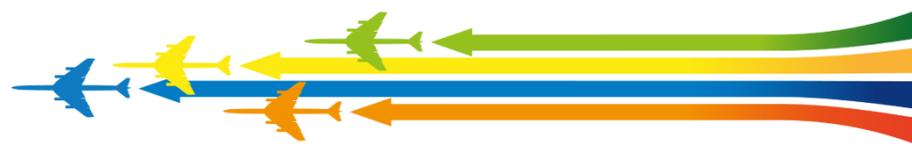




ICAO

UNITING AVIATION

E-GAP



ICAO Global Aviation Partnerships on Emissions Reductions (E-GAP)

Multiplying Environmental Action

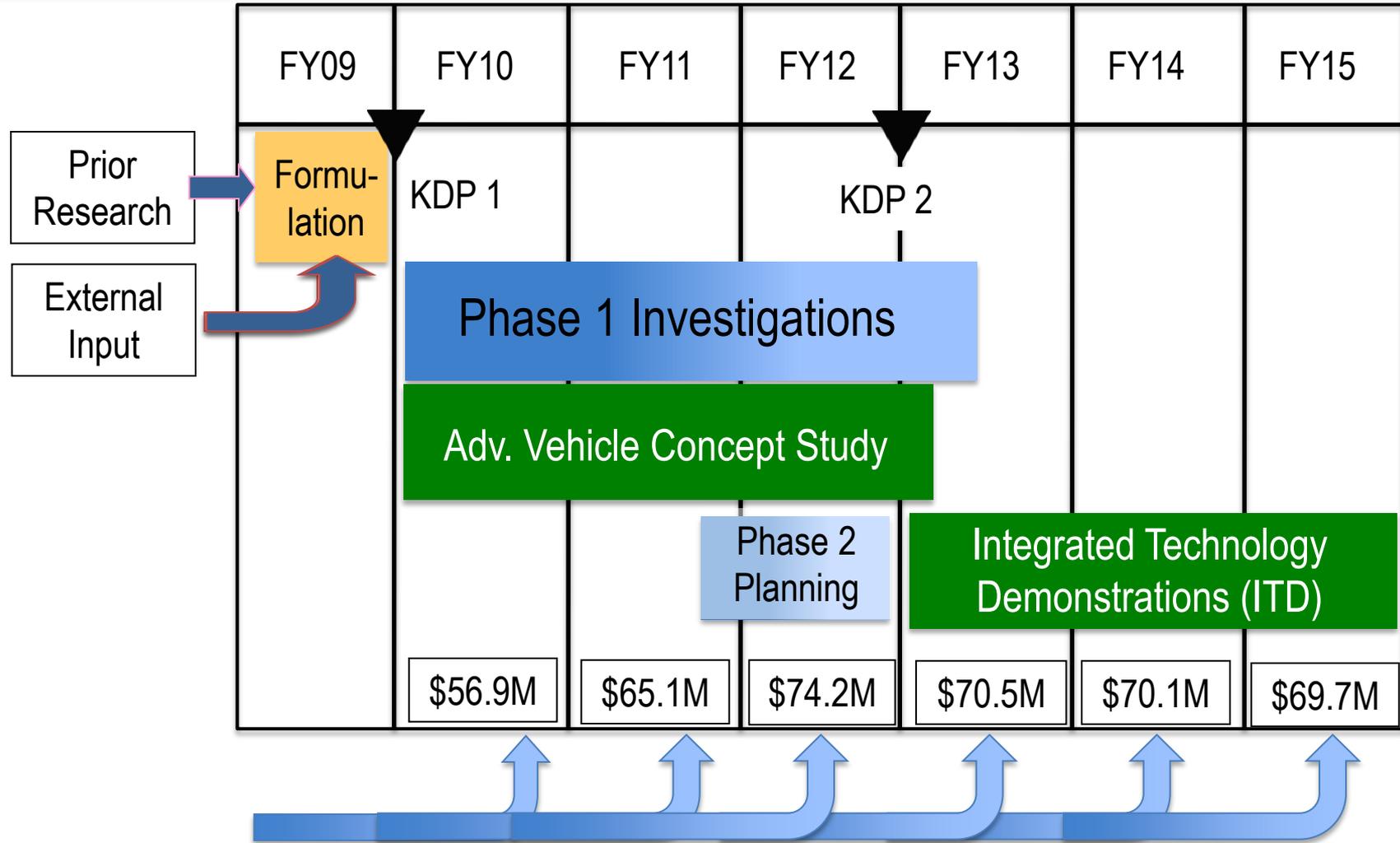
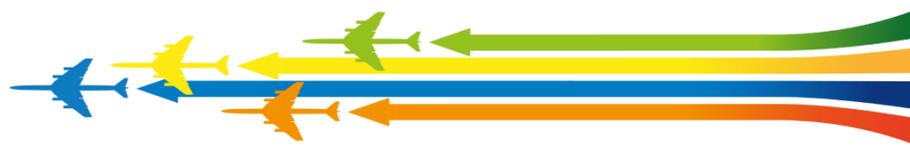
NASA's Environmentally Responsible Aviation Project

Fayette Collier, Ph.D., M.B.A.



Environmentally Responsible Aviation

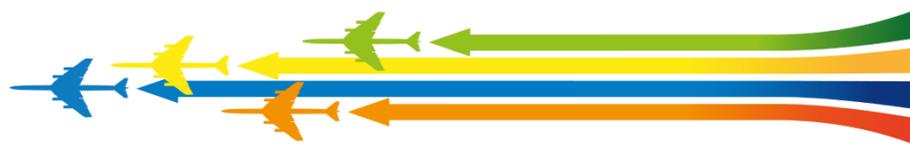
- Vision
 - expand the viable and well-informed trade space for commercial transport design decisions
 - enable **simultaneous** realization of national noise, emissions, and performance goals
- Mission
 - Execute integrated technology demonstrations
 - Partner w/Industry and transfer knowledge
- Scope
 - Mature technology for application in the 2020+ time frame
 - Advance the state-of-the-art, reduce risk of application
 - Perform system/subsystem research in relevant environments



Technical input from Fundamental Programs, NRAs, Industry, Academia, Other Gov't Agencies



	ERA Integrated Technology Demonstrators	Partner
12A+	AFC Enabled Vertical Tail and Advanced Wing Flight Experiment	Boeing
21A	Damage Arresting Composites Demonstration	Boeing
21C	Adaptive Compliant Trailing Edge Flight Test	AFRL/FlexSys
30A	Highly Loaded Front Block Compressor Demonstration	General Electric
35A	2nd Generation UHB Propulsor Integration	Pratt & Whitney
40A	Fuel Flexible, Low NOX Combustor Integration	Pratt & Whitney
50A	Landing Gear and Flap Edge Noise Reduction Flight Test	Gulfstream
51A	UHB Integration on Hybrid Wing Body Aircraft	Boeing



Key Performance Parameter Goal

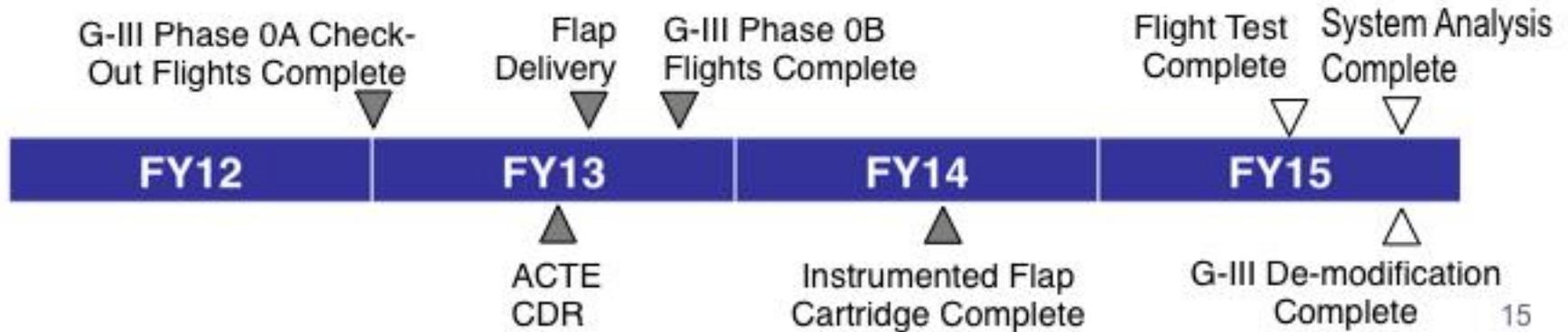
Demonstrate in flight the viability of an ACTE system, to enable a 5% reduction in wing weight when using a MLC / GLA system on transport aircraft

Technology Insertion Challenges to be Addressed

- Airworthy, non-metallic compliant trailing edge flown at high dynamic pressures
- Flexible transition region flown at transonic high altitude flight conditions
- Analytical and ground test flutter predictions validated through flight

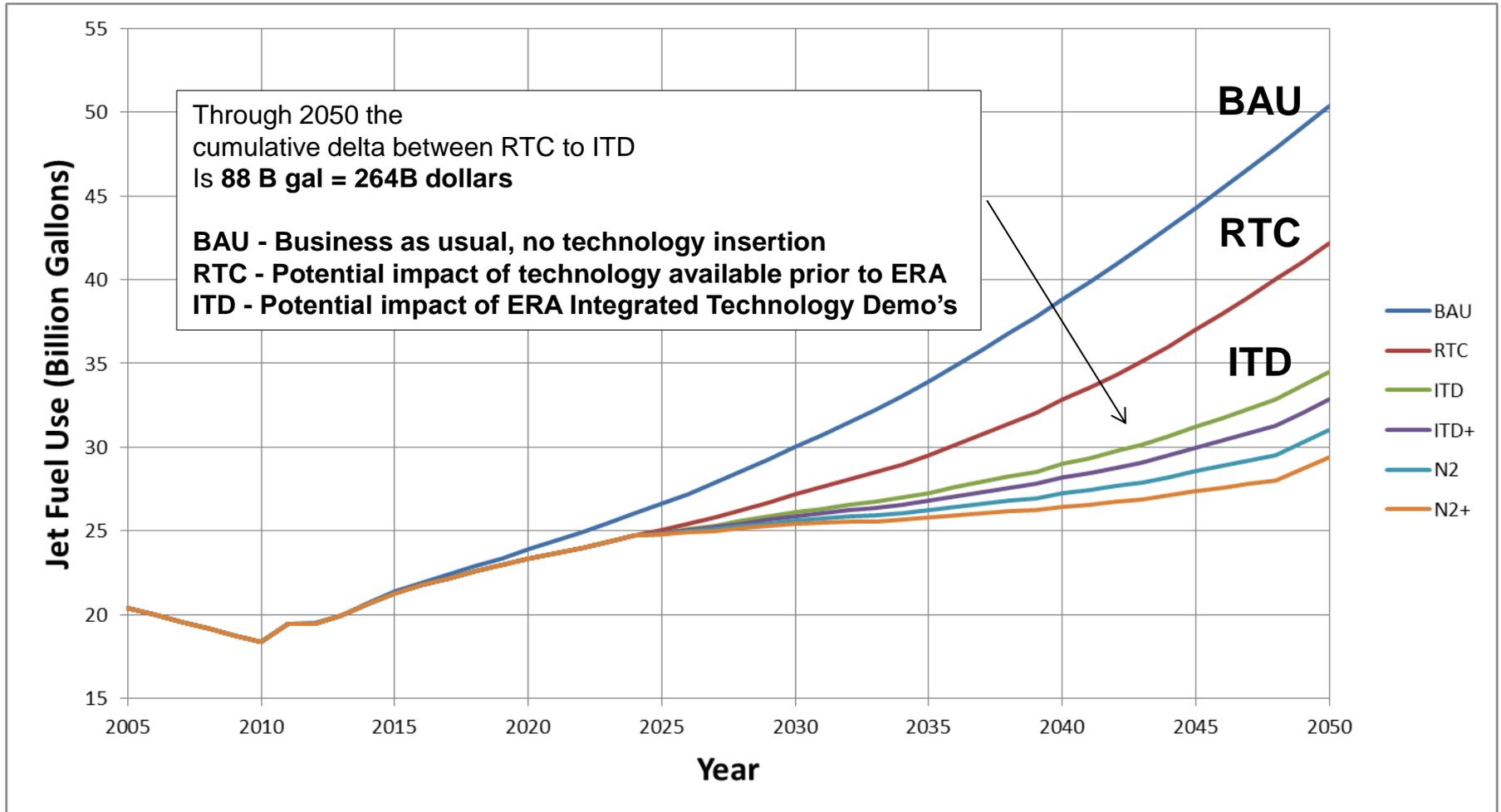


Integrated Technology Demonstrator
 NASA/Air Force/FlexSys Gulfstream G3 Testbed Aircraft
 Adaptive Compliant Trailing Edge Flight Experiment
 March 2015





Projected Impact of ERA on the Fleet





ICAO

UNITING AVIATION

E-GAP



NASA's ERA Project partners multiplying environmentally sustainable aviation action



Pratt & Whitney

A United Technologies Company



Federal Aviation Administration



GE imagination at work



flexsys

engineered to flex



BOEING