# REDAC NAS Operations Subcommittee

## R,E&D Budget Status

Presented to: NAS Operations Subcommittee

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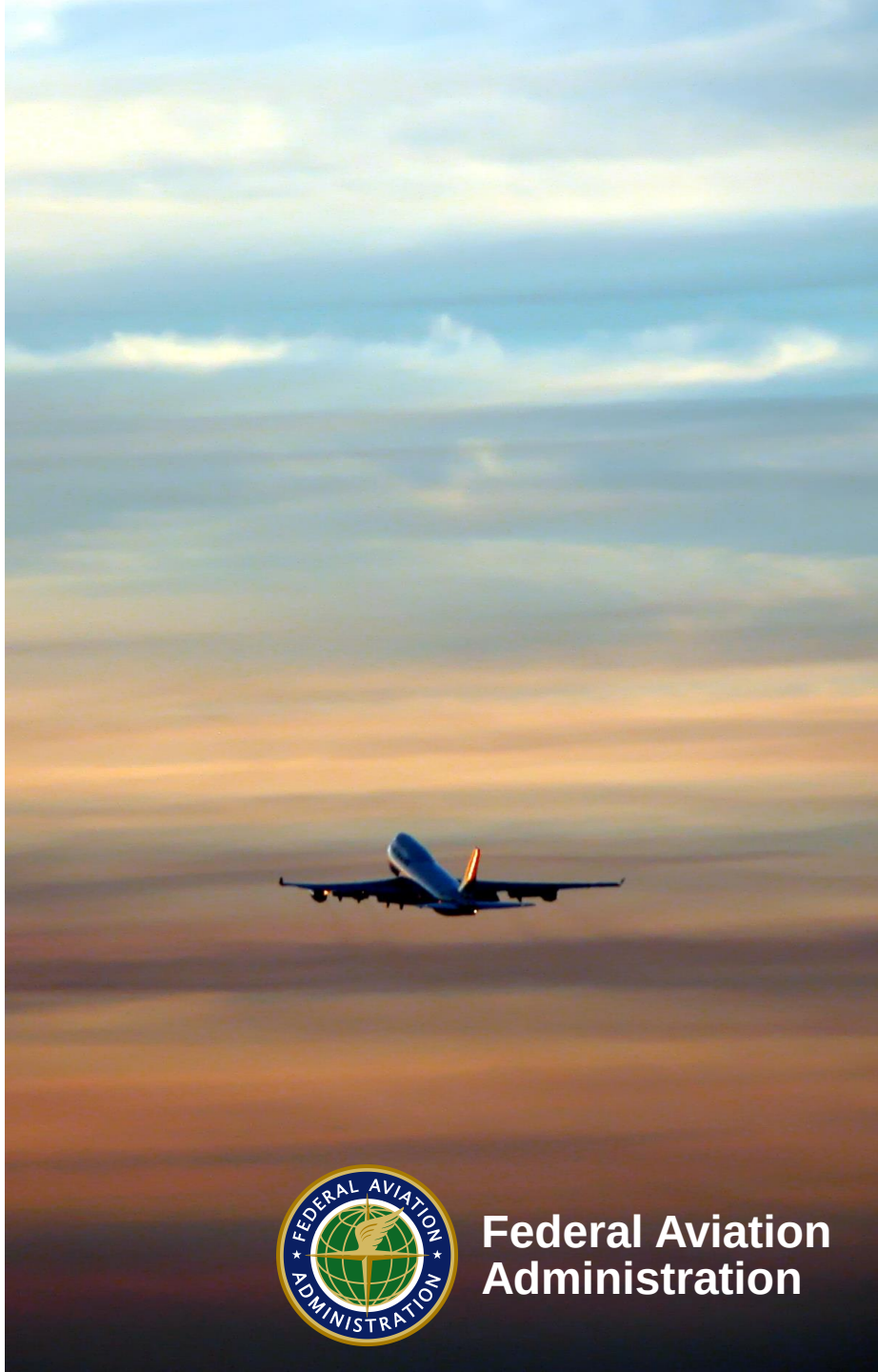
Date: March 15, 2022



# R,ED FY 2022 Budget

- **FY 22 R,E&D Request $258.5M**
  - House Appropriation Committee
    - R,E&D funded at $260.5M
  - Senate Appropriation Committee
    - R,E&D funded at $258.5M
  - President Signed H.J.Res. 75 Extension of Continuing Appropriations Act, 2022 on March 11, 2022 to extend the CR through March 15, 2022

# FAA FY 2022 Budget

| Appropriation | FY 21 Enacted * | FY 22 Request | FY 22 House Mark | Difference | FY 22 Senate Mark | Difference | FY 22 Enacted |
|---|---|---|---|---|---|---|---|
| Operations | $ 11,001,500,000 | $ 11,434,000,000 | $ 11,434,000,000 | $ - | $ 11,434,000,000 | $ - | $ - |
| Facilities & Equipment | $ 3,015,000,000 | $ 3,410,000,000 | $ 3,416,000,000 | $ 6,000,000 | $ 3,200,000,000 | $ (210,000,000) | $ - |
| Research Engineering & Development | $ 198,000,000 | $ 258,500,000 | $ 260,500,000 | $ 2,000,000 | $ 258,500,000 | $ - | $ - |
| Grants-in-aid for Airports | $ 3,750,000,000 | $ 3,350,000,000 | $ 3,750,000,000 | $ 400,000,000 | $ 3,953,000,000 | $ 603,000,000 | $ - |
| Total | **$ 17,964,500,000** | **$ 18,452,500,000** | **$ 18,860,500,000** | **$ 408,000,000** | **$ 18,845,500,000** | **$ 393,000,000** | **$ -** |

**Excluding COVID Related supplemental funding*

- **CR through March 11, 2022**

# FY 2020, 2021 R,E&D Enacted
# FY 2022 CR – March 11, 2022

| BLI Name | FY2020 Enacted $192.6M ($000s) | FY2021 Enacted $198M ($000s) | FY2022 President's Budget $258.5M ($000s) | FY2022 House Mark $260.5M ($000s) | FY 2022 Request/ FY 2022 House +/- | FY2022 Senate Mark $258.5M ($000s) | FY 2022 Request/ FY 2022 Senate +/- | FY 2022 Enacted ($000s) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| **Research, Engineering & Development** | | | | | | | | | |
| Fire Research and Safety | 7,200 | 7,136 | 7,576 | 9,576 | 2,000 | 7,136 | -440 | | |
| Propulsion and Fuel Systems | 2,100 | 4,215 | 3,121 | 3,315 | 194 | 2,500 | -621 | | |
| Advanced Materials /Structural Safety | 14,720 | 14,720 | 1,678 | 1,678 | 0 | 14,720 | 13,042 | | |
| Aircraft Icing | 9,000 | 6,426 | 2,472 | 6,426 | 3,954 | 2,472 | 0 | | |
| Digital System Safety | - | - | 3,689 | 3,689 | | 2,689 | -1,000 | | |
| Continued Air Worthiness | 10,269 | 11,269 | 8,829 | 8,829 | | 8,829 | - | | |
| Aircraft Catastrophic Failure Prevention Research | 1,565 | 1,565 | - | - | | - | - | | |
| Flight deck/Maintenance/System Integration Human Factors | 7,300 | 7,469 | 14,301 | 14,301 | | 14,301 | - | | |
| System Safety Management/Terminal Area Safety | 4,500 | 5,485 | 7,898 | 7,898 | | 7,000 | -898 | | |
| Air Traffic Control/Technical Operations Human Factors | 5,800 | 5,685 | 5,911 | 5,911 | | 5,911 | - | | |
| Aeromedical Research | 7,919 | 10,235 | 13,257 | 13,257 | | 9,000 | -4,257 | | |
| Weather Program | 12,911 | 6,236 | 13,786 | 13,786 | | 13,786 | - | | |
| Unmanned Aircraft Systems Research | 24,035 | 24,035 | 22,077 | 24,035 | 1,958 | 24,035 | 1,958 | | |
| Alternative Fuels for General Aviation | 1,900 | 2,524 | 4,986 | 10,000 | 5,014 | 4,986 | - | | |
| Innovation & Emerging Technologies | - | - | 8,500 | - | -8,500 | - | -8,500 | | Not Funded - Funding moved to other BLIs |
| Commercial Space Transportation Safety | 2,500 | 5,840 | 5,708 | 5,840 | 132 | 5,708 | - | | |
| Wake Turbulence | 5,000 | 3,698 | 3,728 | 3,728 | | 3,728 | - | | |
| NextGen - Air Ground Integration Human Factors | 5,300 | 6,000 | 3,000 | 6,000 | 3,000 | 3,000 | - | | |
| NextGen - Weather Technology in the Cockpit | 3,144 | 1,982 | 3,028 | 3,028 | | 2,659 | -369 | | |
| NextGen - Flight Data Exchange | 1,005 | 1,000 | 1,000 | 1,000 | | 1,000 | - | | |
| Information/Cyber Security | 2,675 | 4,769 | 4,769 | 4,769 | | 4,769 | - | | |
| Environment & Energy | 18,013 | 20,303 | 20,336 | 35,336 | 15,000 | 25,304 | 4,968 | | |
| NextGen – Environmental Research – Aircraft Technologies and Fuels | 29,174 | 31,465 | 33,476 | 58,476 | 25,000 | 76,465 | 42,989 | | |
| Airliner Cabin Environment Research | 1,000 | - | - | - | | - | - | | |
| System Planning and Resource Management | 12,135 | 13,022 | 4,141 | 4,141 | | 3,022 | -1,119 | | |
| Aviation Workforce Development - Section 625 | - | - | 5,752 | 10,000 | 4,248 | 10,000 | 4,248 | | |
| William J. Hughes Technical Center Laboratory Facilities | 3,500 | 2,921 | 5,481 | 5,481 | | 5,481 | - | | |
| ARPA-C Aviation Climate Research | - | - | 50,000 | - | -50,000 | - | -50,000 | | Not Funded - Funding moved to other BLIs |
| **TOTAL RE&D** | **192,665** | **198,000** | **258,500** | **260,500** | **2,000** | **258,500** | **0** | **0** | |

# FY 2022 House Language

- **Aviation climate and noise research –** The Committee supports the FAA's research to reduce greenhouse gas emissions from aviation and strongly encourages the FAA to coordinate its activities with other Federal agencies. The recommendation provides $50,000,000 for this endeavor across multiple existing research programs that strive to advance, among other things, the screening and testing of alternative and sustainable aviation fuels, the development of electric and hybrid-electric propulsion technology, and the deign of engine and airframe efficiency to reduce the environmental impact of aviation noise and emissions.

- The recommendation provides $35,446,000 for the **Environment and Energy**, of which not less than $30,000,000 is for the Center of Excellence for Alternative Jet Fuels and Environment (ASCENT) to analyze, model, and measure technologies capable of reducing noise, improving air quality, increasing energy efficiency, and producing sustainable aviation fuels at commercial scale, Of these funds, not less than $2,000,000 is for the study of the impacts of aviation noise on community annoyance, sleep, health, and children's learning. The committee appreciates that the FAA completed its evaluation of alternative airplane noise metrics and has awarded a grant to the FAA's Air Transportation Center of Excellence for Alternative Jet Fuels and Environment in April 2019 in order to study the health impacts of noise from overflights in accordance with sections 173 and 189 of the

# FY 2022 House Language cont.

- FAA Reauthorization Act (P.L. 115-254). Research on health effects of aircraft noise in the United States is lagging. Studies on sleep disturbances due to a range of noise exposure would be informative for airport and flight operations

- The recommendation provides $58,476,000 for **NextGen-Environmental Research-Aircraft Technologies and Fuels**, of which $36,000,000 is to support the Continuous Lower Energy, Emissions, and Noise (CLEEN) program to reduce noise and emissions at its source – the aircraft engine. The Committee is pleased that the CLEEN program is adding reducing community noise exposure and particulate matter emissions to its goals.

- **Aviation professionals** – The Committee supports increasing the strength and number of aviation professionals who are well-trained and can be relied upon to make air travel safe and efficient. To that end, the Committee provides $5,000,000 for the aviation maintenance technician development program and $5,000,000 for aviation workforce development program in accordance with section 625 of the FAA Reauthorization Act (P.L. 115-254).

# FY 2022 House Language Cont.

- **Crew complements** – The presence of two well-trained, qualified pilot in commercial aircraft is another example of safety through redundancy Funding made available in this Act to study alternative crew complements for flight decks in commercial operations should prioritize the safety effects relative to two-person flights. This direction is not intended to limit the FAA's research and development activities to unmanned aerial vehicles.

- **Emissions reduction plan** – The FAA anticipates revising its United States Aviation Greenhouse Gas Emission Reduction Plan in support of achieving net-zero emissions, economy-wide by 2050. The Committee believes such a plan must be comprehensive (addressing airframe design, engine technology, operational improvements through the NextGen program, and alternative fuels), actionable (resulting in specific policies, standards, measures, and timetables), and defensible (based on peer-reviewed quantitative analysis and modeling). The Committee directs the FAA to brief the House and Senate Committees on Appropriations on its framework for revising the plan not later than 60 days after the date of enactment of this act.

# FY 2022 House Language Cont.

- **Fire research and safety** – The Committee values the FAA's work on aircraft fire safety research to prevent accidents caused by inflight fires and to improve survivability in post-crash fires. Among this research is testing to support the development of standards for new fire detection technology and suppression agents and fire-safety materials.

- **Ice** – Aircraft icing continues to be one of the major safety threats to aircraft operations, both in flight and on the ground. The Committee provides $6,426,000 for aircraft icing research for the FAA to deepen its understanding of the effectiveness of ice protection and detection systems on aircraft operations under different atmospheric and climate conditions and to address the emerging issue of ice and UAS operations.

- **UAS research** – The Committee supports the safe integration of UAS into the national airspace system, including the continued development of a low-altitude authorization and notification capability (LAANC) program. The Committee provides $14,035,000 for the Center of Excellence for UAS Research.

# FY 2022 House Language Cont.

- **Supersonic aircraft** – The Committee encourages the FAA to continues its research rulemaking, and international engagement activities related to supersonic aircraft, including developing noise and emissions standards. Certification will ultimately depend on safety, but should also be informed by acoustical modeling, health effects on persons and animals, pollutants in the stratosphere, and the interdependency among noise, emissions, and fuel.

- **Structural safety** – With the current and forecasted use of advanced material growing, the Committee supports the FAA's research, primarily through the Joint Centers of Excellence for Advance Materials and Structures (JAMS), to ensure the safety of aircraft made of advanced materials. This research contributes to the FAA's ability to provide consistent guidance to industry for compliance with certification requirements and to evaluate test and analysis procedures used by industry to comply with crashworthiness regulations.

# FY 2022 House Language Cont.

- **Test environments** – The Committee reminds the FAA that interested state aviation departments, universities, UAS centers, test complexes and relevant industry stakeholders can be valuable partners to demonstrate the operational requirements for remote towers, unmanned and manned aerial vehicles, urban air mobility flight and electric vertical takeoff and landing (eVTOL) vehicles between multiple airports in order to measure community acceptance and to identify training requirements for the controller, technician and pilot workforces to safely operate and integrate these vehicles and systems into the NAS. Research should be conducted at a variety of places that offer different air traffic operating environments, weather conditions runway configurations, and terrains to assess their impact on operations.

# FY 2022 Senate Language

- **Advanced Materials/Structural Safety** – The Committee recommendation includes a total of $14,720,000 for advanced materials/structural safety. The Committee is aware that the primary challenge in additive manufacturing for aerospace applications is the certification of airworthiness of complex processes used within the additive manufactured components. The Committee recommendation includes $6,000,000 to advance the use of these new additive materials (both metallic and non-metallic based additive processes) in the commercial aviation industry, as well as $4,000,000 to advance the use of fiber reinforced composite materials in commercial aviation industry through the FAA Joint Advanced Materials and Structures Center of Excellence. The Committee is also encouraged by the potential impact that stitched resin composites can have on the aviation industry, and includes $2,000,000 for the FAA to continue its work with existing public private partnerships that provide leading-edge research, development, and testing of composite materials and structures.

- **UAS Research** – The Committee recommendation includes $24,035,000 for UAS research. Of this amount: (1) $12,035,000 is directed to support the expanded role of the UAS COE in areas of UAS research, including cybersecurity, agricultural applications, beyond usual line of sight technology studies of advanced composites;

# FY 2022 Senate Language Cont.

- and other non-metallic engineering materials not common to manned aircraft but utilized in UAS, the STEM program, and to study appropriate safety standards for UAS to develop and validate certification standards for such systems at the Center; (2) $2,000,000 is for the COE's role in transportation disaster preparedness and response, partnering with institutions that have demonstrated experience in damage assessment, collaboration with State transportation agencies, and applied UAS field testing: and (3) $10,000,000 is to support UAS research activities at the FAA Technical Center and other FAA facilities. The Committee is aware of delays in the approval of research projects from the UAS COE, which has led to some projects being cancelled entirely and has led to the FAA accumulating large unobligated balances. The Committee has made substantial investment in UAS research over the last 5 years, particularly at the COE, and expects the Department to expedite its approval process for research projects at the COE. The FAA should also ensure that the research at the COE aligns with the agency's needs as it continues to address the challenges with integration of UAS into the NAS. **Community and Technical College COE in Small UAS Technology Training Program** – The Committee supports efforts by the FAA to collaborate with UAS Collegiate Training Initiative (CTI) schools to deliver up-to-date UAS training tools, resources, and guidelines that will prepare students for careers in UAS and continue to maintain the safety of the NAS.

# FY 2022 Senate Language Cont.

- **Environment and Energy** – The Committee recommendation includes $25,303,500 for environment and energy. The increase funding level shall be used to better understand the impact of non-carbon dioxide (CO2) emissions from aviation on climate change and to identify means to cost-effectively reduce these impacts.

- **NextGen-Environmental Research-Aircraft Technologies and Fuels** – The Committee recommendation includes $76,464,500 for NextGen-Environmental Research-Aircraft Technologies and Fuels. The Committee recommendation includes at $45,000,000 increase, and the FAA is directed to use $25,000,000 of that increase to expand the work under the continuous lower energy, emissions and noise (CLEEN) program in order to accelerate the development of aircraft and engine technologies. The remaining $20,000,000 increase is to conduct research within the aviation sustainability center (ASCENT) COE on sustainable aviation fuels (SAFs).

# FY 2022 Senate Language Cont.

- SAFs have the near-term potential to reduce CO2 emissions from aviation by over 50 percent compared to conventional jet fuel. While SAFs are not currently commercially viable at scale and remain more expensive than conventional jet fuel, several commercial airlines have committed to increase their use of SAFs. The increased funding should be used by ASCENT to go beyond the current 50 percent SAF blending limit and identify means to cost effectively reduce the lifecycle greenhouse gas emissions from SAF production and use, and continue its supply chain analysis work to help establish robust domestic supply chains for SAFs. ASCENT is also directed to continue working with the National Renewable Energy Laboratory on quantifying emissions reduction impacts of policies that could drive demand for SAFs. The FAA should also quantify the non-carbon climate benefits of these fuels.

# FY 2022 Senate Language Cont.

- The Committee directs the FAA, in collaboration with the Departments of Energy and Agriculture and other Federal agencies, to conduct an interagency review and update of the 2016 Federal Alternative Jet Fuels Research and Development Strategy to address key scientific and technical challenges that inhibit the development, wide scale production, and use of economically viable SAF. The revised strategy should identify and prioritize specific research and development activities in order to accelerate SAF utilization. The Committee notes that the FAA's work on SAFs will also be critical to meet the ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORISA) requirements.
- The Committee recommendation includes a total funding level of $35,000,000 for the ASCENT COE from this BLI and the Environment and Energy BLI. In addition to the work on SAFs, ASCENT is also directed to work on quantifying the ultrafine articulate and other public health impacts of aviation on airsheds, particularly for communities near airports.

# FY 2020 Senate Language Cont.

- **Aviation Workforce Development Programs** – The Committee recommendation includes $10,000,000 for the Aviation Workforce Development Programs as authorized by section 625 of the FAA Reauthorization Act of 2018. Funding shall be used for both aircraft pilot workforce and aviation maintenance workforce. The FAA should prioritize funding to academic institutions with established curriculums for flight operations, aviation maintenance, commercial aviation, unmanned aircraft systems, aviation technology, and training at the community college level or through an accredited aviation professional program. The FAA should also prioritize maintaining and growing workforce levels at existing maintenance, repair, and overhaul facilities.

# FY 2023 Budget

- **Received OMB Passback February 14, 2022**
  - **RED at $260.5M**
- **President's Budget Submission – March 23, 2022**

# R,E&D FY 2024 Budget

- **FY 2024 target $267M**
- **Deliver to OST June 2022?**
- **FY 2024 remaining schedule (tentative)**
  - Submit to OMB mid September
  - Submit President's request to Congress Feb. 2023

# Out Year Targets

- **Targets established**
  - FY 24 – $267M
  - FY 25 - $273M
  - FY 26 - $279M
  - FY 27 - $286M
  - FY 28 - $292M
- **Expect targets to change**

# FAA Reauthorization

- **Current Reauthorization signed by President Oct 5, 2018 which extends authorization thru 2023.**