

Alternative Design Configurations to Meet Future Demand

Project 64

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Cost Share Partner: Georgia Tech

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Research Approach:

Development of an overall analysis methodology to support the CO2 Long Term Aspirational Goal (LTAG) effort, including the role of aircraft/technology inputs in this analysis workflow

Execution and assessment of 2050 projections of all technology reference aircraft, all five classes of vehicles (turboprop, business jet, regional jet, narrow body, wide body)

Execution and assessment of 2050 projection of advanced configuration aircraft

Major Accomplishments:

Engaged with the broader ICAO community to develop a framework for the identification and quantification of potential conventional and advanced technologies and aircraft concepts

Established a turboprop model

Assessed wide body technology impacts to 2050

Objective:

Assist FAA in projection of long-term CO2 emissions forecasts by assessing the aircraft technology and configurations possible in the 2050 time frame and utilize results to inform FAA of possible future scenarios to support for engagement at ICAO

Impact Statement:

The impact of this project will be an improved understanding of the impacts of potential alternative design and technology choices by the aircraft manufacturers on potential CO2 reduction goals of the future

By assessing the potential CO2 reduction potential of the future fleet, the FAA will be informed by a data driven process on the potential long term CO2 reduction goals.

Future Work:

Conduct the full analysis across aircraft types for conventional and alternative configuration aircraft through 2050

Coordinate with other LTAG sub-groups

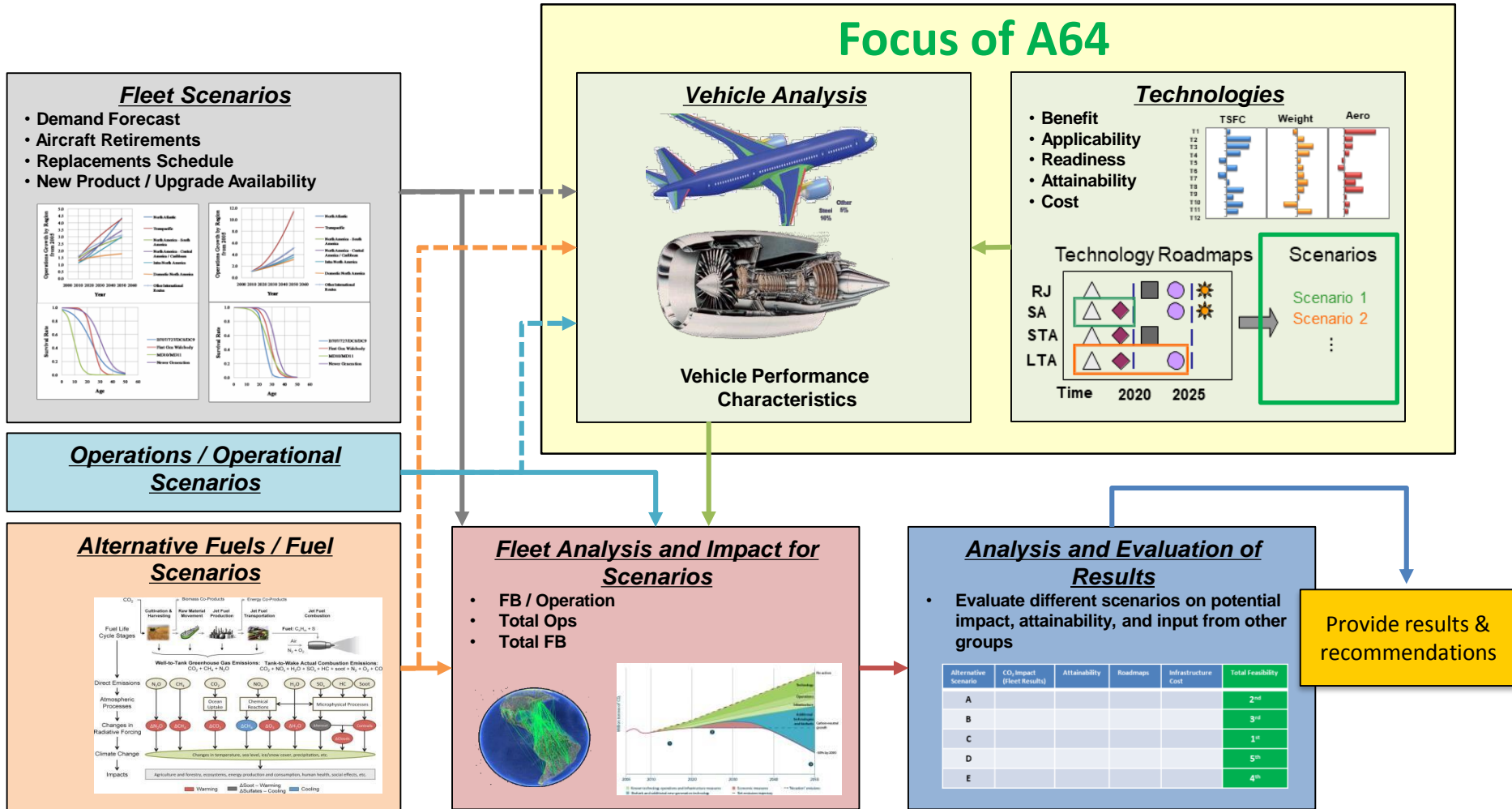
Projected Benefits:

This project will provide the FAA with an understanding of the impacts of future trends in aircraft technology on fuel burn and CO2 emissions from international aviation

The work will support FAA engagement and decision-making at the International Civil Aviation Organization (ICAO), in particular relating to the effort to assess the feasibility of a Long Term Aspirational Goal for CO2 emissions from international aviation.

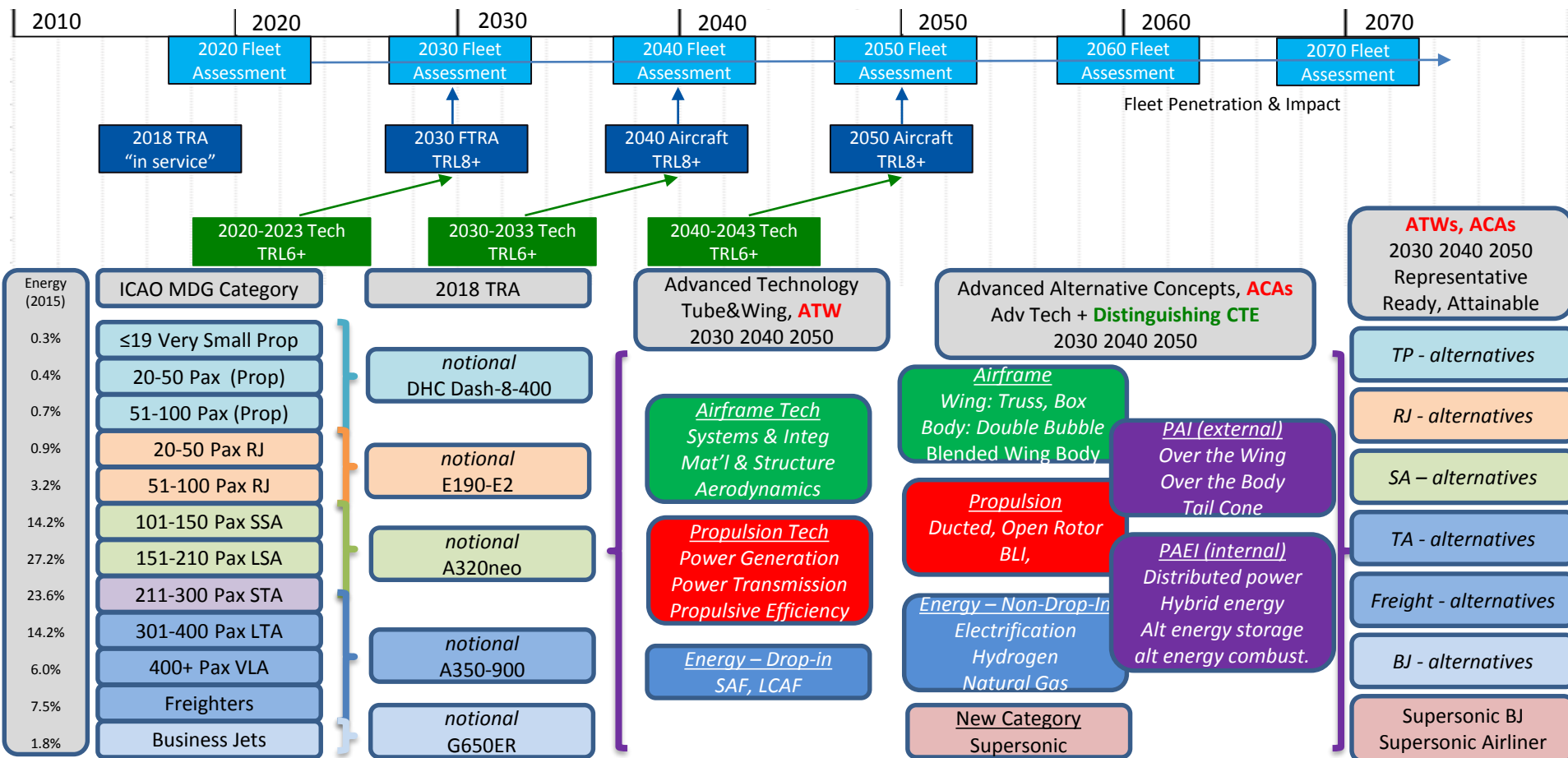
Recent Accomplishments and Contributions

Overall Modeling Process





Technology to Aircraft to Fleet Impact

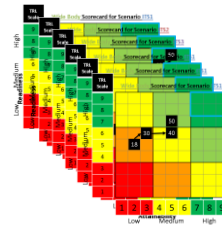
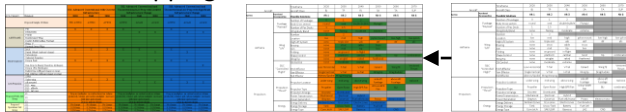


Recent Accomplishments and Contributions

Advanced Configuration Down-selection Process

Vehicle and Scenario Mapping

Morphological Matrix



Benefits are identified through previous studies

Benefit Quantification

Configuration/Architecture Screening based on Potential Benefits per Scenario

Economic, Technical and Non-technical Barrier Identification

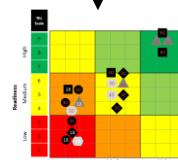
Assessment of Representative ACA Scorecards

Per Annum Improvements and Fleet Penetration Calculations

Fleet Analysis

Barriers for governments, OEMs, airlines, state countries...

Investment and Cost Estimation



Investment to TRL8+, CAPex, unit aircraft cost, fuel burn, infrastructure cost...

Technology	Tech Cost	2020-2025					2026-2030					2031-2035				
		2020	2021	2022	2023	2024	2026	2027	2028	2029	2031	2032	2033	2034	2035	
ACA 1	High	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
ACA 2	High	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
ACA 3	High	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

