

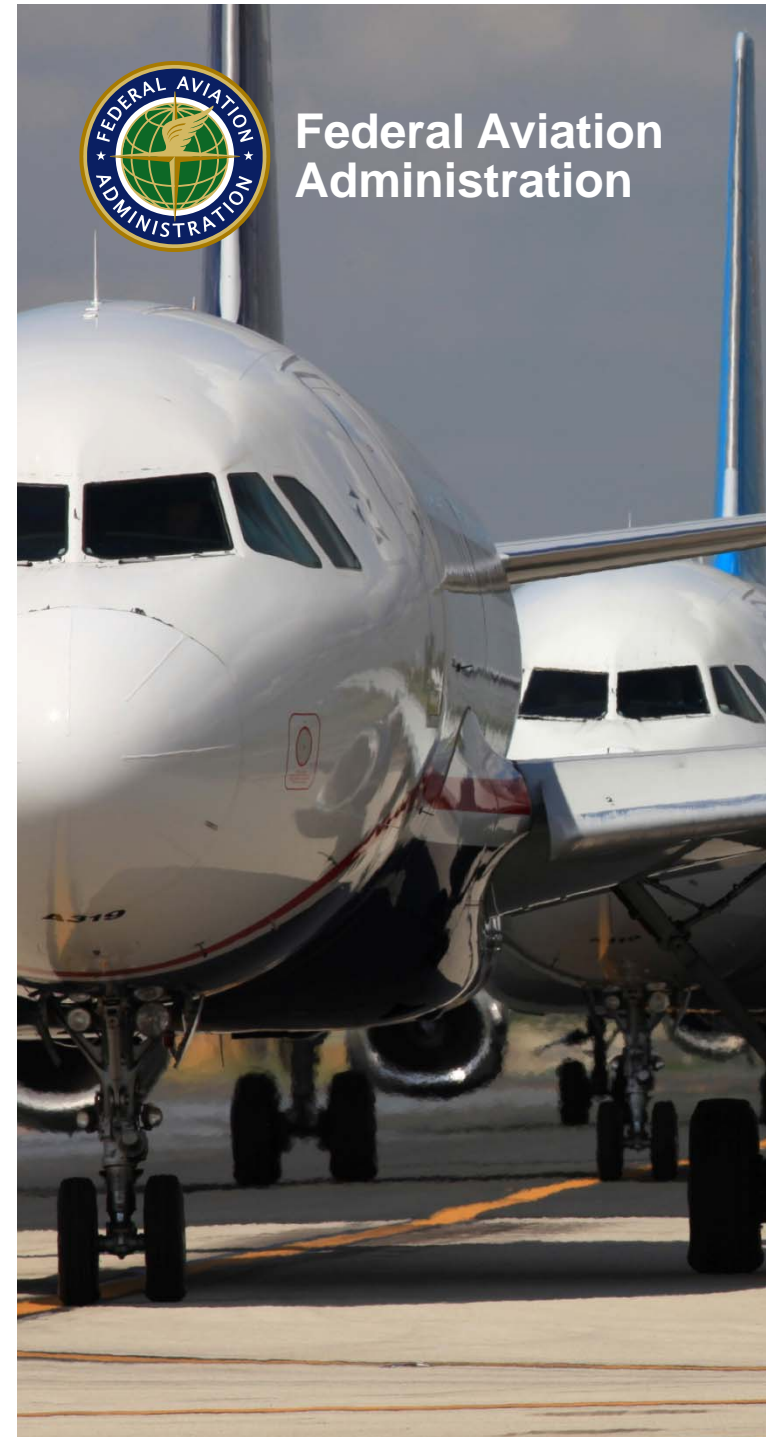
# Alternative Jet Fuels

## FAA Overview: R&D Activities and Coordination Efforts

Presented to: 6<sup>th</sup> Annual Aviation & Marine Biofuels  
Summit

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# Aviation Environmental Challenges



- Aviation impacts community noise, air quality, water quality, energy usage, and climate change
- Environmental impacts from aviation emissions could pose a critical constraint on capacity growth
- Alternative jet fuels could reduce the environmental impact of aviation:
  - Carbon neutral growth by 2020 compared to 2005
  - Absolute reduction of significant air quality impacts, notwithstanding aviation growth
  - 1 billion gallons of renewable jet fuel in use by aviation by 2018



# U.S. Climate Action Plan for Aviation

*The U.S. is pursuing a multipronged approach to address greenhouse gas emissions from aviation*

- Aircraft and engine technology improvement
- Operational improvements
- Alternative fuels development and deployment
- Policies, environmental standards, and market based measures
- Scientific understanding through research, modeling and analysis



# Alternative Fuels Principles – Vision

- Alternative Jet Fuels must:
  - Be drop-in
  - Have equivalent safety as petroleum-based jet fuel
  - Have better environmental performance than petroleum-based jet fuel
- Enable all possible fuels that meet criteria
- Government role to address key barriers
- Work through public-private partnerships
- Address the whole supply chain
- Leverage expertise and resources of other government agencies and other countries
- Aviation should be a lead user of alternative fuels



# FAA Programs supporting Alternative Jet Fuels



## Aviation Sustainability Center (ASCENT)

- Center of Excellence for Alternative Jet Fuels and Environment
- University team led by Washington State University and MIT



## Continuous Lower Energy, Emissions and Noise (CLEEN)

- Reduce aircraft fuel burn, emissions and noise through technology & advance alternative jet fuels
- CLEEN I: 2010-2015 (\$125M with 1:1 minimum cost share)
- CLEEN II: 2015-2020 (\$100M with 1:1 minimum cost share)



## Commercial Aviation Alternative Fuels Initiative (CAAIFI)

- Public-Private coalition for commercial aviation to engage the emerging alternative fuels industry



# FAA Alternative Jet Fuel Activities

- **Testing**

- Support Certification/Qualification testing
- Improve Certification/Qualification process
- Emissions measurements



- **Analysis**

- Environmental sustainability
- Techno-economic analysis
- Future scenarios



- **Coordination**

- Interagency
- Public-Private
- State & Regional
- International



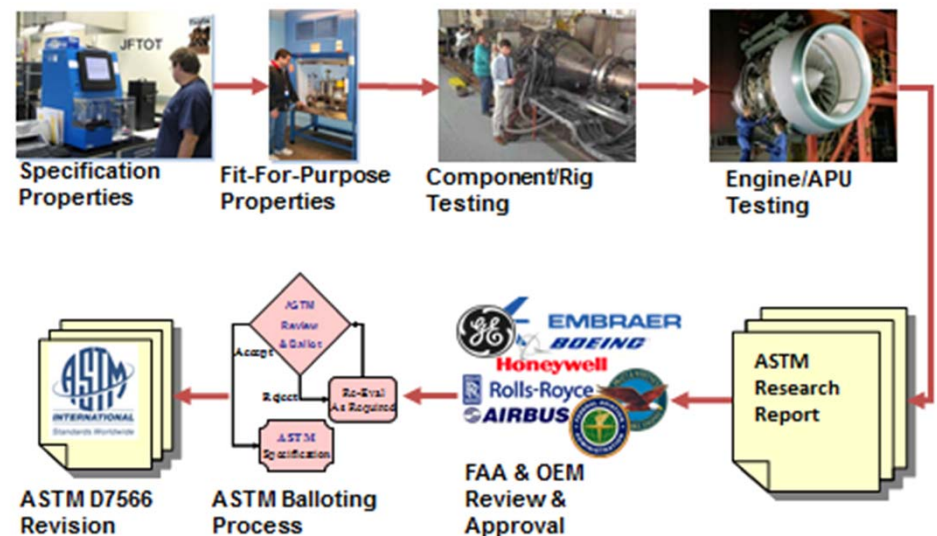


# Fuel Qualification Support

## Support ASTM Intl evaluation of alternative jet fuels

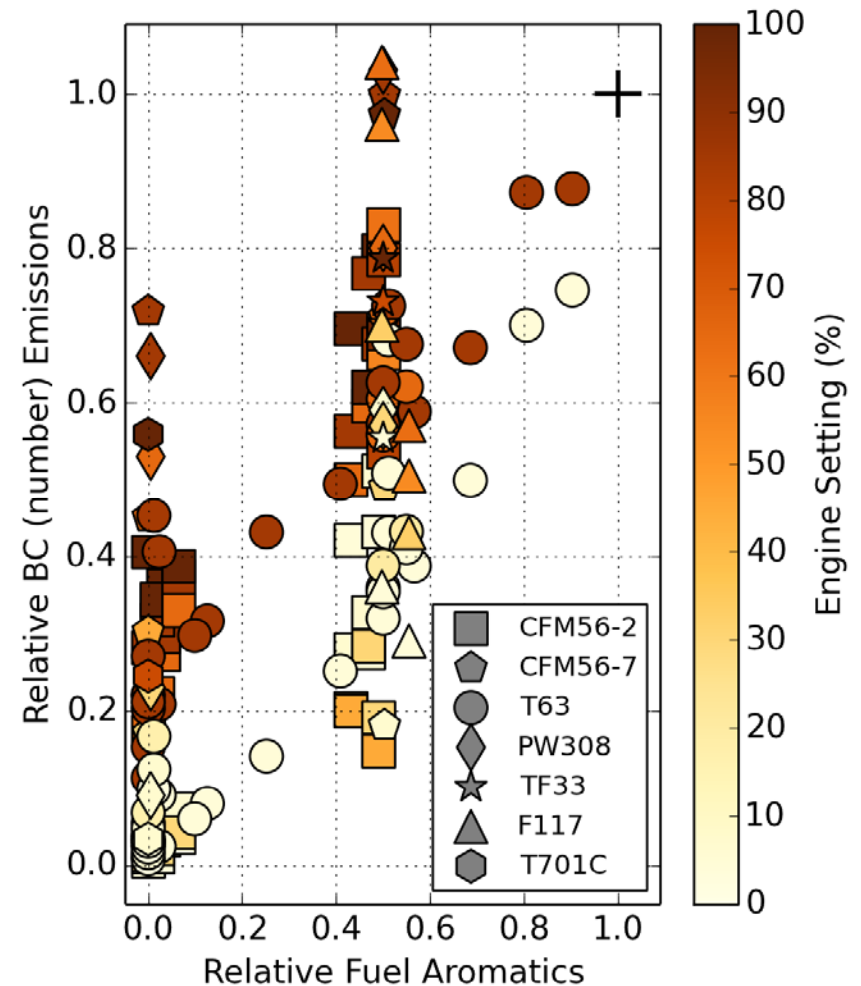
- Support ASTM D4054 testing activities to enable development of data for fuel approval
- ASTM Research Report Review
- Streamline ASTM Intl jet fuel approval process via the National Jet Fuel Combustion Program

Aviation Fuel Qualification (ASTM D4054 Process)



# Emissions Measurements

- Supporting teams through our ASCENT Center of Excellence to gather and examine alternative jet fuel emissions measurements
- Developing relationship for black carbon emissions based on engine thrust and fuel aromatic content
- Emissions measurements from alternative jet fuels that lack aromatic compounds consistently result in black carbon reductions
- Expanding knowledge to include alt jet fuels that have aromatic content (e.g., HDCJ)

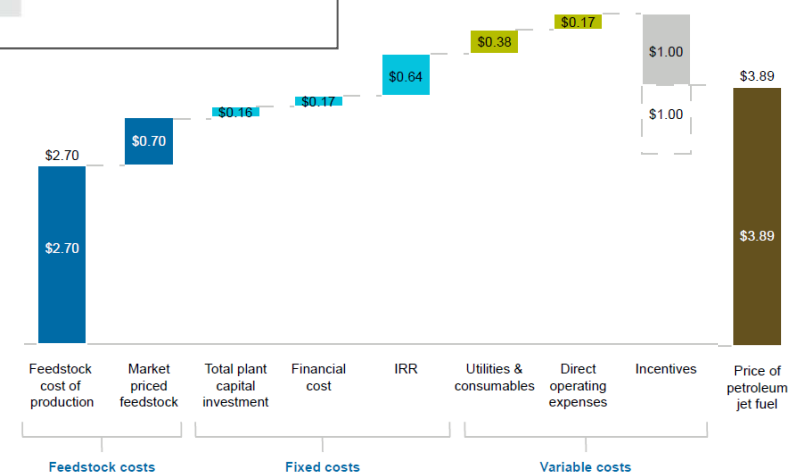
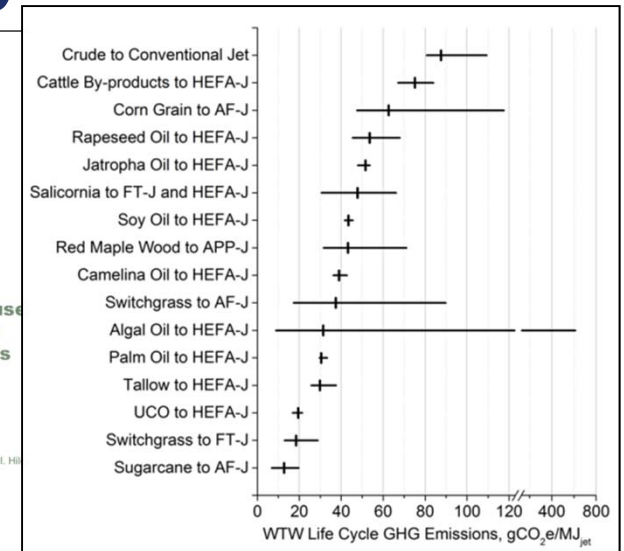
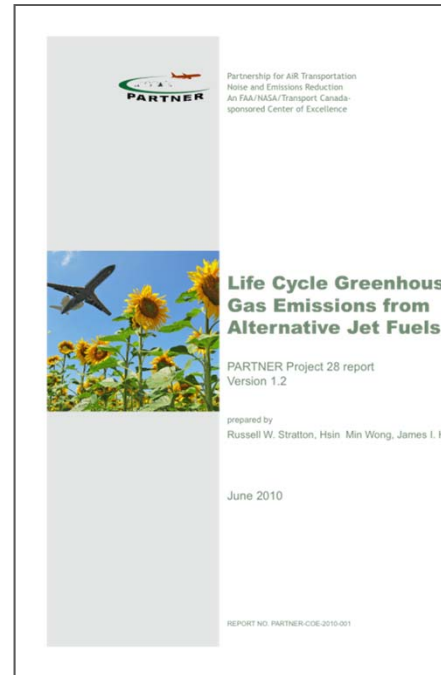


ASCENT Research Results (Speth et al. 2015)



# Environmental & Economic Analysis

- Environmental Analysis
  - Focus on well-to-tank GHG and combustion CO<sub>2</sub>
  - Emphasize influential aspects of fuel production on GHG emissions
  - Results used in ANL models and EPA analyses
  - Water footprint analysis
- Economic Analysis
  - Technoeconomic analysis of multiple pathways
  - Focus on reducing production cost: Feedstocks; production slate; brownfields



1. ANL GREET model available at <http://greet.es.anl.gov/files/aviation-lca>
2. PARTNER Project 28 and 47 research: (partner.aero): Stratton et al. 2010, Pearson et al (2012), Staples et al. 2014, Bond et al. 2014, and Seber et al. (2014), among others
3. [http://www.masbi.org/content/assets/MASBI\\_Report.pdf](http://www.masbi.org/content/assets/MASBI_Report.pdf)



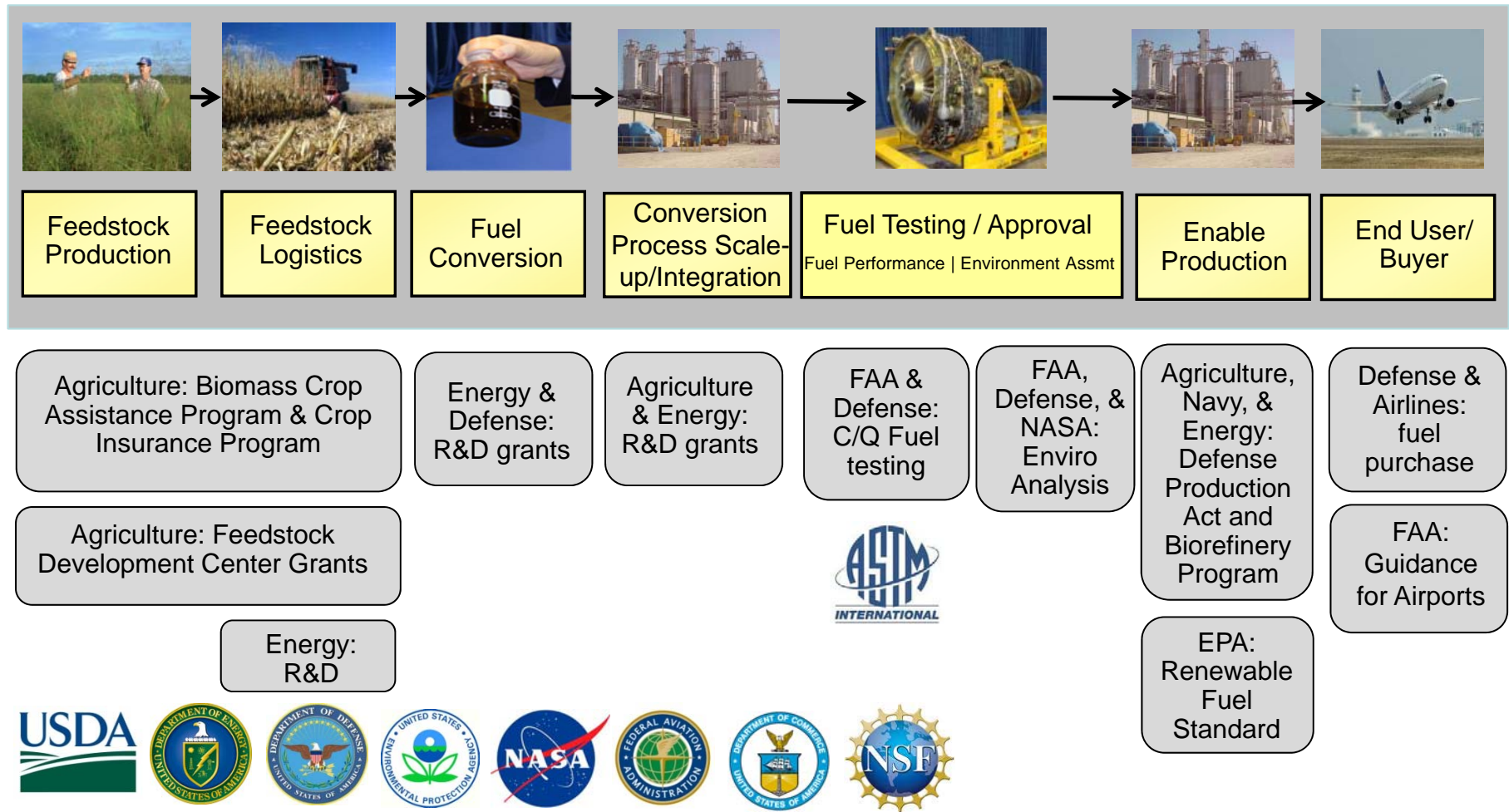
Federal Aviation  
Administration

# ASCENT Alternative Jet Fuel Supply Chain Project

- Examining barriers to alternative jet fuel production via the full range of pathways being considered for ASTM approval
- Considering the entire supply chain
  - Feedstock production, transportation, and conversion
  - Jet fuel and co-products,
  - Blending and jet fuel use by aviation
  - Quantify competition for resources along the supply-chain
- Project Contributions
  - Provide a holistic evaluation of pathways and resources
  - Develop scenarios of alternative jet fuel production
  - Evaluate sustainability from environmental, economic and societal perspectives
  - Supports Farm to Fly 2.0 and CAAFI efforts



# Coordinate USG Efforts Across the Supply Chain



# International Engagement

- Bilateral cooperation agreements
- Informal coordination with counterpart organizations
- International Civil Aviation Organization



# Summary

- Alternative jet fuels are a key component of U.S. strategy for meeting aviation environmental goals
- FAA efforts are directed to overcoming key challenges via testing, analysis and coordination
- Multiple programs and activities focus on different aspects of the challenge
- Partnerships across technical areas are a key focus
- Strong domestic and international coordination necessary for success





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