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Pathways to a Sustainable Aviation Ecosystem

Flight DNA: An Anonymized Aviation Data Tool and Repository

Sustainable aviation technologies are pushing the boundaries of flight performance, efficiency, and economic viability—providing exciting opportunities for decarbonizing the aviation sector. But technology developers, aviation planners, and operations managers need broad knowledge on what it means to operate these technologies in the real world under highly varied conditions. A common database with anonymized data on aviation components, systems, technologies, and operations could accelerate the deployment and development of advanced aviation technologies.

Understand the Challenges of Amassing Aviation Data

Sustainable aviation technologies are still in their infancy, and operational performance data are only now being collected. Regulatory agencies, industry organizations, state and local governments, energy suppliers, technology developers, and research institutions may struggle to access the data they need to make informed decisions.

What You Need To Know

- 1. Legal Agreements Are Resource-Intensive**—For most organizations, creating and signing individual and multiparty nondisclosure agreements is time-consuming and expensive.
- 2. Data Must Be Anonymous**—To protect proprietary information, data need to be anonymized, a challenge usually outside the prime focus of most organizations.
- 3. Analyzing Complex Data Requires Specialized Expertise**—Efficiently and effectively capturing, storing, organizing, and analyzing vast amounts of data requires specialized expertise, often with the help of artificial intelligence and advanced data models.
- 4. Active Participation Is Essential**—Identifying high-priority data, data sources, and key output parameters requires active participation by key stakeholders.



From Fleet DNA to Flight DNA



Fleet DNA

NREL's Fleet DNA is a clearinghouse of commercial fleet vehicle operating data, which helps manufacturers and researchers assess vehicle and operational efficiency technologies and optimize vehicle designs. It also assists fleet managers in choosing advanced technologies for their fleets.

Flight DNA would extend this framework to aviation, becoming a resource for in-depth data on the deployment and operation of aerial vehicles in the 21st century.



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NREL Is a Clearinghouse for Gathering and Analyzing Aviation Data

The National Renewable Energy Laboratory (NREL) has deep experience developing secure, national data repositories, which it augments with analysis, technology and market expertise, high-performance computing, and innovative data visualization. By adapting the architecture of existing mobility databases (i.e., Fleet DNA, the Transportation Secure Data Center, the National Fuel Cell Technology Evaluation Center), NREL can build a powerful aviation data clearinghouse—Flight DNA—that helps stakeholders navigate the web of pitfalls and possibilities generated by new aviation technologies.

Flight DNA would capture a broad range of aviation-related operational data, including:

- Flight information
- Power, energy, and fuel usage
- Reserve capacity
- Ambient conditions
- Fuel burn
- Flight distances and times
- Turnaround times
- Emissions
- Aircraft metadata
- Other stakeholder-determined data.

NREL would then feed these data points into open-source analysis tools, making it easy for stakeholders to interpret and benchmark progress in meeting their goals.

Unlock the Benefits of Flight DNA

- 1. Planning and analysis tools** to evaluate alternative aviation energy carriers (e.g., sustainable aviation fuel, e-fuels, hydrogen, electrification), aircraft energy use, and geographic, economic, social, and functional impacts.
- 2. A national, centralized data repository** to standardize data collection protocols, prioritize data needs, reduce duplication of effort in collecting and storing data, and set common, industry-vetted input assumptions and parameters.
- 3. Data to support long-range planning** by a range of stakeholders, including:
 - a. Technology developers.
 - b. Electric utilities and airport planners.
 - c. Fuel producers.
 - d. Fleet operators.
 - e. Transportation planners at all levels of government.
- 4. Repository for aviation emissions, energy consumption, and performance profiles**, making it easier to improve operations and understand the effectiveness of advanced technologies.

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