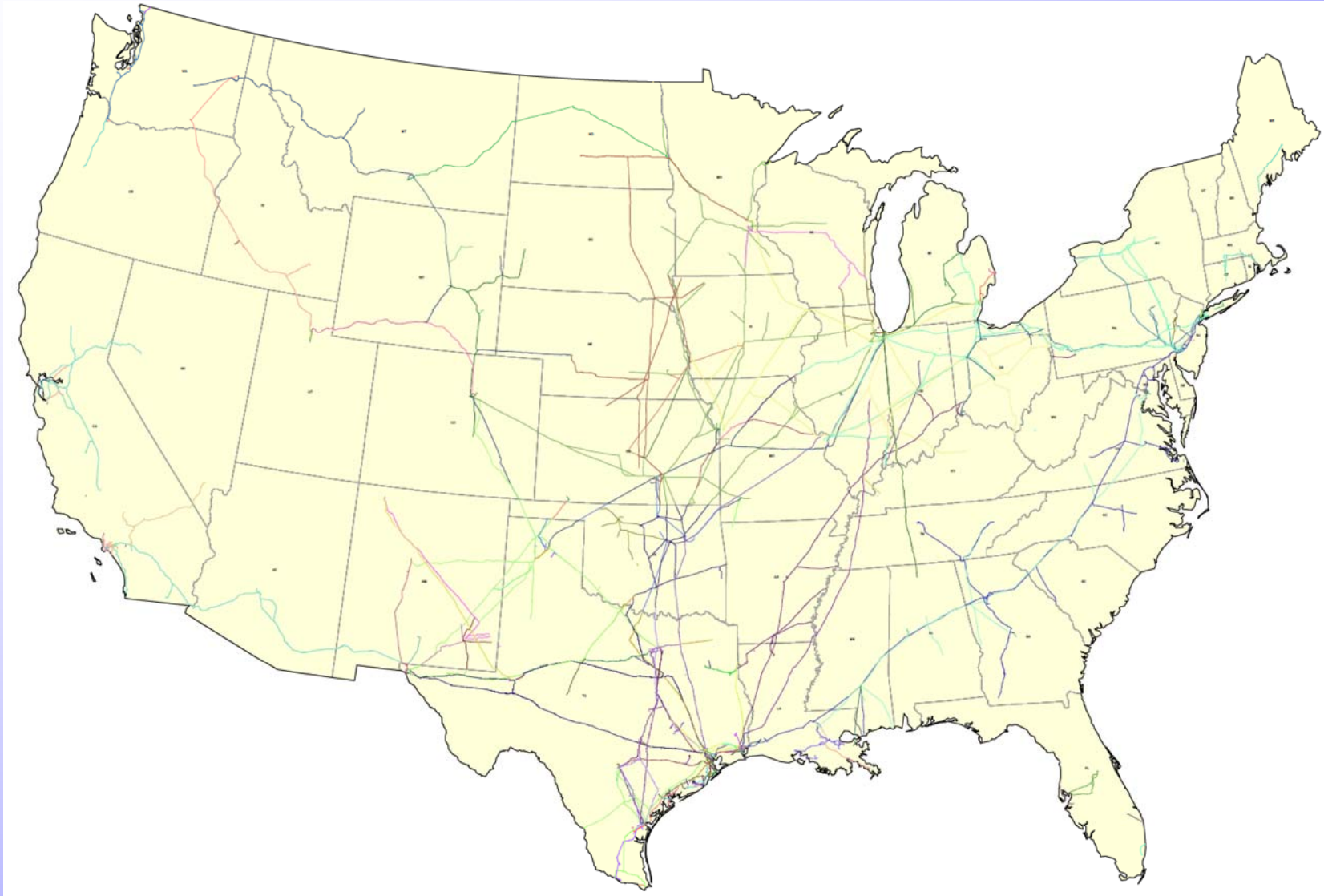
Concentrated Demand – 85% of Fuel at 35 Largest Airports

35 Largest U.S. Airports by CY 2008 Jet Fuel Requirements (Million Gallons)

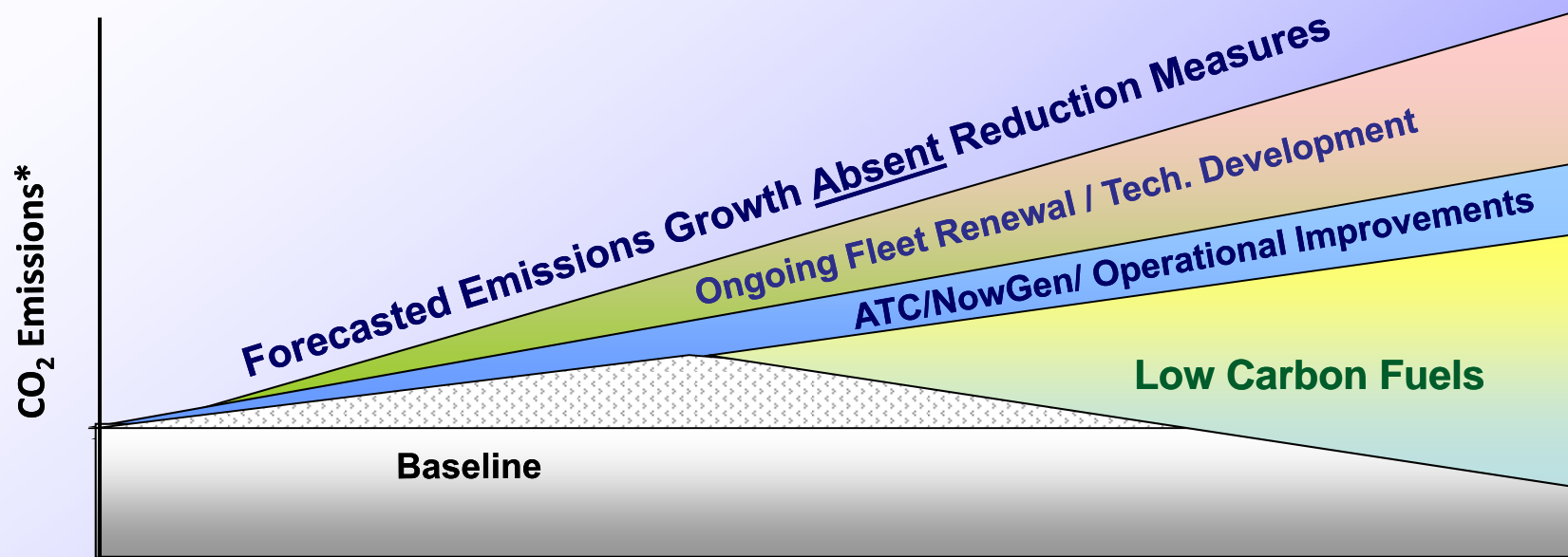


Jet Fuel Distribution Infrastructure Already in Place

Approximately 90% of Jet Fuel Uplifted at U.S. Airports Moves Via Pipeline



Aviation Taking Action on CO₂



Carbon-Neutral Growth and Reduction Timeline

2050

- United worldwide – global sectoral approach
- Sustainable bio-fuels a key part of the solution

Airline Criteria for Alternative Fuels

- Reliable (Must meet ASTM Fuel Specifications)
- “Drop-In” Fuel
- Cost Competitive
- Environmentally better than conventional jet on an LCA basis



Technical Viability Proven



Jan 2009

Continental
Algae and Jatropha



- Numerous flight tests Feb. 2008 through present
 - Extensive laboratory and ground tests
- Results met or exceeded expectations
- Excellent fuel properties
 - Lower freeze point
 - Higher thermal stability
- Jet fuel specification approvals (by ASTM)
 - Fisher-Tropsch (“F-T”) approved 2009
 - Approval of hydrotreated renewable jet (“HRJ”) anticipated by 2011
 - Additional technologies/processes underway
 - 100% bio solutions (no blending) in development
- Sustainability criteria evolving

Great progress. Superior fuel. Early in the journey.

Commercial Off-Take Agreements Key to Progress

Started with Ground Fuel (Diesel)

Eight U.S. airlines* signed 5-year contract with Rentech and ASIG

- Contract with Rentech and ASIG
- Feedstock will be urban woody waste
- Operational by end of 2012
- Diesel for use in LAX ground equipment
- Small volume
- Price was competitive with market

Opportunity to test industry approach

- Less complex than a jet fuel deal

* Alaska, American, Continental, Delta, Southwest, United, UPS, US Airways



Commercial Off-Take Agreements Key to Progress

Proceeding to Aviation Jet Fuel

14 airlines* from 4 countries signed multi-year MOU with AltAir Fuels

- Pursuing multi-year agreement with AltAir to purchase jet fuel and diesel
- Feedstock will be camelina or other non-food crops (e.g., algae, jatropha)
- Crop oils will be refined at a facility located on the West Coast
- Estimated to be operational by 2013
- Up to 75 million gallons per year
- Viability depends on multi-year biofuel tax credits and value of RFS2 RINs

Utilized industry approach

- Much more complexity



* Air Canada, Alaska, American, Atlas, Delta, FedEx, Hawaiian, JetBlue, Lufthansa, Mexicana, Polar, United, UPS, US Airways

Commercial Off-take Agreements

Key to Progress

- United Airlines signed MOU with GEVO for future supply of biofuels to Chicago – July 2010
 - Multi year agreement
 - Feedstock corn/cellulose
 - Fermentation process produces isobutyronol in conventional ethanol plants
 - Isobutyronol becomes feedstock for conventional refinery.
- Discussion ongoing with; AltAir, Amyris, BioPure Fuels, Byogy, GEVO, Jet E, NextStep, Rentch, Sapphire, Sasol, Solazyme, Solena and others...



Partnerships & Progress

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- Airlines/Airports/Manufacturers/F
AA Co-founded CAAFI in 2006
 - Universities, think-tanks,
government labs and agencies,
energy start-ups, major oil
companies, bankers
 - Three task teams; Business
Development/Commercial, R&D
and Environmental.



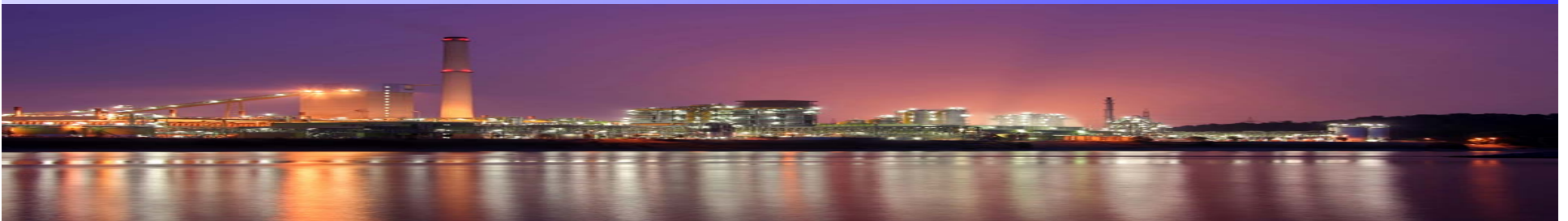
Partnerships

- Farm-To-Fly Program
 - Coalition of Airlines, Boeing and USDA
 - Determines regulations and policy changes necessary to future development of bio-energy feedstocks.
- Commercial/Military Strategic Alliance
 - ATA/DLA-Energy create a unified effort to pursue bio-fuels opportunities
 - Steering Committee with 3 working groups

Progress

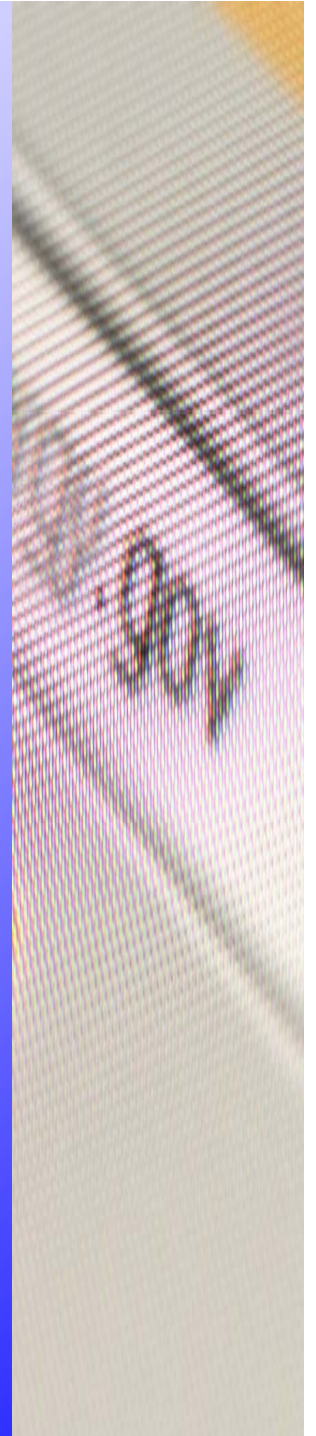
- ASTM approval of Fischer-Tropsch fuels
 - Sept 2009
- United flew first commercial flight using domestically produced synthetic jet fuel
 - April 2010
- HRJ fuels expected to be approved by ASTM by 1st Quarter of 2011
- Development of Regional working groups to identify and pursue regional solutions
- Sustainable Aviation Fuels Northwest
- U.S. Pacific Command Green Initiative - Hawaii

Key Challenges



Key Challenges

- Price Stability and Affordability
 - Getting facilities built and financed
 - Competitive with conventional fuel
 - Multi-year financial incentives critical
- Certification of New Processes
 - HRJ not yet approved (est. 1Q 2011)
 - Additional pathway
 - Hydrolysis/Fermentation (FRJ)
 - Lignocelulosic bio conversion
 - Pyrolysis/liquefaction



Key Challenges

- Feedstock Readiness
- Crediting of Environmental Benefits
- Compatibility of International & Domestic Acceptance Criteria
 - Lack of consistent environmental criteria could hamper deployment