

## NASA Aeronautics 10-Year American Aviation Plan

**BACKGROUND:** The President's FY 2017 budget provides \$790 million to NASA's Aeronautics Research Mission Directorate to accelerate aviation energy efficiency, advance propulsion system transformation and enable major improvements in aviation safety and mobility. This budget is the first step in a 10-year plan to achieve the most critical outcomes outlined in NASA's Aeronautics long term vision and strategy, including a bold series of new experimental aircraft or "X-plane" and technology systems demonstrations.

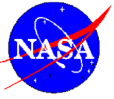
FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
\$642M	\$640M	\$790M	\$846M	\$1,060M	\$1,173M	\$1,287M	\$1,294M	\$1,308M	\$1,218M	\$830M	\$839M

**Investing In Our Future** - Investments in NASA's cutting edge aeronautics research today are investments in a greener, safer, quieter and faster tomorrow for American aviation:

- A future where Americans are working in stable, well-paying jobs.
- A future where we fly on aircraft that consume half as much fuel and generate only one quarter of current emissions.
- A future where flight is fueled by greener energy sources.
- A future where our air transportation system is able to absorb nearly four billion more passengers over the next 20 years without compromising the safety of our skies.
- A future where our airports are better neighbors because aircraft noise is contained well within the airport boundary.
- A future where people can travel to most cities in the world in six hours or less in an airplane that can fly faster than the speed of sound on bio-fuels.

### Aviation Budget Facts

- Global demand for moving people and cargo through the air and fierce international competition continue to grow. The International Air Transport Association forecasts a doubling (3.2 billion to seven billion) of passengers flying worldwide by 2034.
- Efforts to reduce carbon pollution presents opportunities to strengthen the economy, drive innovation, and create new jobs.
- NASA's forward-looking aeronautics research is enabling a greener and more efficient air transportation system through investments in revolutionary aircraft technologies and designs.
- In FY 2017, NASA Aeronautics begins a major research initiative that will accelerate aviation energy efficiency, achieve propulsion system transformation, and enable major improvements in aviation mobility.
- ARMD plans to fund experimental aircraft, technology and systems demonstrations to robustly and rapidly implement the ultra-high efficiency and low carbon elements of the ARMD's long term vision and strategy. These investments will build on advancements achieved through NASA's Environmentally Responsible Aviation project and other NASA aeronautics research from component levels through computer modeling, ground tests, and flight tests pioneered by NASA in partnership with industry and academia.
- The largest element of our strategy is a bold series of new experimental aircraft and technology systems demonstrations under the "New Aviation Horizons" initiative to accelerate the path to commercialization of ultra-efficient subsonic transport experimental aircraft, and to initiate the detailed design and build of the world's first low boom flight demonstrator. These will be complemented by investments to develop enabling tools and technologies and other revolutionary concepts, foster the next generation workforce, and leverage advances by non-traditional aerospace industry partners that will enable U.S. industry innovation.
- If commercialized by industry, NASA-developed "green aviation" concepts and technologies could lead to aircraft that use half the energy, and generate only one quarter of the emissions and contain the noise well within airport boundaries than current generation aircraft.
- This budget is the first step in a 10-year investment portfolio to achieve the most critical outcomes outlined in NASA's Aeronautics long-term vision and strategy, as outlined ARMD's Strategic Implementation Plan <http://www.aeronautics.nasa.gov/pdf/armd-strategic-implementation-plan.pdf>.



- NASA will continue to develop revolutionary concepts and technologies to enable the full realization of the Nation's NextGen initiative, in partnership with the FAA and industry, and validate new NextGen operational technologies for efficient arrivals and departures through a series of flight test demonstrations.
- NASA will continue to lead the U.S. in researching key issues for safe unmanned aircraft system (UAS) operations, including integration of UAS operations in the National Air Space and development of key technologies for low altitude operations.
- NASA also will solicit university-led teams to propose independent, innovative research to solve key technical aviation challenges.
- NASA will seek input from key government and industry stakeholders about the details of our plans over the next few months to ensure alignment with community priorities.
- NASA's green aviation research primarily takes place at four NASA research centers: Ames Research Center at Moffett Field, Calif., Neil A. Armstrong Flight Research Center at Edwards Air Force Base, Calif., Glenn Research Center in Cleveland, and Langley Research Center in Hampton, Va.

#### **FY 2017 Highlights:**

- \$159 million for the Airspace Operations and Safety Program to develop and explore new technologies that increase efficiency of the Nation's air traffic management systems reducing flight delays and fuel consumption.
  - Conducts a series of air traffic management technology demonstrations to validate the benefits of new concepts.
  - Provides leading edge research to enable safe and efficient operations of small unmanned aircraft systems (UAS) at low altitudes.
  - Pioneers real-time integration and analysis of data to support system-wide safety assurance, enabling proactive and prognostic aviation safety assurance.
- \$299 million for the Advanced Air Vehicles Program to develop the tools, technologies, and concepts that enable new generations of civil aircraft that are safer and more energy efficient.
  - Enables revolutionary advances in energy efficiency and environmental compatibility of future generations of aircraft.
  - Develops and validates tools and technologies that will lead to a more efficient vertical lift vehicles.
  - Develops technologies that will eliminate the barriers to commercial supersonic flight.
  - Maintains NASA's fundamental hypersonic research capability for national needs.
  - Continues work on reducing the timeline for development and certification of innovative advanced composite materials and structures.
  - Sustains and advances key national testing capabilities that support aeronautics research.
- \$210 million for the Integrated Aviation Systems Program to conduct experimental flight research and major demonstrations of transformative innovation.
  - Contributes flight-validated data and capabilities that reduce technical barriers related to the safety and operational challenges associated with enabling routine civil UAS access to the NAS.
  - Establishes a major new flight initiative, New Aviation Horizons, to develop a continuing series of X-Planes and X-Systems to provide large scale testing of new technologies that will dramatically reduce fuel consumption, noise, and emissions and open new markets for U.S. industry. The initiative includes projects that will demonstrate a hybrid wing body aircraft, hybrid electric aircraft, and a quiet supersonic aircraft.
  - Conducts flight research on the most promising concepts and technologies at an integrated system level.
- \$122 million for the Transformative Aeronautics Concepts Program to cultivate multi-disciplinary, revolutionary concepts to enable aviation transformation and harnesses convergence in aeronautics and non-aeronautics technologies to create new opportunities in aviation.
  - Evaluates initial feasibility of internally and externally originated concepts to support the discovery and development of new, transformative solutions to challenges in aviation.
  - Supports research and development of major advancements in cross-cutting computational tools, methods, and single discipline technologies to advance research capabilities.
  - Creates a University Innovation and Challenge project to establish university leadership in developing transformative concepts and addressing key technical challenges facing the aviation industry.