AERONAUTICS R&D POLICY PLATFORM PAPER


Credit: Joby Aviation

For over a century, aeronautics research and development (R&D) has been a vital part of the foundation of U.S. economic prosperity and is a critical asset for maintaining our national security and defense. The aviation industry could not be more important to our nation's economic engine and our interconnectedness to the world. Aeronautics-related R&D is the foundation upon which this healthy industry has been built.

Contributions include dramatically improved aviation safety, defense force modernization, development of cutting-edge manufacturing processes and materials, significantly reduced environmental impact of aircraft, and, now, the creation of a dynamic aviation start-up ecosystem. Continued long-term federal investments have helped create, foster, and sustain a vibrant aviation industry and the need for ongoing support of the industry is even more vital considering the significant impacts of the coronavirus pandemic.

KEY POINTS

The United States must continue to ensure the viability of the civil aviation industry in the near term with sustained bipartisan policies, programs, and investment to allow for the stabilization and potential future growth of the industry during these unprecedented times. Despite a growing deficit and budget constraints, continued consistent federal investment in aeronautics R&D, as outlined in NASA's Strategic Implementation Plan, is essential to compete with international competitors like China and the European Union. The continuity of policies and programs that are meeting their objectives and adding value to the nation's technological advancement, scientific knowledge, and strategic security is necessary to maintain "constancy of purpose" in both civil aviation and national defense. This includes robust government support of basic research that is often the source of technological breakthroughs fueling America's engine of innovation.

American Institute of Aeronautics and Astronautics
12700 Sunrise Valley Drive, Suite 200, Reston, VA 20191-5807 I 703.264.7500 I aiaa.org

The commercial aviation market is projected to recover from the coronavirus pandemic and grow in the coming years. The U.S. economy stands to gain significantly from a growing market that is realized through emerging technologies. Ensuring U.S. preeminence will require continued congressional support, as well as increased funding for robust, long-term federal civil aeronautics research and technology initiatives. Government-funded R&D at the DOD, the FAA, and NASA has enabled the development of advanced engines, materials, aerodynamics, and systems to address the expansion of global operations. Research conducted at these federal agencies has developed multiple world-class technologies that enabled significant fuel savings, new materials, reduced noise and emissions, and the NextGen Air Traffic System.

These investments in aeronautics have made civil aviation safer, air travel affordable for most Americans, and significantly reduced the environmental impact of aircraft by reducing community noise and emissions. Excitement in the civil aviation industry is at a generational high with the advent of technologies in autonomous systems, low boom supersonics, alternative fuels, and air traffic control systems. New products and companies created from these technologies will fuel economic prosperity in the U.S. economy by connecting people, cultures, and businesses, as well as supporting the necessary infrastructure of companies working on equipment and vehicle maintenance, repair, and overhaul.

Beyond these technologies, there are substantial areas of research that need investment to ensure the United States remains a world leader in aeronautics. The future of aeronautics requires research funding for federal agencies to study supersonic and hypersonic flight, environmental sustainability, new materials, noise reductions, advanced propulsion systems, UAS, and the further development of Next Generation air traffic management technologies. Also, while the federal government has recognized the importance of a healthy aeronautics industry with financial support provided in the CARES Act to deal with the short-term impacts of the pandemic, additional aid is needed.

ADVANCEMENTS AND NEW TECHNOLOGIES

AIAA has identified several key advancements in aeronautics and civil aviation that must be addressed to safeguard ongoing U.S. leadership. Efforts in these areas are vital to ensure innovation in this high-tech sector, continued stabilization and growth for our nation's economic prosperity, and that that we maintain our national security and defense.

- ***Focus on Reducing Carbon Emissions*** – The use of ultra-efficient commercial air vehicles and emerging capabilities, such as electric and hybrid-electric propulsion systems and renewable alternate aviation fuels, will enable the U.S. industry to cultivate emerging markets and to stay competitive in existing markets. Continuing research is needed in areas like advanced composite materials for strong, lightweight aircraft structures and electric propulsion for the next generation of single aisle transport.
- ***Supersonic Flight*** – While current FAA restrictions prevent civil aircraft from operating at supersonic speeds over land, companies continue to propose and develop supersonic platforms for commercial applications of high-speed transit. In addition, propulsion and materials research is being performed to address the unique environmental challenges of providing safe, reliable structures and engines that are economical to operate and maintain.
- ***Hypersonics*** – Research related to heat exchangers, engines, and high-temperature materials is needed to make this technology viable for military payloads, so the United States does not fall behind work being performed by Russia and China. Robust and highly integration control systems for hypersonic and supersonic technologies are necessary and would help other aspects of aviation.
- ***UAS*** – As the aerospace and defense industry's UAS capabilities evolve and mature, more commercial applications and technology advances are realized. With the advent of drone delivery services and the use of first responder drones for wildfires and aerial surveillance, there is significant pressure to invest in the maturation of UAS technology and policy to keep up with its accelerating pace.
- ***Advanced Air Mobility*** – NASA has launched an Advanced Air Mobility national campaign to help emerging aviation markets safely develop an air transportation system that moves people and cargo between places not previously served or underserved by aviation. The U.S. Air Force has developed Agility Prime to accelerate the commercial market for these new air vehicles. Additionally, there is a need for defense force modernization incorporating the developing technologies to meet future national security threats.

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