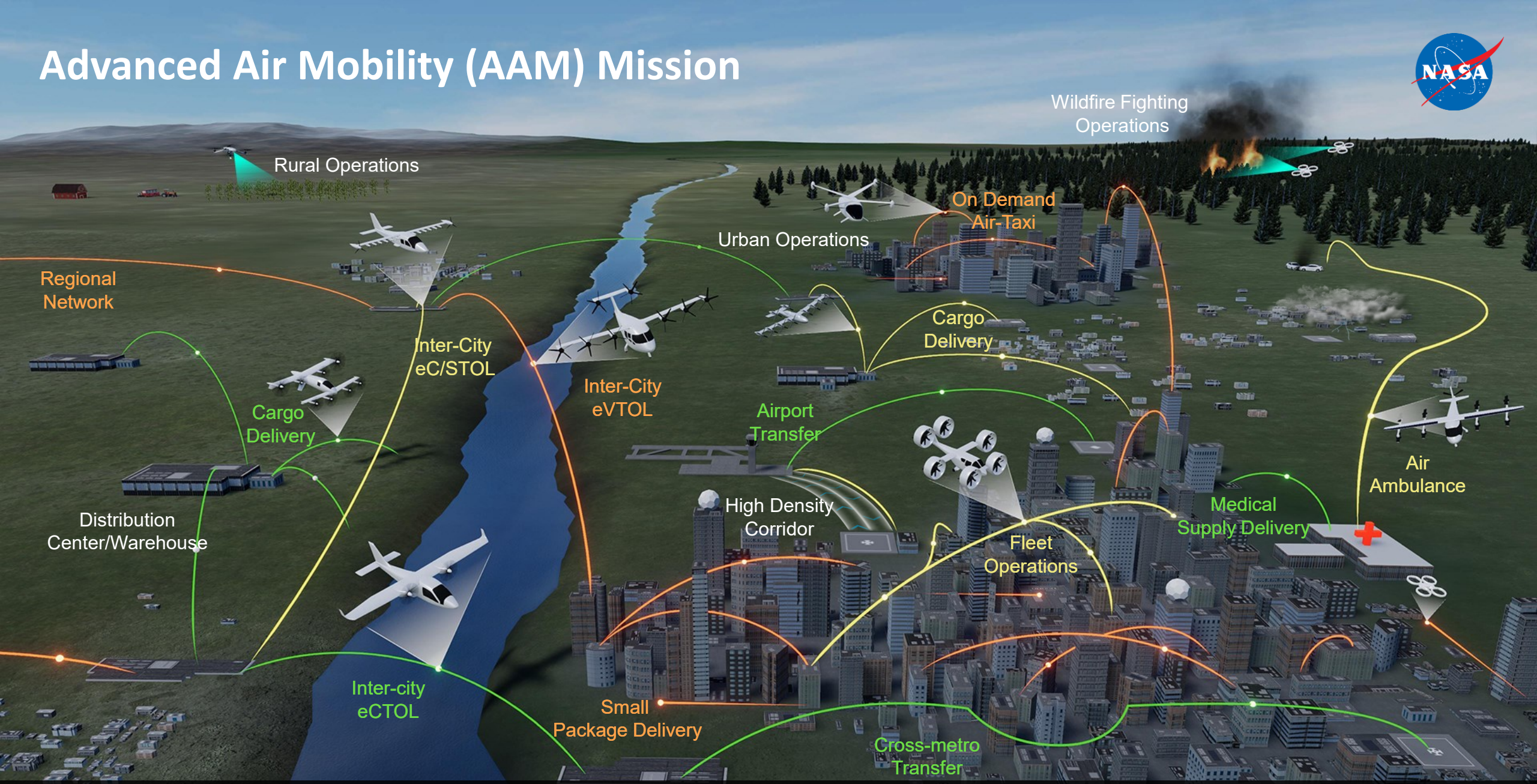


Advanced Air Mobility: Environmental Impact (Noise and Emissions)

Noah Schiller
Associate Project Manager for the Revolutionary Vertical Lift Technology Project
September 11, 2023

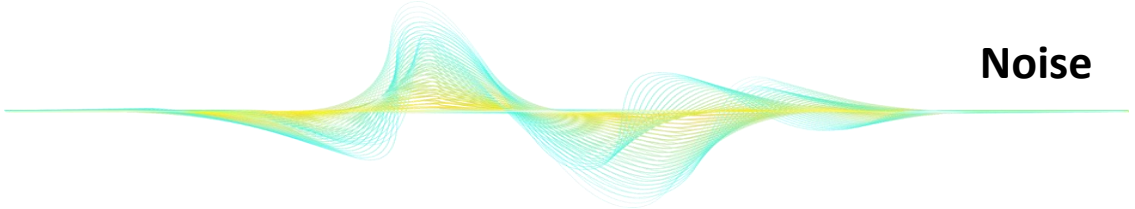
Advanced Air Mobility (AAM) Mission



Safe, sustainable, affordable, and accessible

Environmental Impact





Noise

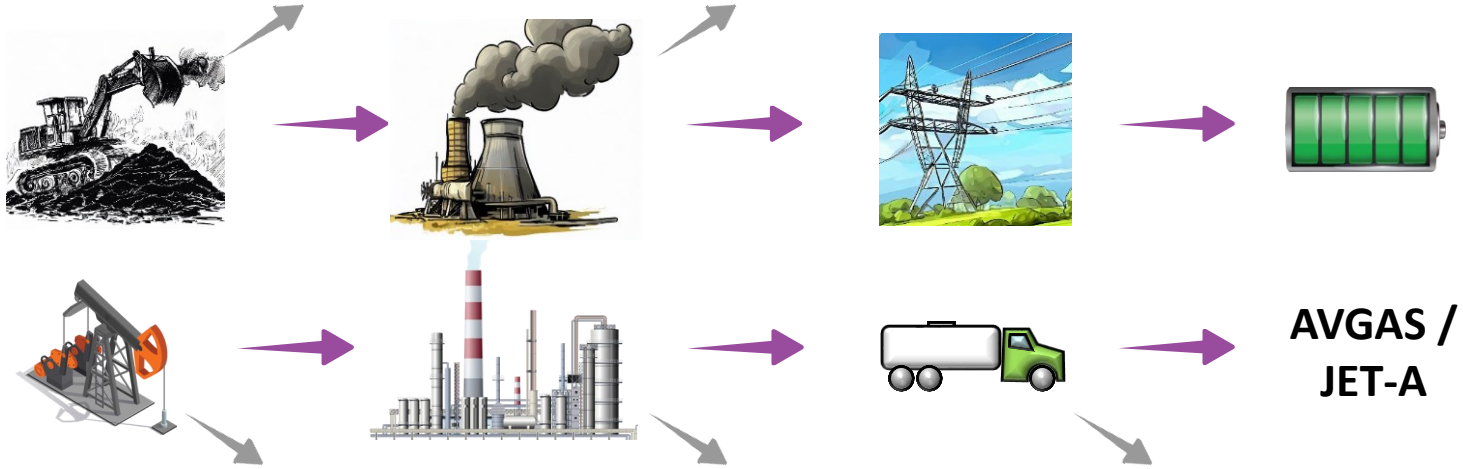
Combustion Emissions (if hybrid)

Emissions from Infrastructure Development and Maintenance



LOCAL IMPACT

Emissions from Electricity Generation / Fuel Production (if hybrid)



AVGAS / JET-A

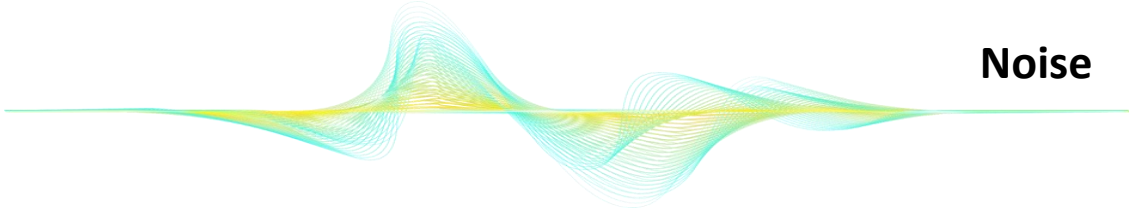
Emissions from vehicle / battery manufacturing and disposal



GLOBAL IMPACT

Environmental Impact… a Greener Alternative





Noise

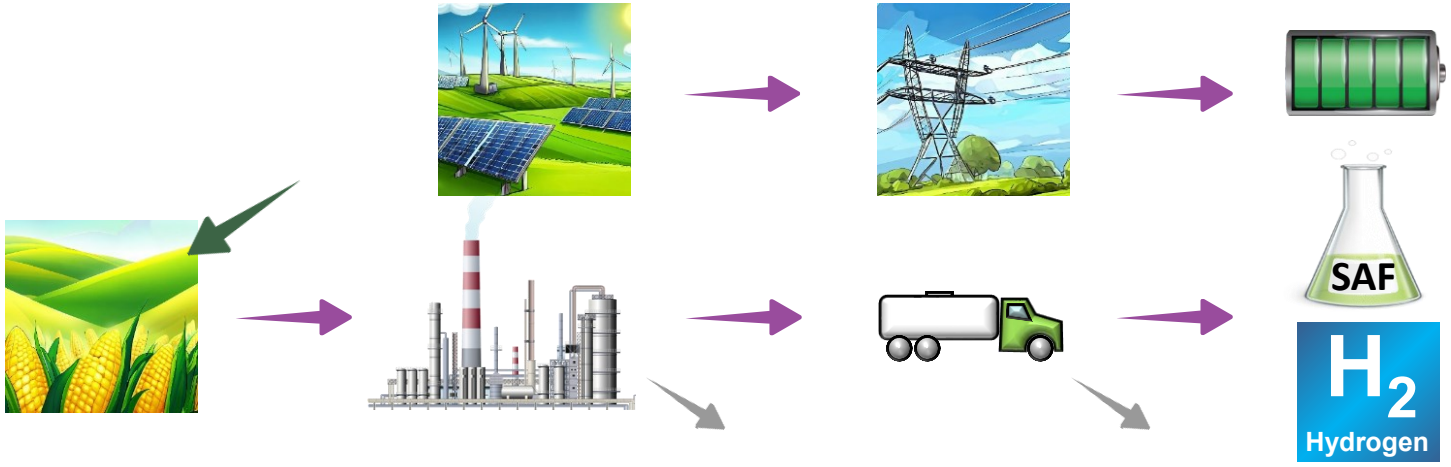
Combustion Emissions (if hybrid)

Emissions from Infrastructure Development and Maintenance



LOCAL IMPACT

Emissions from Electricity Generation / Fuel Production (if hybrid)



Emissions from vehicle / battery manufacturing and disposal



GLOBAL IMPACT

NASA AAM Research Goals

Goals

- **Understand the impacts** to inform stakeholders
- Improve **what we fly** through the development of new tools and technologies to improve performance / efficiency and reduce noise
- Improve **how we fly** with a focus on operational efficiency and community impact

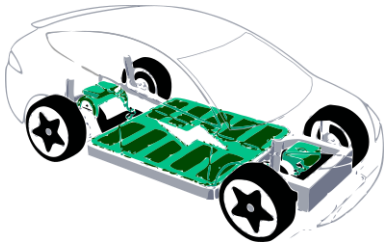




Leverage

- Widespread transition to renewable energy, including access to green electricity and sustainable aviation fuels
- Sustainable aviation policy, market-based measures including carbon offsets
- Improved energy storage (e.g., batteries)
- Sustainable battery manufacturing and recycling

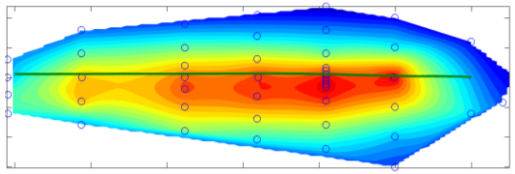


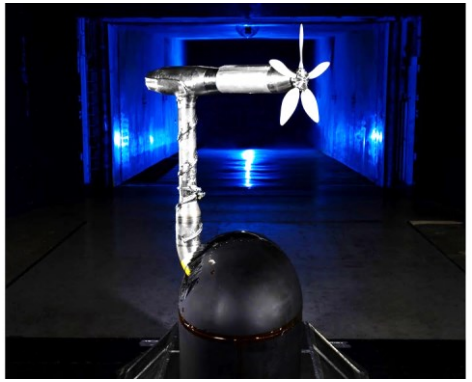


Understand the Impacts (Noise)

Acoustic Flight Tests

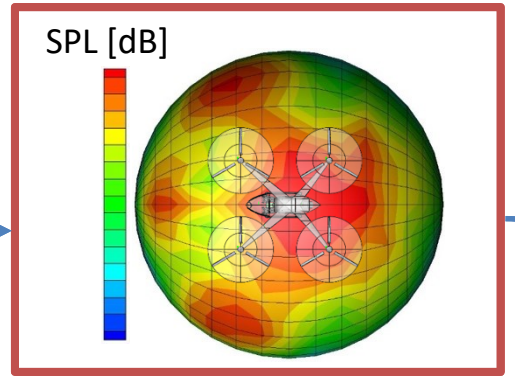






Wind Tunnel Tests

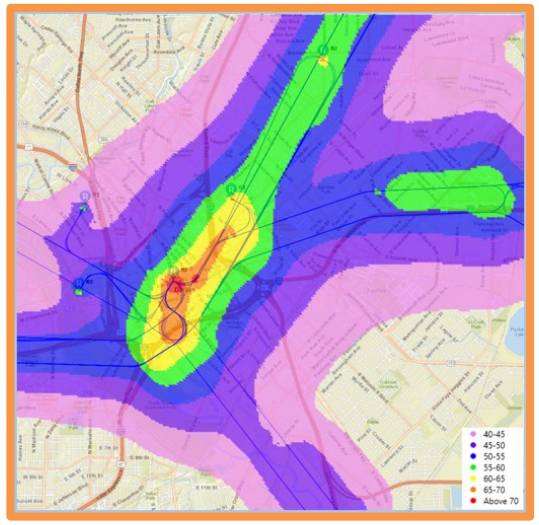
UAM Source Noise Tool Development and Validation



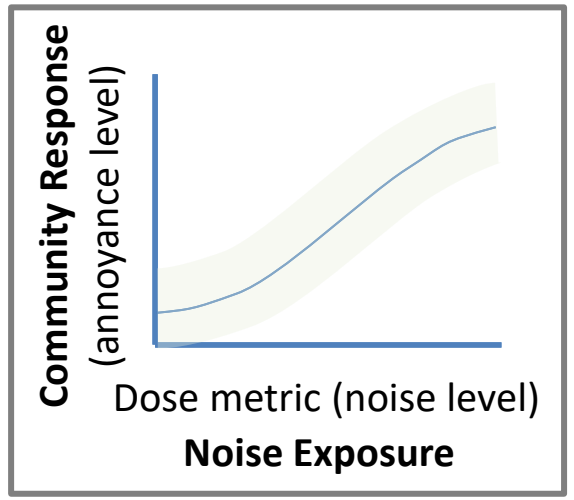


Human Response to Noise

UAM Fleet Noise Prediction



Community Response to UAM Operations

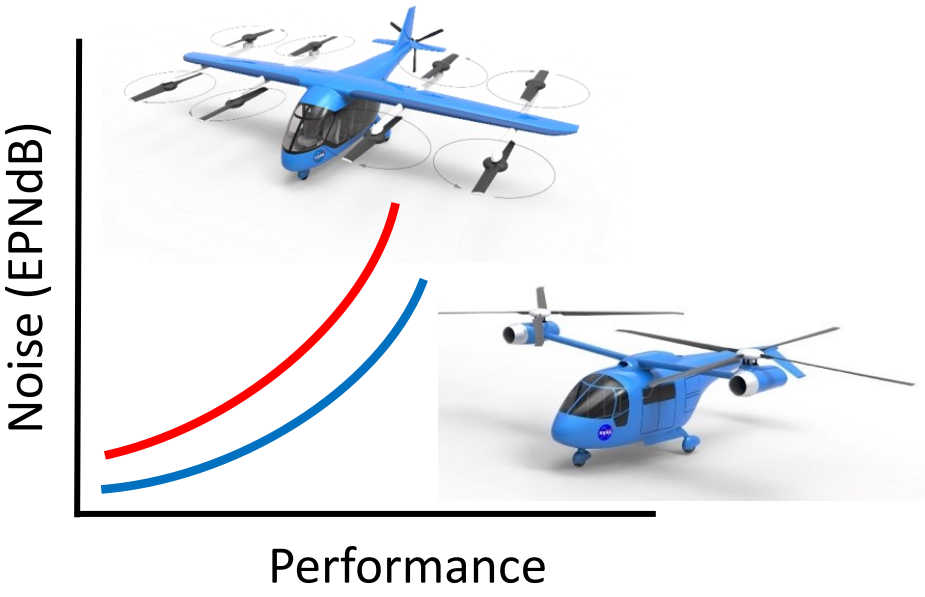


- Early guidance is needed to inform land use planning and infrastructure development
- Understanding the cumulative impacts will be needed to inform routing and achieve sustainable growth

Understanding and mitigating the cumulative impact will be necessary to scale operations

Improve What We Fly

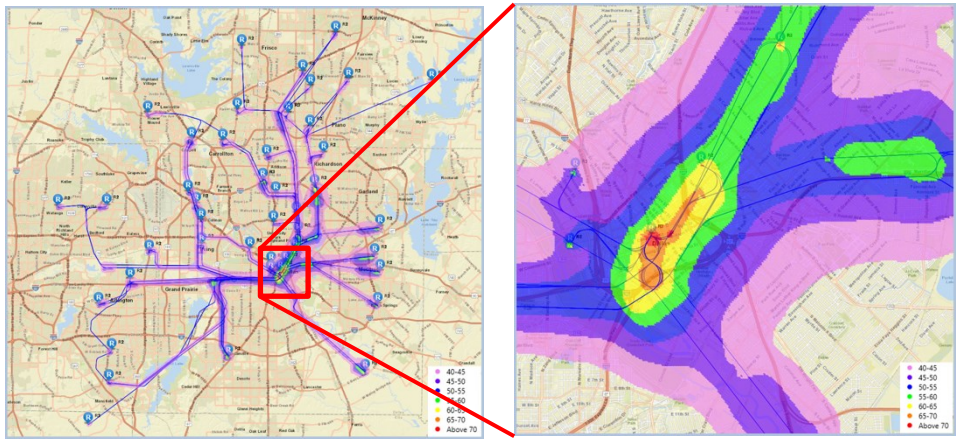
- Develop new tools to evaluate tradeoffs between performance, noise, and emissions (along with safety, cost, etc.)
  - Requires multidisciplinary tools to design vehicles that execute the mission while minimizing environmental impacts
  - Requires multi-fidelity tools to capture relevant physics
  - Validated for AAM vehicle configurations
- Incorporate new technologies to improve vehicle performance while reducing noise and emissions



Investments in innovation today enable the next generation of AAM vehicles

Improve How We Fly





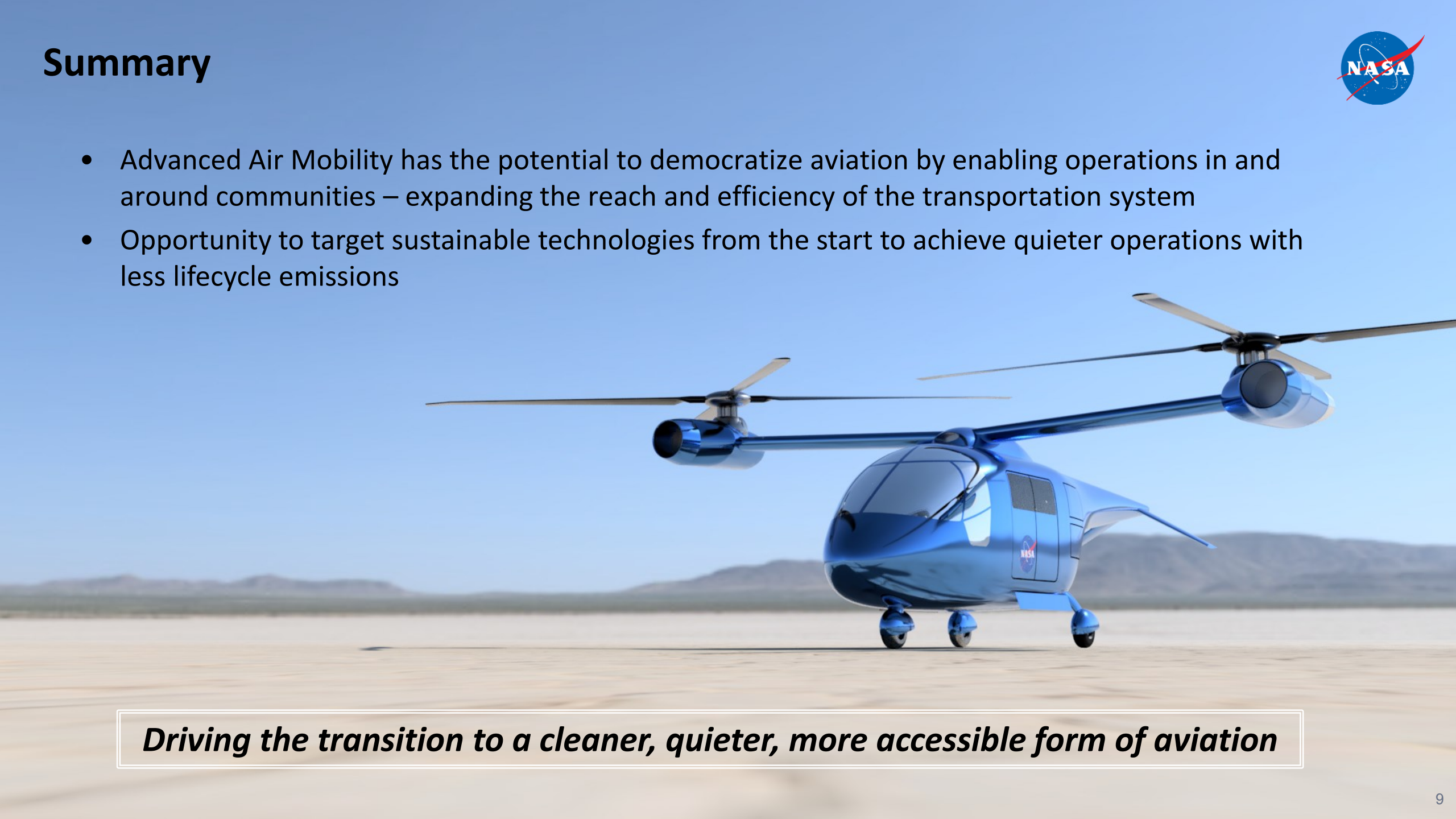
Day-night level noise contours for potential operations

- Develop advanced concepts and tools to maximize **operational efficiency** within a scalable, accessible, safe, sustainable, and resilient airspace
- Mitigate **community impact** through routing and optimized fleet operations

Evolving the airspace towards sustainable AAM operations

Summary

- Advanced Air Mobility has the potential to democratize aviation by enabling operations in and around communities – expanding the reach and efficiency of the transportation system
- Opportunity to target sustainable technologies from the start to achieve quieter operations with less lifecycle emissions



Driving the transition to a cleaner, quieter, more accessible form of aviation