

PAFI
Piston Aviation Fuels Initiative

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Presenters

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Piston Aviation Fuels Initiative (PAFI)

Mission: Facilitate the development and deployment of an unleaded AVGAS with the least impact on the existing piston-engine aircraft fleet. This is a govt/industry collaboration to ensure all stakeholders are involved in a coordinated approach to fleetwide implementation

Established to develop a path forward for the identification, evaluation and fleetwide certification and deployment of the most promising unleaded replacement fuels

Overcome the significant hurdles which have hindered past efforts to develop an unleaded avgas replacement.

Provides a sound process to ensure that this goal is achieved with a minimum of disruption to the general aviation industry and with the greatest likelihood of marketplace success.

The PAFI process involves a two phase testing program at the FAA's Technical Center

FAA's Unleaded Avgas Transition Aviation Rulemaking Committee (UAT ARC)

- Charter signed by FAA Administrator - 1/31/2011
- The UAT ARC was tasked with investigating the current issues relating to the transition to a replacement unleaded fuel and make recommendation to resolve them
- The UAT ARC membership included FAA & EPA; manufacturers GAMA, Lycoming, Cessna, etc; operator groups AOPA, EAA clean 100 coalition, fuel distributors and producers NATA, API, Exxon, and fuel developers Swift/GAMI

UAT ARC – Issues Identified

Significant Technical Challenges to Identify Replacement for 100LL...

- Ensure safety of existing fleet is maintained: FAA certification process...
 - Ensures the engine and aircraft meet all safety requirements when operating on known fuels conforming to long-established specifications
 - Does not approve fuel – Does not evaluate the properties and performance of fuels
 - Requires a separate showing that each aircraft and engine complies with all airworthiness standards when operated on a new fuel.
 - Extremely challenging considering over 167,000 piston aircraft, dozens of manufacturers, thousands of models and configurations
 - Spanning almost a century of design, construction & certification
 - 30,000+ amateur build aircraft with limitless nuances in design
 - Key Issue: No FAA policy or test procedures exist to enable fleet-wide assessment and certification of a replacement unleaded fuel
- Ensure market availability/viability:
 - Other factors critical to determine whether a candidate unleaded fuel is a viable replacement for 100LL
 - Production and distribution infrastructure (ability to produce and distribute to over 5,000 airports in the U.S.)
 - Environmental and toxicological considerations
 - Cost to consumer
 - Key Issue: No program exists that can coordinate and facilitate the complete impact assessment of a replacement avgas on both the aircraft fleet and also deployment considerations

UAT-ARC Recommendations

Final report issued in February 17, 2012 - five Key Recommendations

1. “Fuel Development Roadmap – AVGAS Readiness Levels (ARL)”
 - key milestones in the aviation gasoline development process
 - Information needed to support assessment of the viability of candidate fuels in terms of impact upon the existing fleet, production and distribution infrastructure, environment and toxicology, and economic considerations
2. Centralized testing of candidate unleaded fuels at the FAA William J. Hughes Technical Center (Tech Center)
 - Funded by government and industry in-kind contributions.
 - Generate standardized test and qualification data
 - Support FAA fleet-wide certification approval and development of ASTM specification necessary for commercializing fuel
3. Solicitation and selection process for the centralized fuel testing program
4. FAA centralized certification office with sufficient resources
5. Establishment of Piston Aviation Fuels Initiative (PAFI)
 - collaborative industry-government initiative

Ability to identify a replacement unleaded avgas with least impact on the fleet and facilitate an orderly transition requires a PAFI like program and ensuring funding necessary for centralized FAA testing.

UAT ARC Unleaded Avgas Transition Concept

PAFI

Industry Technical Support



Support



Fuel Developer



Data

Avgas Readiness Levels (ARLs)											
1	2	3	4	5	6	7	8	9	10	11	12

ARLs			
13	14	15	16

Fuel

Project Stage

Data

Data



FAA Centralized Certification

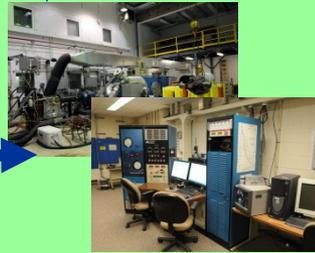
Deployment Stage

FAA

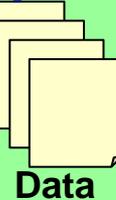
Procedures, Methods, Policy, Screening Criteria



Review Board



FAA Tech Center

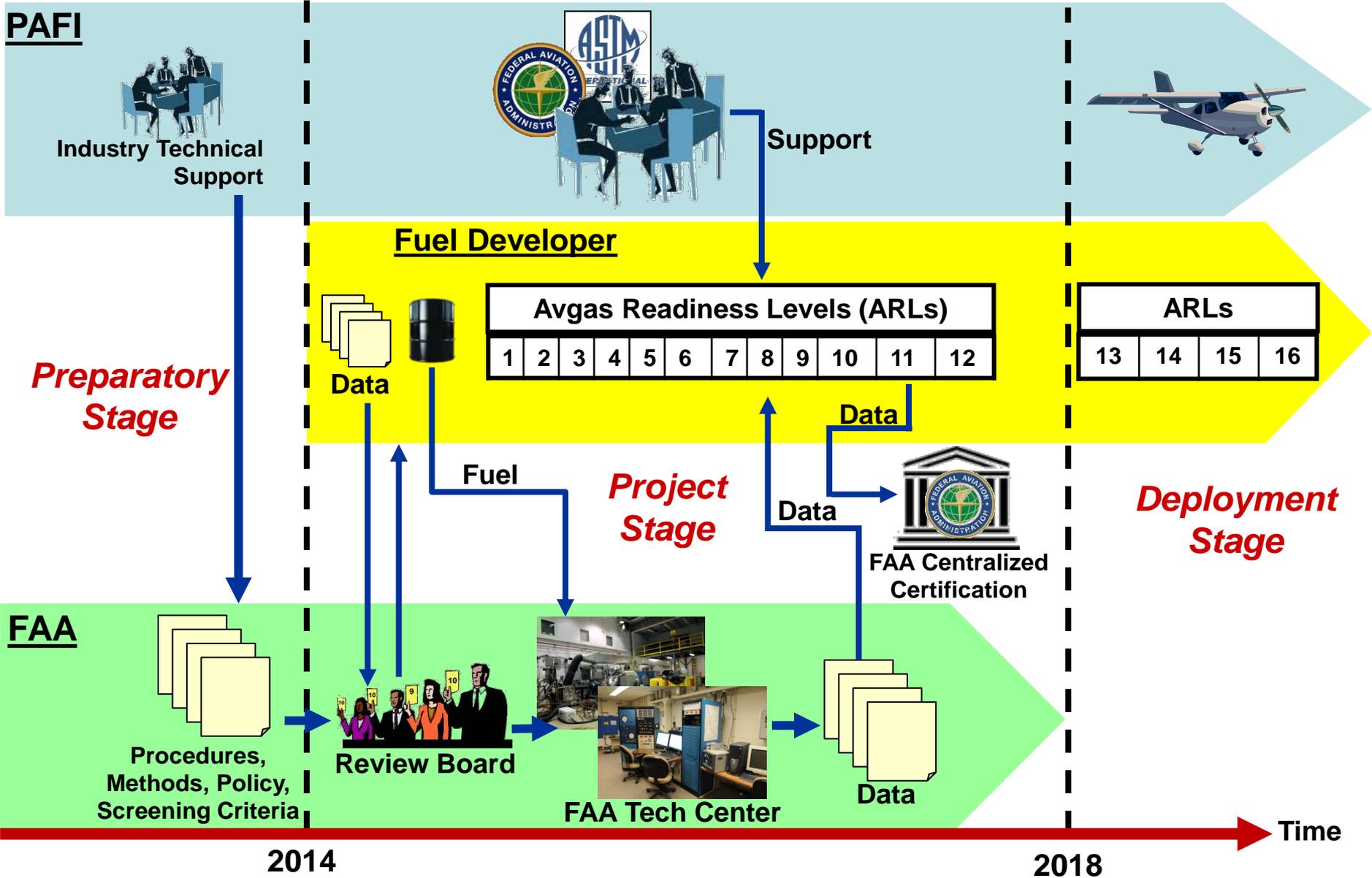


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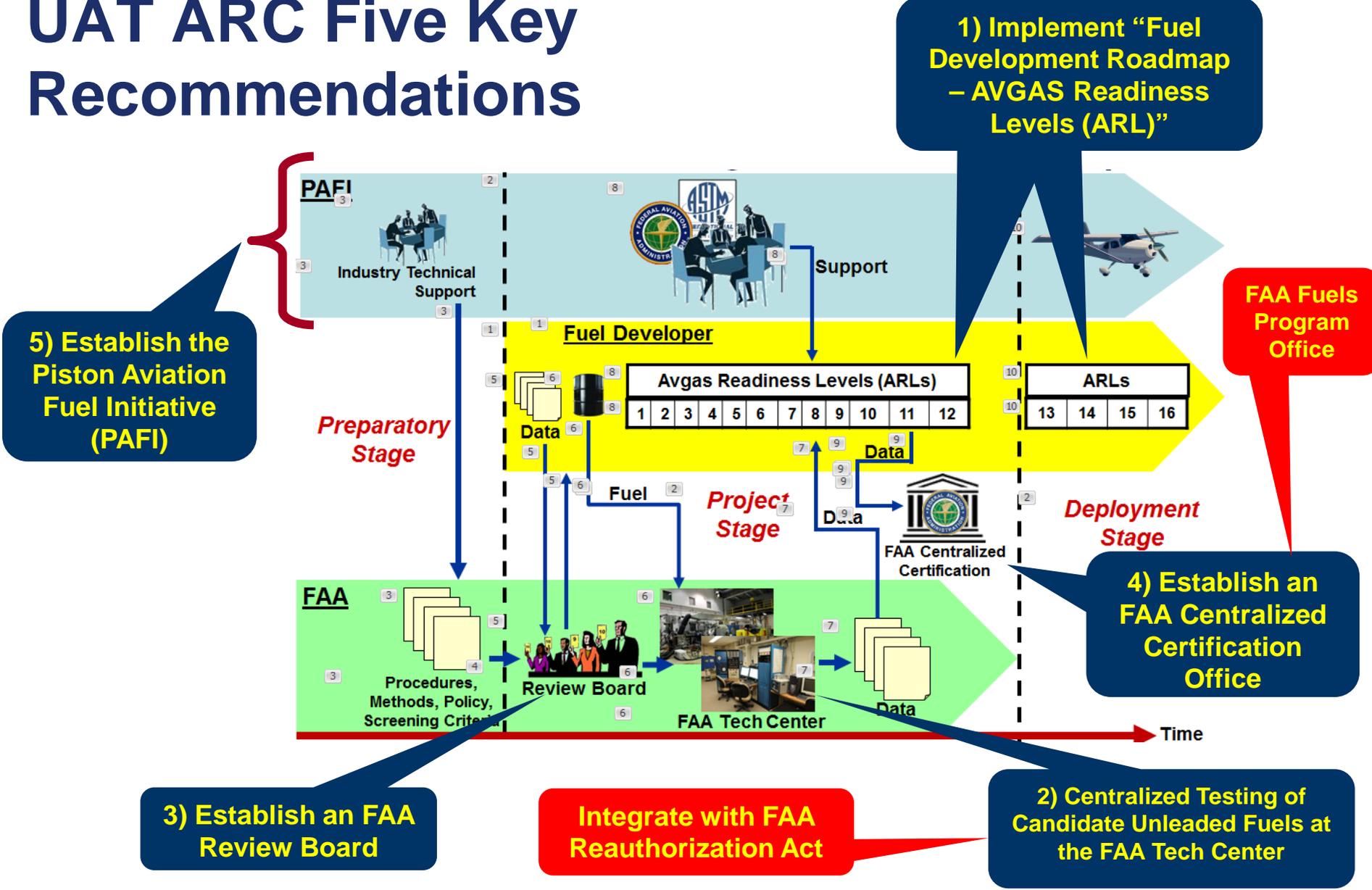
2014

2018

Time



UAT ARC Five Key Recommendations



Key Accomplishments

The FAA created the Fuels Program Office, AIR-20, in August 2012

- This office included the Fuels Program Branch, which will provide the “centralized certification office” concept recommended by the UAT ARC (UAT ARC Key Rec #4)

The FAA Modernization and Reform Act of 2012 section 910 called for the FAA develop an R&D program to qualify an unleaded aviation fuel available and to safely transition the fleet of piston engine aircraft to that fuel, in collaboration with industry groups representing manufacturers, consumers, fuel producers and distributors, and other government agencies.

- This represented a transition from previous R&D efforts aimed at the evaluation of fuel formulations and additives in hopes of identifying a “drop-in” replacement for 100LL - and recognized that transitioning the fleet to a new fuel would require the collaboration of the entire community.
- The FAA issued a detailed R&D report in July 2013 in response to the Modernization and Reform act, which defines a centralized testing program for candidate unleaded fuels at the FAA’s William J Hughes Technical Center (see UAT ARC Key Rec #2) and reports on status

In June 2013, the FAA issued a solicitation for candidate unleaded fuels to participate in the FAA centralized testing program. The solicitation closes in July 2014 (see UAT ARC Key Rec #3)

The FAA and industry have formed an industry-government collaborative initiative called PAFI, and a PAFI Steering Group (PSG) to oversee this activity.

- The PSG charter was signed by the FAA and industry members in February 2013 (see UAT ARC Key Rec #1, 5)

AIR-20 continues to support applicants that approach the FAA directly for approvals of alternative fuels on specific models of engines/aircraft. These involve fuel offerors applying for 3rd party design approvals (STC’s) and OEM’s looking to amend their TC’s to add new fuels.

PSG

Purpose of the Piston Aviation Fuels Initiative Steering Group (PSG): To facilitate, coordinate, expedite, promote and oversee the Piston Aviation Fuels Initiative (PAFI) based on the recommendations of the UAT ARC Final Report.

Aircraft Owners and Pilots Association (AOPA), American Petroleum Industry (API), Experimental Aircraft Association (EAA), General Aviation Manufacturers Association (GAMA), National Air Transportation Association (NATA), National Business Aircraft Association (NBAA) and the Federal Aviation Administration (FAA)

The role of the PSG includes providing supporting data and coordinating the activities of member organizations in support of the PAFI program. The PSG will establish a technical advisory committee comprising representatives from key stakeholder organizations to support the development of PAFI project activities and identify and engage subject matter experts as necessary to accomplish specific tasks. The Technical Advisory committee will help identify the resources needed to support unique PAFI tasks, such as the generation of job aids, solicit and coordinate the in-kind support needed from industry to support the development and approval of unleaded aviation gasolines.

The PSG is organized as an industry-FAA coalition comprising industry associations and the FAA to coordinate the resources and support necessary for the program. The PSG will form working groups composed of necessary FAA and industry subject matter experts to develop procedures, plans, and other necessary information to conduct the fuel testing. The PSG will engage with industry stakeholders who allocate manpower and other resources to support these working groups and the test program.

PAFI will also include the establishment of an Industry Co-Lead and an FAA Co-Lead. The Industry Co-Lead, reporting to the PSG, will act as the industry program manager, monitoring, directing and coordinating overall industry-related PAFI activities, and interface with industry, government and candidate fuel developers. The FAA Co-Lead (manager of the Fuels Program Office, AIR-20) will act as the FAA program manager and will monitor direct and coordinate overall government-related PAFI activities.

FAA Technical Center Testing Program

Phase 1 (up to 10 fuels)

- Evaluates candidate fuels for potentially show stopping issues
 - chemical makeup
 - performance properties
 - Establish credible and peer-reviewed test protocols for ascertaining necessary fit-for-purpose data
 - Fit for purpose testing across the ranges allowed by the fuel formulations (worse case formulations)
 - Evaluate emissions and toxicology properties
 - Evaluate business case for candidate fuels
 - Projected production,
 - Availability, and
 - Distribution
 - Costs

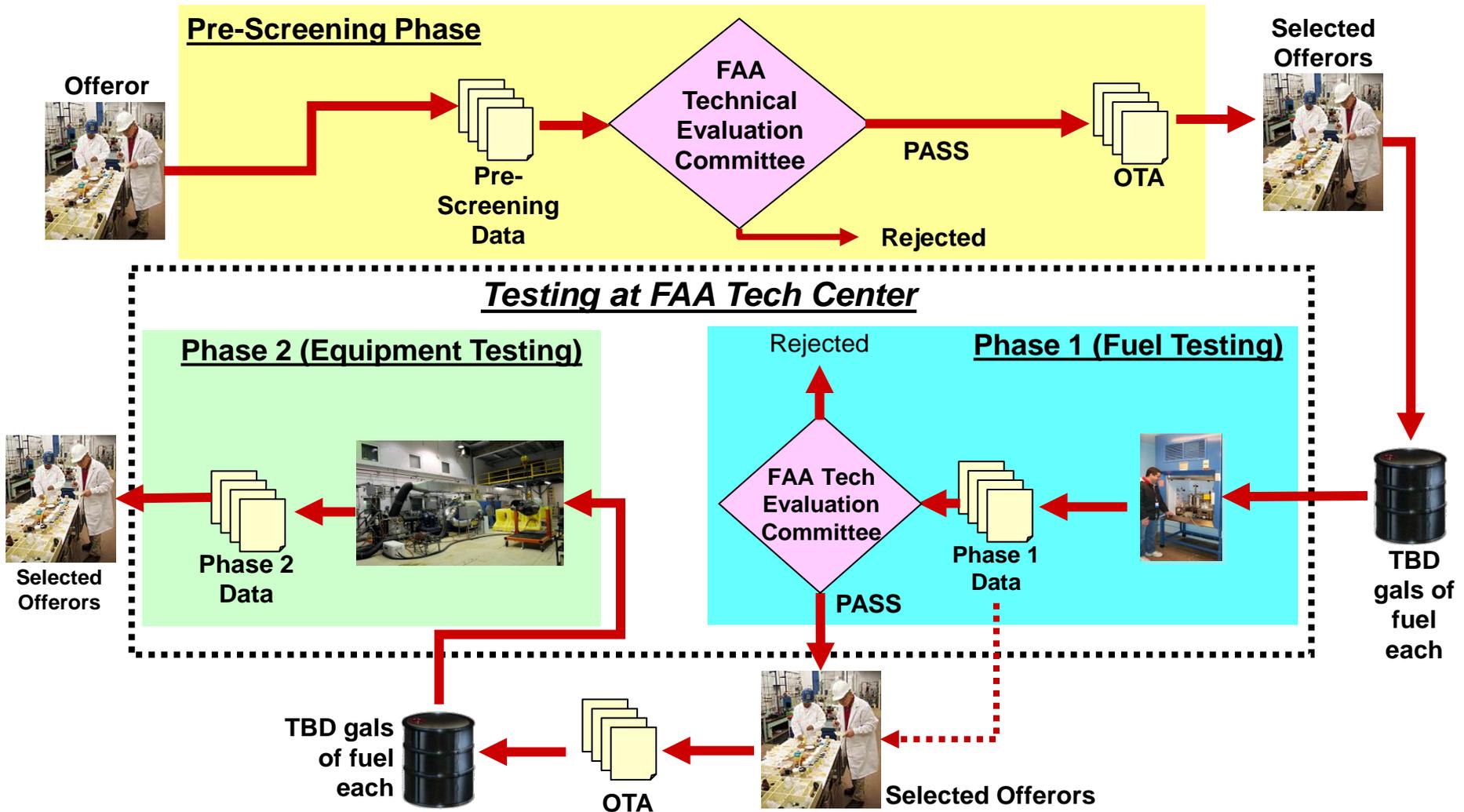
FAA Technical Center Testing Program

Phase 2 (up to 2 Fuels)

- Fuels to be tested at the engine and aircraft level to evaluate their suitability across as much of the existing fleet as possible
- Data collected from this testing will generate data that can be used to support the fleet wide approval of aircraft and engines including the orphaned fleet no longer supported by a manufacturer. This program is the most viable path to a fleetwide approval of new fuel formulations
- Data from the Phase 1 and Phase 2 testing can also be submitted for ASTM Production Specification, which will enable the fuels to be accepted in the marketplace in an orderly and comprehensive manner. FAA involvement in this step will ensure acceptance and adoption of the fuel with consumers and across the petroleum and aviation industry.

FAA Request for Candidate Fuels

- Solicit Candidate Unleaded Fuels for FAA Testing
- Issued June 2013, Closes July 2014



Funding Discussion

The 2014 President's budget request included \$5.571 million funding for the FAA's William J. Hughes Technical Center establishing it as the primary facility for the centralized assessment and testing that will generate standardized qualification and certification data of candidate fuels.

Phase 2 Reports

- The Phase 2 testing will result in reports containing data that can be utilized to obtain an ASTM production specification, and presented to the FAA for fleetwide certification
- Fleetwide Certification
 - Process will depend on the fuel – the closer the fuel is to current D910 fuel, the easier/simpler this effort can be

Fleetwide Certification

- Form of Approval
 - Portion of fleet may be “drop-in”
 - Could issue letter of approval/statement of equivalency (Policy memo, SAIB, other?)
 - Portion of fleet may require design change
 - More complicated... (ATC, STC, option for modification of method above with contingencies??)
 - Non-traditional methods will require extensive coordination to ensure all reqmts/needs are met
 - FAA is committed to develop a fleetwide approval methodology to align with PAFI schedule

Questions?