The Environmentally Responsible Aviation (ERA) Project

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Project Manager

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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
Environmentally Responsible Aviation

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Phase 1 Investigations

Adv. Vehicle Concept Study

- Prior Research
- External Input

KDP 1
- Formulation

KDP 2
- Phase 2 Planning
- Integrated Technology Demonstrations (ITD)

$65.1M $74.2M $70.5M $70.1M $69.7M

Technical input from Fundamental Programs, NRAs, Industry, Academia, Other Gov’t Agencies
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<th>Integrated Technology Demonstrators</th>
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<td>Fuel Flexible, Low NOX Combustor Integration</td>
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<td>Landing Gear and Flap Edge Noise Reduction Flight Test</td>
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<td>UHB Integration on Hybrid Wing Body Aircraft</td>
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Integrated Technology Demonstrator
AFC Vertical Tail and Advanced Wing Flight Test

Key Performance Parameters
- Reduce total cruise drag by 1.5%
- Enable more laminar flow to reduce total cruise drag by at least 3 percent

Technology Insertion Challenges Addressed
- Full-scale AFC demonstration in flight
- Effect of flight profile on insect accumulation
- Durable, repairable insect adhesion mitigation surfaces

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<td>Engineered surface flight test</td>
<td>AFC actuator approach downselect</td>
<td>Beginning of testbed modification</td>
<td>Insect protection flight tests</td>
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50% side force increment on 12% model

Full scale ground test - NFAC
AFC tail flight test
System Level Assessment

NASA/BOEING B757 ecoDemonstrator FCF
March 2015

Approved for Public Release
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

End TRL: 6

Approved for Public Release
Projected Impact of ERA Technologies on the US Fleet Through 2050 the cumulative delta between RTC to ITD is 88 B gal = 264B dollars

BAU - Business as usual, no technology insertion
RTC - Potential impact of technology available prior to ERA
ITD - Potential impact of ERA Integrated Technology Demo’s