Aeronautics – the science of flight – is a cornerstone of economic prosperity and is critical to maintaining our national security and defense. Today’s aviation industry owes its successes to U.S.-led research and development (R&D) efforts to improve safety, reliability, and efficiency of air travel. R&D is truly the basis for U.S. leadership in aerospace and has resulted in significant economic benefits to the U.S. both in terms of export and balance of trade, and in terms of high wage jobs in engineering and manufacturing. U.S. leadership in aerospace – specifically in aeronautics – has established the United States as the destination for students from around the world who seek to learn from the world’s leading authorities in this field. The failure to make long-term investments in aeronautics R&D could eventually lead to the loss of our preeminence in aviation and significant detrimental impacts to our economy, workforce, and educational system.

The Government’s and NASA’s Role Today

For more than a century, the Federal government has played a leading role in advancing the fundamental scientific principles and technologies on which modern aviation is built – investments which take too long and are too risky for commercial pursuit alone. Investments in aeronautics have dramatically improved aviation safety, made air travel affordable for most Americans, and significantly reduced the environmental impact of aviation through reduced community noise and emissions.

Government investments in aeronautical research have developed technologies to the level of maturity where industry can engineer them into their product lines. Historically, there has been a strong partnership among the Federal government, industry and academia to achieve this goal. In fact, the higher levels of spending 15-20 years ago arguably helped fuel the increase in aircraft shipments we enjoy today. We risk a lag effect of limited future growth resulting from reduced funding today.

Even as civil aviation markets have grown, NASA’s aeronautics funding has declined significantly over the last two decades to $640 million in fiscal year 2016. By comparison, fiscal year 2014 funding was $1.3 billion in constant dollars. Unfortunately, the reduced funding meant NASA could not contribute substantively to help the United States keep pace with near-peer nations who have invested heavily in aviation. Federal investment in aeronautics R&D has become inconsistent and insufficient while international competitors like China and the European Union have developed and are funding long-term strategies to wrest aeronautics leadership, and the resulting business opportunities, from us.
For example, China recently announced that it intends to spend roughly $300 billion – equivalent to NASA’s entire annual budget over the next 16 years – on aviation gas turbine engines. It has become evident to stakeholders among policymakers, industry, and academia that stable, adequate funding for NASA Aeronautics Research is a necessity.

NASA’s Aeronautics Research Mission Directorate has developed a ten-year Strategic Implementation Plan with a vision for the next 25 years and beyond. It encompasses a broad range of technologies to meet future needs of the aviation community, our nation, and the world, for safe, efficient, flexible, and environmentally sustainable air transportation. The newly released strategic plan clearly prioritizes research areas to enable advancement in both traditional aeronautical disciplines and emerging fields for integration into system-level capabilities for broad application. This plan supports:

- Cutting-edge research at the fundamental and integrated systems levels to advance U.S. leadership in aeronautics R&D to address national aviation challenges such as energy and the environment. This would include transformative concepts such as ultra-efficiency, hybrid-electric propulsion, and low-noise supersonic flight.
- Research into further improvements in aviation safety for legacy and emerging concepts
- Innovative air traffic management and vehicle NextGen technologies
- Research into the integration of Unmanned Aerial Systems into the National Airspace System and the validation and verification of complex aviation systems
- The maintenance and upgrade of NASA’s world-class aeronautics facilities to keep pace with emerging technologies

**Stability and Long-Term Commitment is Essential**

Such funding will enable NASA to:

- Accelerate research and development to enable the capabilities of NextGen and the vehicles that fly in that system
- Lead with a vision towards revolutionary capabilities for the nation’s future aviation systems that will transform and reinvigorate the industry

Over the next two decades, continued economic growth in markets like the Asia Pacific region and Latin America will fuel a sustained increase in the number of air travelers. This demand will require more than 21,000 new airplanes, bringing the global fleet to more than 42,000. At the same time, fleet retirements will necessitate an additional 15,500 planes to replace existing capacity. This tremendous growth represents a $5.2 trillion market for aerospace manufacturers. International competition will be fierce, as will requirements to reduce CO2 emissions to meet new global targets. Significant R&D investments are necessary to ensure that domestic aircraft manufacturers are competitive in order for the U.S. to capture these new markets.

**Recommendation**

The U.S. government must support robust, long-term Federal civil aeronautics research and technology initiatives funded at a level that will ensure U.S. leadership in aeronautics. Congress should support NASA’s ten-year Strategic Implementation Plan at least at the levels recommended in the fiscal year 2017 NASA Budget request to sustain a strong economy, maintain a skilled workforce, support national security, and drive a world-class educational system.