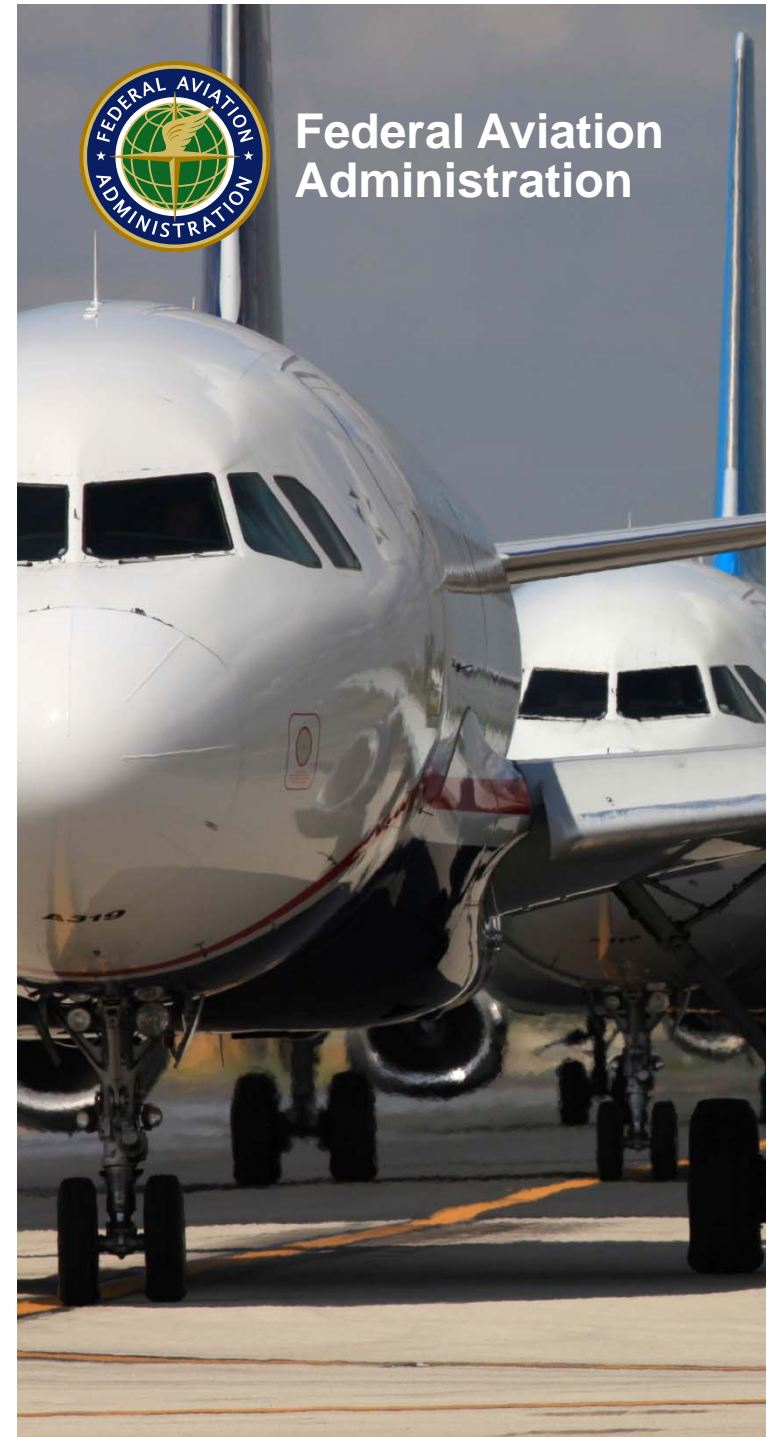


Alternative Jet Fuels Research Overview

Presented to: REDAC E&E Subcommittee

By: Aniel Jardines
Federal Aviation Administration

Date: August 26, 2014



Alt Fuels Development Progress

- ASTM approval of SIP fuels (June 2014), additional ballots under preparation
- Engine tests of novel fuels continue
 - PW615F turbofan testing of 3 fuels completed
 - Honeywell APU testing of 7 fuels will be complete September 2014
 - Cooperative testing of Alcohol-to-Jet fuel with USAF
- ASCENT projects underway
 - National Jet Fuel Combustion Program
 - Supply chain analysis
 - Environmental and economic sustainability analyses
 - Emissions research to relate measured changes in emissions and fuel performance to fuel composition
- Continued domestic and international engagement
 - DOE joined Farm to Fly 2.0 (July 2014)
 - National Alternative Jet Fuel Strategy draft completed & in review
 - ICAO Alternative Fuels Task Force (AFTF) is advancing

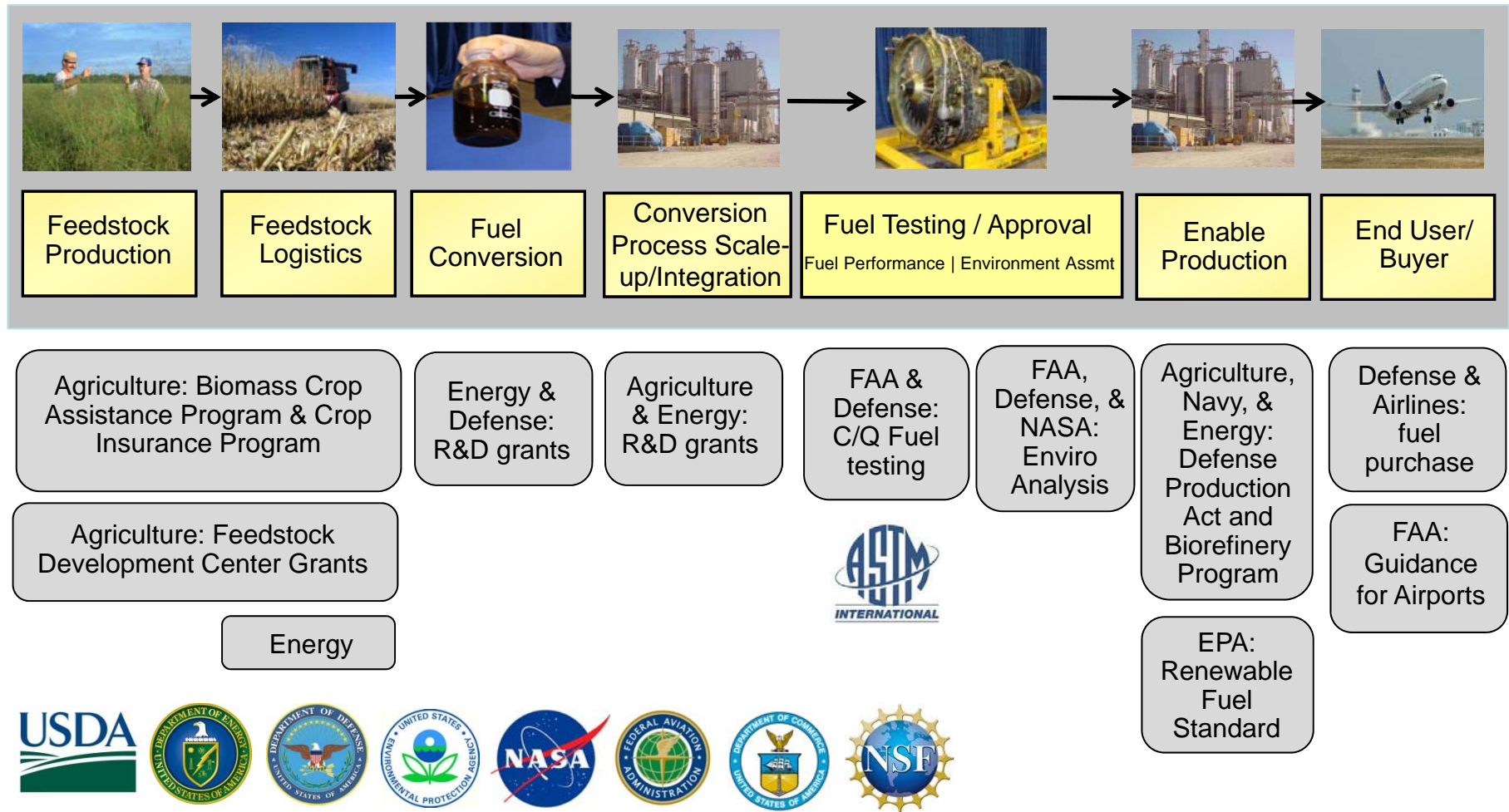


Challenges for Alternative Jet Fuels

- **Feedstock Availability**
- **Competitive cost for alternative fuel**
- **Approved for performance/safety**
- **Environmentally sustainable**
- **Commercially produced**



USG Efforts across Alternative Jet Fuel Supply Chain



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FAA Alternative Jet Fuel Activities

- **Testing**

- Support Cert/Qual testing
- Improve Cert/Qual process
- Emissions measurements

- **Analysis**

- Environmental sustainability
- Techno-economic analysis
- Future scenarios & supply chain

- **Coordination**

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

- **Tracking use**



FAA Alternative Jet Fuel Activities

- **Testing**

- Support Cert/Qual testing
- Improve Cert/Qual process
- Emissions measurements

- Support evaluation of fuels for ASTM approval
- Reduce test cost and time for qualification

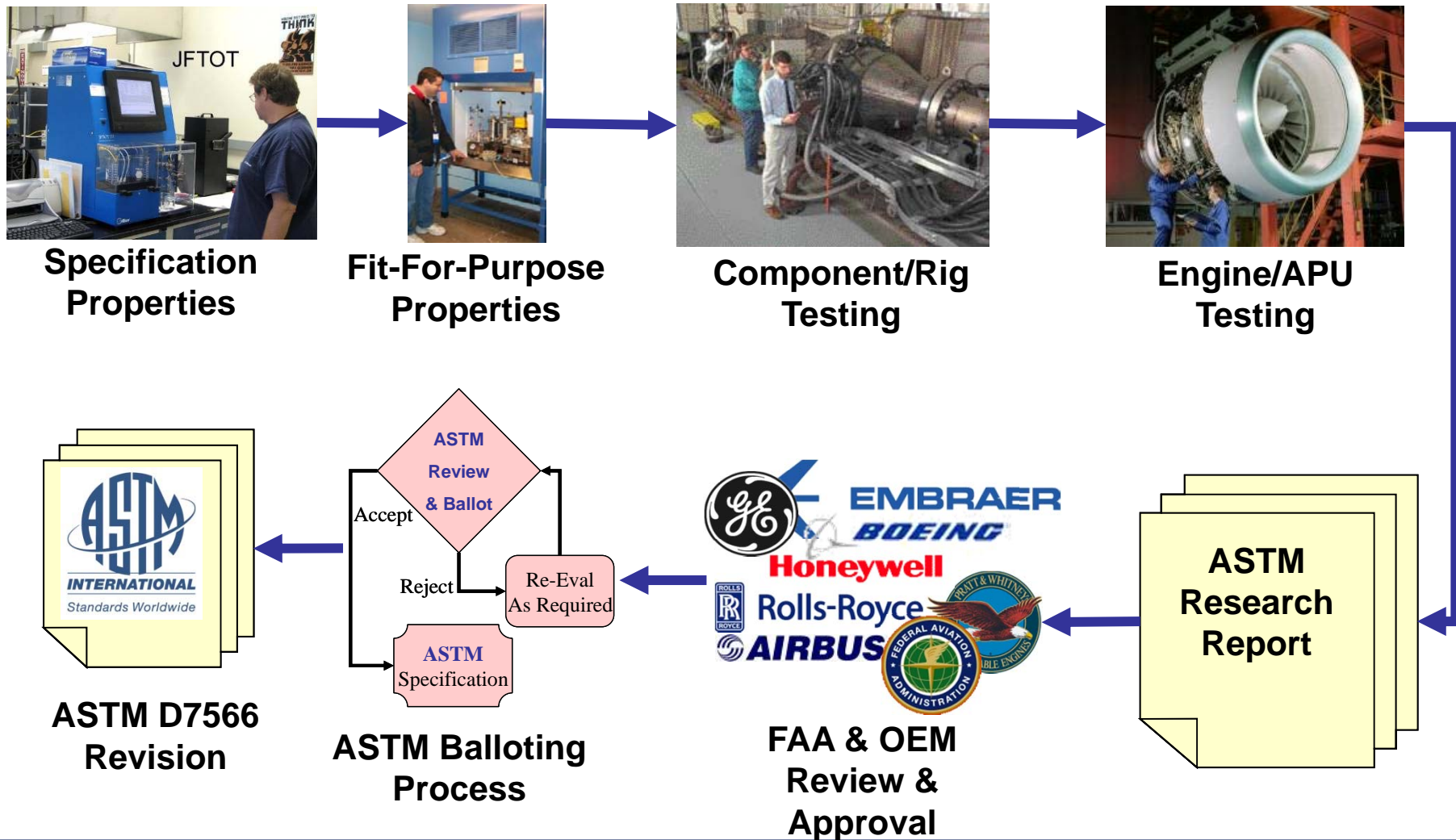
- **Coordination**

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

- **Tracking use**

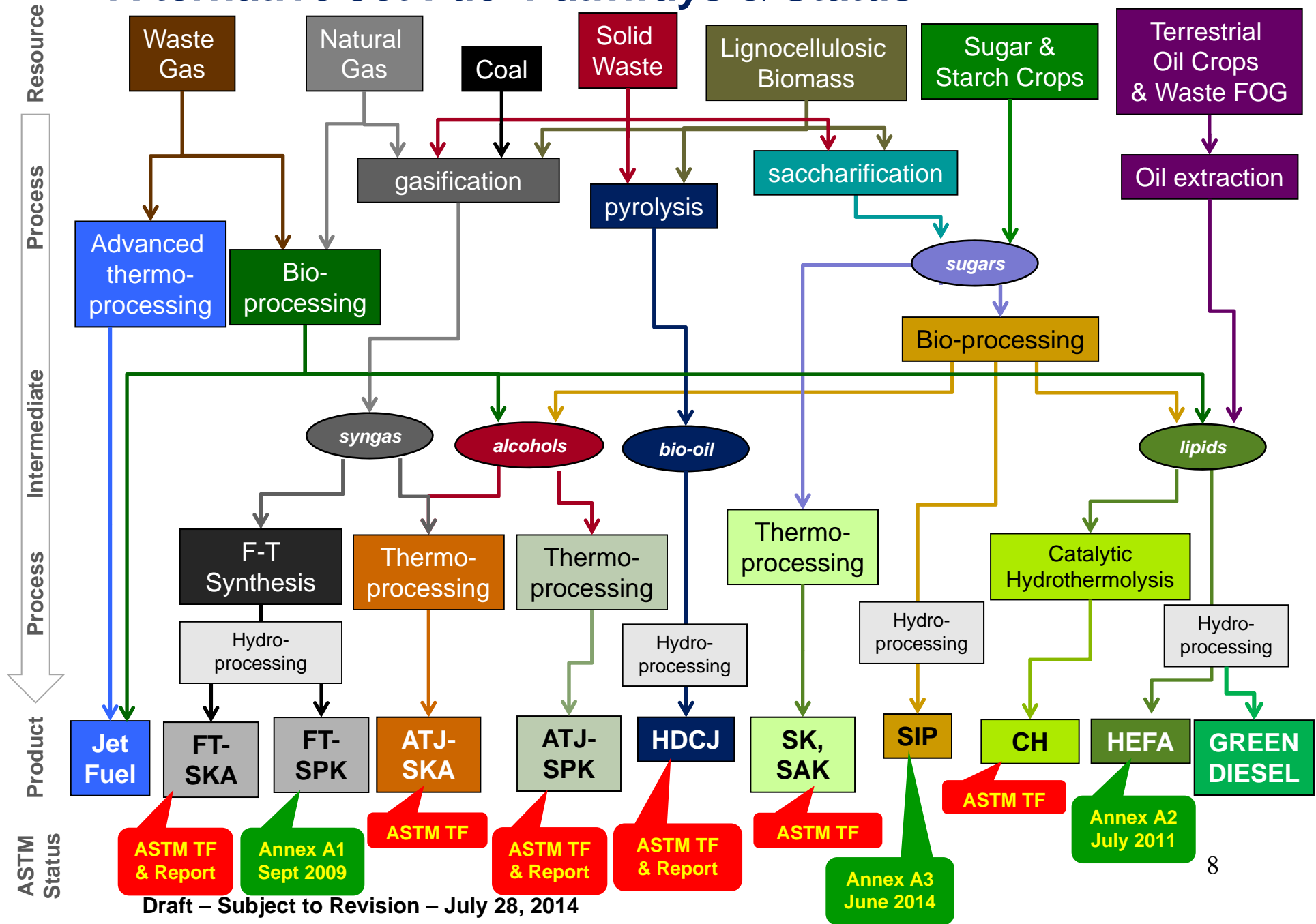


Aviation Fuel Qualification (ASTM D4054 Process)



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Alternative Jet Fuel Pathways & Status



FAA Alternative Jet Fuel Activities

- **Testing**

- Material compatibility
- Certification / Qualification
- Emissions measurements

- **Analysis**

- Environmental sustainability
- Techno-economic analysis
- Future scenarios & supply chain

- Improve understanding of environmental and economic sustainability of alternative jet fuel pathways
- Improve understanding of the potential availability of alternative jet fuel



ASCENT Alternative Jet Fuel Supply Chain Analysis

Objectives

- Develop information on regional supply chains for use in creating scenarios of future alternative jet fuel production
- Identify the key barriers in regional supply chains that must be overcome to produce 1 billion gallons of alternative jet fuel by 2018 and an order of magnitude larger production in the longer term
- Support the Alternative Fuel Task Force (AFTF) of the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP) by estimating the contribution of alternative jet fuels toward CO₂ reduction targets in 2050



ASCENT Alternative Jet Fuel Supply Chain Analysis

Research Team

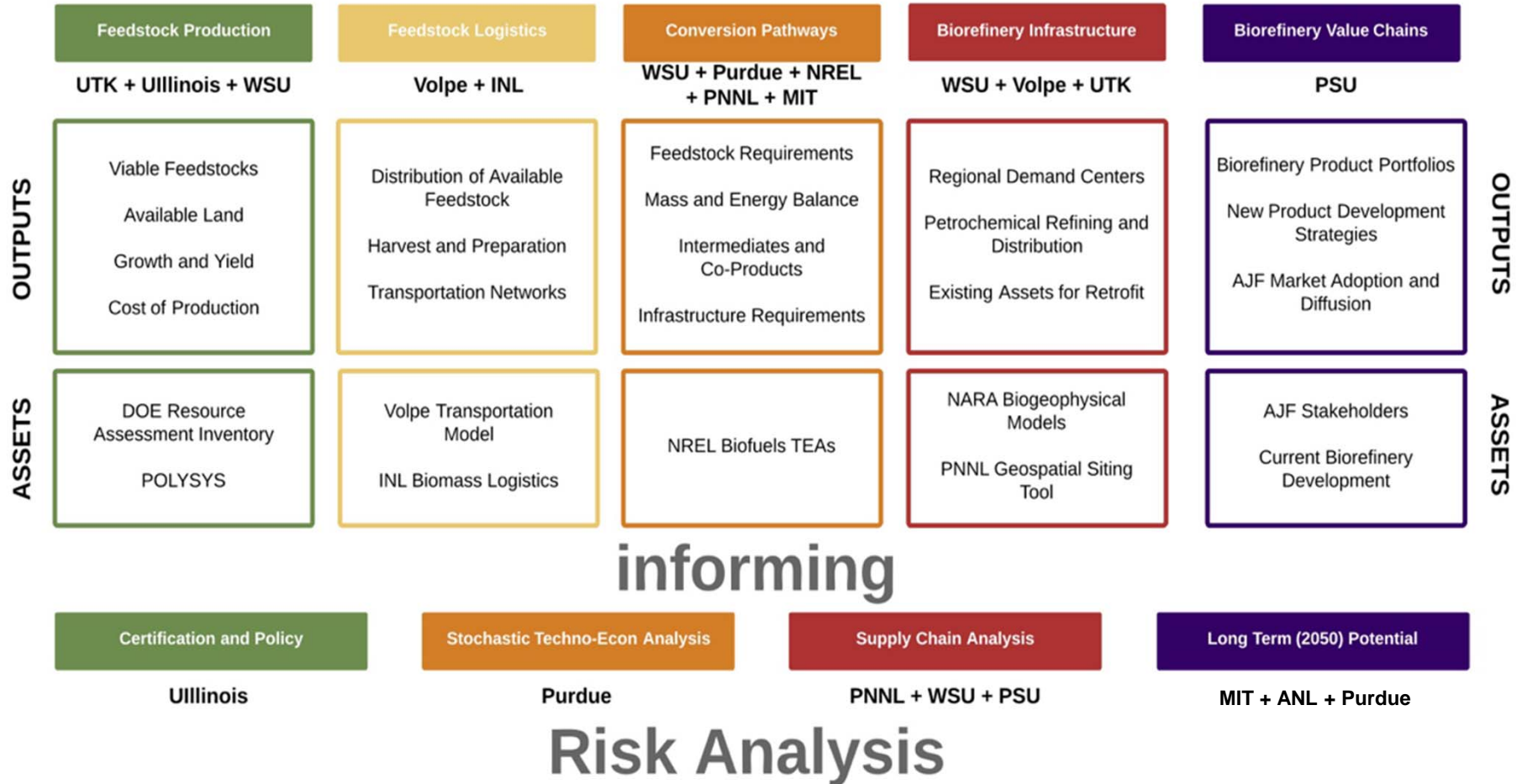
- **ASCENT Universities:**
 - Washington State (M. Wolcott)
 - Penn State (P. Smith)
 - U. Illinois (J. Endres)
 - U. Tennessee (T. Rials)
 - Penn State (T. Richard)
 - MIT (R. Malina)
 - Purdue (W. Tyner)
- **National Labs:**
 - Volpe, ANL (already onboard)
 - *INL, NREL, ORNL, PNNL (as possible)*
- **Cost share support:**
 - Biojet Canada (TC funded effort)
 - ITAKA (CLH Aviation, EC funded effort)
 - Delta Airlines
 - Byogy
 - Monsanto
- **Universities represented:**
 - Sun Grant Partnership
 - USDA AFRI Coordinated Agricultural Projects
 - Northwest Advanced Renewables Alliance (NARA via WSU)
 - Southeast Partnership for Integrated Biomass Supply Systems (IBSS via U. Tennessee)
 - Northeast Woody/Warm-season Biomass Consortium (NEWBio via PSU)
 - Bioenergy Science Center (via U. Illinois)
- **Kick-off Meeting – shooting for September:**
 - Team, CAAFI, Airlines 4 America, USDA, DOE, DLA-Energy, US Navy, and AFRL



ASCENT Alternative Jet Fuel Supply Chain Analysis

Project Layout

AJF Supply Chain Assessment



FAA Alternative Jet Fuel Activities

- Complement and leverage work of other U.S. agencies
- Complement and leverage work of private sector
- Complement and leverage work of international partners
- Support state/regional supply chain development and deployment

- **Coordination**

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

- Tracking use



Farm to Fly 2.0

... “THEREFORE, AS OUR GOAL, we the undersigned, jointly signify our intent to continue working together over the next five years in an expanded collaboration entitled “Farm to Fly 2.0”, to **enable commercially viable, sustainable bio-Jet Fuel supply chains in the U.S.** that are able to support the goal of **one billion gallons of bio-Jet Fuel production** capacity and use for the Aviation Enterprise **by 2018**”



Federal Aviation
Administration

FY15 Anticipated efforts

- Continue support to ASTM approval of additional fuel pathways
- Continued Certification / Qualification testing of fuels with current methods (D4054) to support ASTM approval
- Continue work to improve testing methods to reduce cost and time of Certification / Qualification over longer term via NJFCP
- Continue Analysis in support of deployment:
 - Supply chain analysis
 - Environmental and economic sustainability analyses
 - Emissions research to relate measured changes in emissions and fuel performance to fuel composition
- Continued domestic and international engagement
 - CAAFI
 - Farm to Fly 2.0 working group
 - National Alternative Jet Fuel Strategy draft completed & in review
 - ICAO Alternative Fuels Task Force (AFTF) is advancing



Summary

- Alternative jet fuels are a key component of FAA strategy in meeting environmental goals
- FAA efforts are directed to overcoming key challenges via testing, analysis and coordination
- Multiple programs and activities:
 - Commercial Aviation Alternative Fuels Initiative (CAAFI)
 - Continuous Lower Energy, Emissions and Noise (CLEEN) Program
 - Aviation Sustainability Center (ASCENT)
 - National Alternative Jet Fuel Strategy development
 - National Jet Fuel Combustion Program
 - Farm to Fly 2.0
- Strong domestic and international coordination

