



FAA Environment & Energy R,E&D Program Overview

Center of Excellence for Noise
Mitigation Information Meeting

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Outline

- ➔ Motivation & Assumptions
- ➔ R,E&D Vision
- ➔ E&E R,E&D Program Structure
- ➔ The Way Ahead



Aviation Industry Strategic Environment

- Security dominant near-term issue
- Industry financial weakness & uncertainty
- Airline operations down significantly
- Aviation environment impacts reduced



Future Drivers Remain “Stable”

- Americans want safe, convenient, inexpensive air travel
- Americans want the environment protected
- Environmental issues remain a long-term capacity constraint on aviation
- “Silver bullet” technology developments unpredictable – probability lessened by limited R&D



Some Trends/Assumptions Influencing Environment R,E&D

- Air traffic growth will continue, despite 9/11 aftershocks – but uncertainties over industry and fleet structure
- Fleet turnover will remain slow
- U.S. and Europe will set the agenda – though with different visions – on aviation environmental issues
- Enhanced air traffic management and operations offer opportunities to mitigate environmental impact comparable to technology solutions
- Divisions between civil/military aviation operations lessen – aviation environmental issues impede preparedness and readiness, especially abroad
- Supersonic issues regain prominence due to new business markets and impetus of National Aerospace Initiative



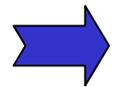
Some Trends/Assumptions Influencing Environment R,E&D

- Next 5 -10 years of R&D are critical for the 2015 - 2025 fleet
- The public will continue to demand more meaningful noise metrics
- Aviation emissions contributions to local air quality and health issues will gain prominence in environmental debate in next decade
- Impacts of aviation on atmosphere remain uncertain and need better understanding
- Tradeoffs between noise, emissions, and economics will drive policy debate in U.S.



Outline

→ Motivation & Assumptions



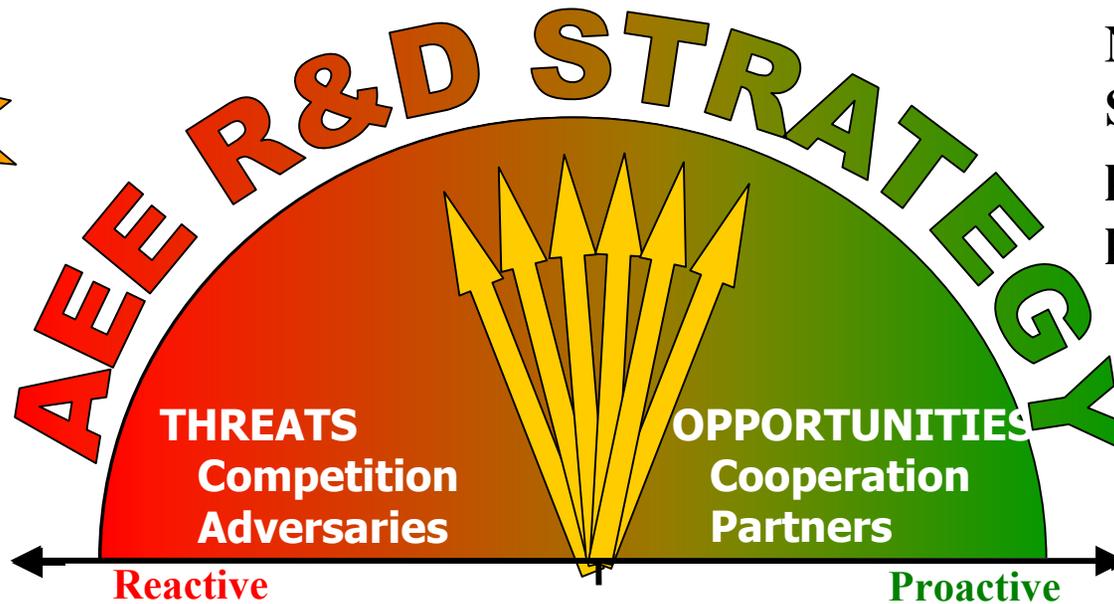
→ Vision

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Opportunity



New R&D Strategy needs to put us into proactive mode.

- Take a fresh look at Office of Environment & Energy RE&D portfolio using a proactive needs based approach rather than a reactive approach.
- Shed “business as usual” baggage to develop a new strategic framework ...in an inter-agency like setting encompassing relevant stakeholders.



Agency Environmental Goal & Derivative R,E&D Vision

Prevent, minimize and mitigate environmental impacts, which may represent the single greatest challenge to the continued growth and prosperity of civil aero-space

- ➔ To foster breakthrough technical, operational, and workforce capabilities enabling cleaner and quieter aircraft
- ➔ To have the world's best understanding of aerospace environmental issues
- ➔ To be the premier source of noise, emissions, economic analysis, and societal impact environmental models



Overarching Payoffs

- Maintain global aerospace leadership
- Leadership in international environmental regulatory forums
- Curtail the effect of adverse environmental by-products of aviation - primarily noise and emissions - on civil aviation's ability to grow and operate unrestrained nationally and internationally



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FAA Environment & Energy R,E&D Program

- ➔ Research within this area develops information, tools, methods, and technologies that help mitigate the adverse impacts of aircraft noise and emissions upon the environment and ease capacity concerns

Program Elements

- ➔ Aircraft Noise - Aircraft noise a heated issue at major airports, constraining operations and construction of critical new runways
- ➔ Aviation Emissions - Increasing public concern about local air quality and global warming may constrain air travel if impact of emissions not reduced



FAA Environment & Energy R,E&D Program Funding

Total Funding (\$K)	FY03	FY04	FY05	FY06	FY07	FY08
R,E&D	22,100*	7,975	8,085	8,289	8,389	8,583
AIP**		20,000	20,000	20,000	20,000	20,000

FY03 funds actual; FY04 proposed, FY05-FY08 estimates

*Congress directed \$15M for Quiet Aircraft Technology, 850K for noise reduction procedure tests at Louisville, and further work on an airport low frequency noise study.

**FY04-FY08 funds proposed; Use of AIP noise set asides funds proposed in FAA Flight-100 Reauthorization proposal



Aircraft Noise R&D



Recent Success

- ➔ Completed continuous deceleration approach demonstration with NASA, academia, and industry
- ➔ Previous studies indicate substantial community noise reduction; present work indicates 3-6 decibel reduction

Future Plans

- ➔ Simulation studies to demonstrate the benefits of the Continuous Descent Approach (CDA)
- ➔ Demonstrate additional nearer term, higher maturity, lower implementation risk QAT technologies



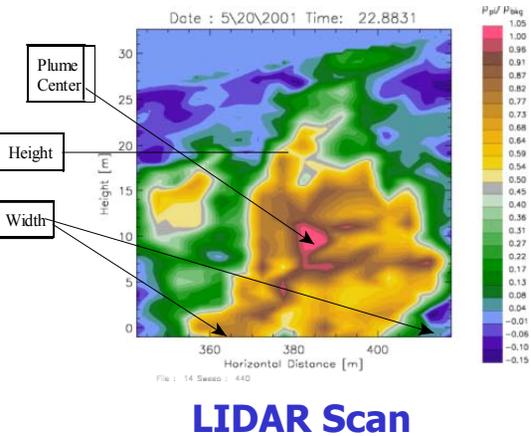
**Research simulators
help address training &
control issues**



Aviation Emissions R&D

Recent Success

- ➔ Jet exhaust plumes behind airplanes measured using LIDAR (Light Detection And Ranging) to observe time-varying position and geometry
- ➔ Produced best airplane exhaust dispersion information gathered to date – more accurate pollutant concentrations than previously predicted



LIDAR Scan

Future Plans

- ➔ Continue to enhance model inputs to more accurately predict local pollutant concentrations
- ➔ Continue validation of FAA's airport air quality model, the Emissions and Dispersion Modeling System (EDMS)



Plume Scan Angles



Key Research Areas

- ➔ Models
 - ➔ Noise, Emissions, Efficiency, Economic
 - ➔ Environmental Design Space tools (systems integration to enable understanding tradeoffs between environmental parameters)
 - ➔ Portfolio Management Approach (overarching tools and models to translate environmental predictions into impacts – provide policy informing tools and economic “reality check”)
- ➔ Education/Communication (convey information to the public, foster next generation workforce)
- ➔ Mitigation Options (technology, operations, compatible land use)
- ➔ Source Abatement Technology Advancement (Higher TRL)
- ➔ Aerospace environmental measurements (e.g., particulate matter and air toxics emissions)



Key Consideration: Environmental Design Space

- Aviation noise & emissions environmental impacts generally addressed in a “stove pipe” fashion by different communities
- Tradeoffs exist between noise and emissions, and amongst various emissions
- Operational measures can lead to efficiencies AND environmental benefits and are part an important component of the tradeoff space
- Economic considerations vital to a robust tool
- Aerospace systems increasingly complex – drive to interdisciplinary approach based on sharing knowledge and applying collective learning
- Design advances and increasing computing power offer tremendous optimization possibilities



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Center of Excellence for Aircraft Noise

- ➔ Scope of Work:
 - ➔ Socio-economic Effects of Noise and Noise Mitigation
 - ➔ Noise Abatement Flight Procedures
 - ➔ Compatible Land Use Management
 - ➔ Airport Operational Controls
 - ➔ Workforce stimulation – student award
- ➔ We envision the scope work may in the future include other areas of interest to the FAA such as the interaction between airport noise mitigation and air traffic control, gaseous emissions, particulate matter, and human impact of aviation emissions



The Future?



→ Environment will be the key constrain on aviation's capacity to grow

→ Most likely driven by unforeseen “disruptor”

→ Balanced R&D approach is crucial

- High-risk, high-payoff, science investments
- Fostering new technologies
- Long-term aerospace vision



- Near-term, research and development application-specific investments
- Improving existing technologies
- Near-term focus on security and survival

CoE an Enabler of a Bright Future!