2024

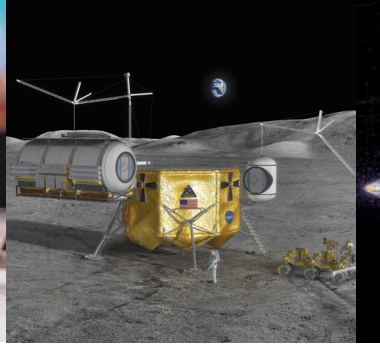
AEROSPACE DAY

Aerospace – Virginia's High-Tech Economic and Jobs Engine

Virginia's aerospace sector asks policymakers to:

- Support two budget amendments for the Virginia Space Grant Consortium to 1) provide workforce development opportunities through flight scholarships and an online Private Pilot Ground School for Virginia's high school students, and 2) provide the Virginia Aviation Pathways Portal to provide aviation careers guidance and links to resources.
- Support initiatives to grow Virginia's spaceport and the NASA Wallops Flight Facility launch range, one of two U.S. East Coast ranges, and to protect them from activities that encroach upon their operations.
- Pass laws and appropriate funds to support the development of uncrewed systems technology, which is creating extraordinary products and services with numerous economic and societal benefits throughout the Commonwealth.
- Continue support of Old Dominion University's Virginia Institute for Spaceflight & Autonomy (VISA) located on the Eastern Shore which is helping to grow the region's aerospace ecosystem through talent development, partnerships, and applied research.
- Support commercial development, use and testing of Uncrewed Aircraft Systems (UAS) (or "drones") - consistent with federal air safety standards.
- Provide a supportive public policy environment that will help develop and build a vibrant Advanced Air Mobility (AAM) (or "air taxi") industry to connect Virginia communities with quick, affordable and safe air service to destinations throughout the Commonwealth and region.

Cover Photo: Electra.aero completes world's first hybrid-electric eSTOL (Short Takeoff and Landing) flight in Manassas in November 2023.

2023 MILESTONES & ACCOMPLISHMENTS

NASA Langley Research Center

Hosted over 40,000 members of the public for NASA Langley's first Open House since 2017. The Open House showcased the research and technology, business innovation, partnerships, and workforce development underpinning Virginia's aerospace and aviation industries.

TIME's 'Best Inventions of 2023' included the TEMPO (Tropospheric Emissions: Monitoring of Pollution) satellite, launched in April 2023, which is providing hourly air quality information, improving scientists' understanding of air pollution that can damage human health and the environment across most of North America.

Advanced "green" aviation through Boeing 777 EcoDemonstrator flights—testing emissions from aircraft engines using unblended sustainable aviation fuel.

Successful flight tests between the NASA Langley CERTAIN drone test range with off-site locations to create Beyond Visual Line of Sight (BVLOS) safe flight corridors for drones and future FAA-approved air taxis. Imagine hopping across the peninsulas, avoiding bridge traffic and cutting commute time.

Advancement of commercial space activity with the inclusion of Langley's Navigation Doppler Lidar (NDL) on commercial lunar lander missions. The NDL data helps vehicles precisely navigate and execute a gentle touchdown — whether it be on the surface of the Moon, Mars, or other destinations in our solar system.

NASA Wallops/Virginia Spaceport Authority

"Virginia Space" rebranded as "Virginia Spaceport Authority," the brand name for the Virginia Commercial Space Flight Authority.

Celebrated 10 years of Antares rocket launches from the Spaceport at Wallops. Northrop Grumman's Antares rockets delivered 130,000 lbs. of research experiments, supplies and vehicle hardware to the International Space Station over 17 successful missions.

"Virginia is for Launch Lovers" was the first-ever U.S. launch of Rocket Lab's Electron rocket and took place at MARS, supported by NASA's Automated Flight Termination Unit (NAFTU), which is already transforming the launch industry. The rocket launched three satellites that were developed by Hawkeye360, a Virginia-based satellite company.

Secured $103 million in federal funds to replace the Wallops Island causeway bridge, which provides the only ground access to the $1.4 billion in state and federal facilities on Wallops.

The UAS airfield at MARS continued to see healthy use by government and commercial customers.

Provided launch range command/control for U.S. Department of Defense hypersonics research with multiple suborbital missions to mature this critical technology.

Industry and Commonwealth

Manassas-based Electra.aero conducted its first test flight of its hybrid-electric short takeoff and landing aircraft that could be one of the first new AAM aircraft in operation in the U.S. Electra.aero received funding from Virginia Innovative Partnership Corporation's (VIPC) Virginia Venture Fund and Commonwealth Commercialization Fund and has received over 1,000 orders, exceeding $4 billion in value, from major airlines and aircraft fleet operators.

The VIPC hosted a Virginia Pavilion at Xponential in Denver. The pavilion featured 20 Virginia companies and organizations that are developing and commercializing uncrewed systems technology.

VIPC, ODU/VISA, Riverside Health, the Accomack-Northampton Planning District Commission, and DroneUp teamed to launch "Elevating Access to Healthcare" to deliver medicine by drones on Virginia's Eastern Shore. The project, which is funded by VIPC and the U.S. Department of Transportation, will improve patients' access to prescription medications for rural communities.

The aviation education program of the Virginia Department of Aviation (DOAV) remains the nation's best, according to the National Association of State Aviation Officials. The DOAV's Introduction to Flight program, which brings an ICON A5 amphibious aircraft to schools across the state, inspired more than 16,000 students in 2023.

Thanks to the efforts of DOAV and VIPC, as well as research by Virginia Tech, FAA granted conditional approval for a vertiport at the Blackstone Army Airfield. Vertiports are critical infrastructure vital to the growth of AAM in Virginia.

Virginia remains the only state to be consecutively ranked #1 in the nation for UAS business climate by Business Facilities magazine.

More than 60 state and local government agencies are using the Virginia Flight Information Exchange (VaFIX) to support safe UAS operations, and more than 24,000 advisories were posted in VaFIX in 2023.

Academia

VSGC provided more than 160 paid internships, awarded more than $350,000 in scholarships and fellowships, impacted more than 2,500 7th-12th grade students through immersive STEM programs, provided professional development to more than 100 educators, and trained 50 educators on providing safe drone operator instruction.

Virginia Tech's Mid-Atlantic Aviation Partnership (MAAP) continues to partner with the FAA on new air traffic technologies/procedures and safety/security enhancements.

VT MAAP held two drone camps at the VT Drone Park in summer 2023 with a focus on drone operations and STEM education in partnership with Google's Wing and Boeing.

VT MAAP assisted Dominion Energy and Skydio in gaining approval for fully remote beyond visual line of sight (BVLOS) operations.

Virginia Spaceport Authority continued its summer internships for college students/graduates (including the Eastern Shore Community College) and expanded the number of partnerships with K-12 and higher education.

VT MAAP and Wing's popular drone delivery service continues to thrive in Christiansburg, Va., where it made history as the first U.S. residential drone delivery service when it launched in 2019.

VIRGINIA AEROSPACE & AVIATION STATISTICS

Economic Impact:

$30.4B ($22.9B for aviation and $7.6B for aerospace). [1,2]

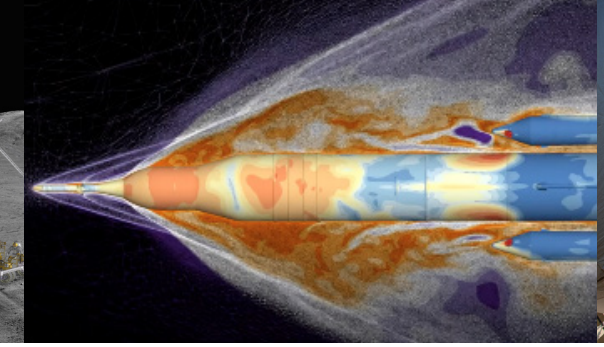
Jobs: 146,660 aviation sector jobs and 19,706 aerospace jobs. [1,2]

High Wages: Average annual aerospace wage of $99,385 and on-airport tenants and businesses of $64,000 compared to $48,334 for all Virginia industries. [1,2]

State Tax Revenues: $57.5M (corporate and personal taxes). [1]

FOOTNOTES:

1 - "Virginia's Aerospace Industry, An Economic Impact Analysis," Revised Edition, January 2011, prepared by Chmura Economics & Analytics and the Performance Management Group. 2 - "Virginia Airport System Economic Impact Study, Executive Summary," prepared for the Virginia Department of Aviation, 2017.



Workforce: A recent study has forecasted Virginia's AAM industry will generate $16 billion in new business activity, create 17,000 jobs, and carry 8 million passengers annually in Virginia within 20 years - highlighting the substantial economic benefits of AAM.

Aviation provides 146,600 jobs in Virginia. Virginia's 65 public-use airports play a critical role in transportation, employment, and economic development. The nine air carrier airports offering service to global destinations and 56 general aviation airports, are truly economic engines.

Our airports have created and sustained 146,660 jobs, or 3.6% of total employment in Virginia: [2]

- Virginia airport jobs contributed $7.7 billion in payroll. [2]
- Each airport job supports 2.2 additional jobs in Virginia. [2]
- These jobs contribute $535 million in state and local tax revenue. [2]
- Total economic impact of airports on Virginia's economy is $22.9 billion. [2]
- More than 10 million tourists come to Virginia each year by airplane.

AEROSPACE IN VIRGINIA

Two NASA facilities – Langley Research Center and Wallops Flight Facility in 2023:

- Had an economic impact in Virginia of $6.8 billion in 2023.
- NASA's Moon to Mars activity generated $900 million in economic output in Virginia.
- NASA's climate change activity generated $830 million in economic output in Virginia.
- Supported approximately 33,000 jobs in Virginia.
- Generated $273 million in tax revenues for Virginia state and local governments.

More than 300 aerospace firms, including the largest commercial satellite manufacturing facility east of the Mississippi at Northrop Grumman's Dulles Campus. [2]

Virginia Spaceport Authority owns and operates the Mid-Atlantic Regional Spaceport (MARS) on Wallops Island. The facility includes three launch pads, a drone airfield, the newest payload processing facility in the U.S., and an integration/control facility to meet customer needs for launch, range testing, and research. The Spaceport is one of four in the U.S. licensed by the FAA for vertical launches to orbit. The Spaceport and NASA have enjoyed a partnership for nearly 30 years on the Eastern Shore.

VIPC and DOAV have established the Virginia AAM Alliance (VAAMA), comprised of leading aviation business, education, and policy experts to guide the Commonwealth in building essential infrastructure and regulations for the success AAM operations.

The Mid-Atlantic Aviation Partnership (MAAP) led by Virginia Tech is the busiest of the six national UAS test sites (flying over 40% of the flights and flight hours).

The Virginia Unmanned Systems Center at VIPC serves as a unified voice and central source for information and assistance for the state's unmanned systems community. The Public Safety Innovation Center (PSIC) at VIPC promotes drone use that saves lives and protects first responders in the line of duty.

PHOTO CAPTIONS - Clockwise, left to right: **1** - Virginia Tech MAAP staff share about the Wing Hummingbird at the Virginia booth at AUVSI. **2** - Launch of "Stronger Together" from Pad 0C. Photo by Brady Kenniston. **3** - Drones are delivering many benefits to Virginia. **4** - NASA's Lightweight Surface Manipulation System, a lunar crane technology is autonomous and interchangeable with landers, rovers, and habitats. **5** - NASA Langley conducts supersonic Computational Fluid Dynamics (CFD) modeling and simulation of the Space Launch System (SLS) for the Artemis campaign. **6** - The NG-19 Antares rocket rolls out to Virginia's Pad 0A on Wallops Island. **7** - Governor Glenn Youngkin at the launch of the NG-19 on August 1, 2023. **8** - Pathways Flight Academies student receives flight instructions in a Piper aircraft at Averett University. **9** - The Mid-Atlantic Regional Spaceport on Wallops Island, Virginia. **10** - NASA launches a football-stadium-sized science balloon from New Zealand.. **11** - NASA Langley Center Director Clayton Turner, NASA supersonic X-59 lead test pilot Nils Larson, and current Artemis II lunar astronaut Victor Glover.



The Association for Uncrewed Vehicle Systems International (AUVSI), the world's largest organization dedicated to the advancement of uncrewed systems, is headquartered in Virginia, and has three chapters here.

National security facilities involved in aerospace research and technology development include: Defense Advanced Research Projects Agency, Air Force Office of Scientific Research, National Reconnaissance Office, National Geospatial Intelligence Agency, National Security Space, and Office of Naval Research.

The National Institute of Aerospace (NIA), a non-profit research and graduate education institute, conducts leading-edge aerospace and atmospheric research and development of new technologies.

The Virginia Space Grant Consortium (VSGC), a NASA/state partnership, focuses on science, technology, engineering, and math K-graduate education, workforce development and research in STEM and aerospace-related fields.

The Virginia AeroSpace Business Association (VASBA) promotes business development, economic growth, workforce development, and STEM sponsorships including providing STEM-related K-12 Sponsorships and STEM scholarships to students pursuing 2- or 4-year degrees. Teamed with the Lt. Governor's office, VASBA is also Virginia's Aerospace States Association representative.

Virginia's universities perform over $100M per year in funded aerospace-related research and provide a robust pipeline of skilled employees for Virginia aerospace business.

NASA Wallops Flight Facility (WFF) provides STEM opportunities for Virginia students, educators, and faculty including paid internships, mission-related workshops, student research on a high-altitude balloon, and student flight research payloads launched on sounding rockets through the RockOn! program. NASA Wallops collaborates with VSGC and NASA Langley Research Center to educate and recruit Virginia students for aerospace careers.

LOOK FORWARD TO

Construction on a fourth launch pad at MARS and continued progress on Rocket Lab's Neutron Rocket Production Site, which is bringing 250 jobs to Virginia.

NASA's first flight of the supersonic X-59/QUESSST mission to advance commercial aviation with technologies for quiet supersonic flight over land. This will cut travel time in half for air travelers crossing the continent, connecting us closer and faster.

NASA's Artemis II launch around the Moon as a precursor to landing the first woman and first person of color on the Moon and preparing for human missions to Mars. Langley's contributions of the Launch Abort System, impact testing of the Orion capsule, and data analysis and testing of Artemis I flight data directly contributes to this mission by keeping the crew safe in case of mission anomalies.

Providing assured access to space for multiple Rocket Lab orbital and suborbital flight operations in support of commercial and government needs

Wallops will conduct more than 40 sounding rocket and scientific balloon launches from Wallops New Mexico, Alaska, Norway, Sweden, and the Kwajalein Atoll.

The 2024 Total Solar Eclipse on April 8, for which Wallops will launch three sounding rockets just 30 minutes apart to study the solar phenomenon.

Launch of two 6U cube-sat payloads in partnership with ODU, U.S. Coast Guard Academy and Virginia Tech in August 2024.

NASA Wallops' record breaking scientific balloon flight in Antartica with a $40 million experiment.

Ribbon cutting for the state-of-the-art Flight Dynamics Research Facility (FDRF) at NASA Langley with a 25,000 square-foot vertical spin wind tunnel.

NASA flying the Airborne Science Laboratory on a modified Boeing 777 to conduct airborne Earth science research missions.

VSGC training at least 50 educators in using drones in the classroom to prepare the future workforce.

ODU/VISA completing a GO Virginia planning grant examining air routes/corridors and associated infrastructure to help foster AAM/UAS growth in the region.

VIPC and DOAV partnering in an education campaign to help local government and economic development leaders prepare their communities for AAM.

THANK YOU FOR

Passing laws and appropriating funds to support the development of uncrewed systems technology, which is creating extraordinary products and services with numerous economic and societal benefits throughout the Commonwealth.

Continued support of ODU's Virginia Institute for Spaceflight & Autonomy (VISA) located on the Eastern Shore and helping to grow the region's aerospace ecosystem through talent development, partnerships and applied research.

Funding to the VGSC for higher education scholarships, Building Leaders for Advancing Science and Technology program, Virginia Space Coast Scholars, Virginia Aerospace Science and Technology Scholars, Virginia Earth System Science Scholars, and the Commonwealth STEM Industry Internship Program – which impact nearly 2,000 students per year.

For your ongoing support of aerospace-friendly legislation in Virginia.

PHOTO CAPTIONS - Left to right: **1** - NASA Langley Open House 5K Moonwalk & Run participants enjoyed a sneak preview of NASA advanced aircraft and spacecraft. **2** - VIPC sponsored research conducted by VT MAAP, NAVOS air and Textron that led to the first ever FAA approved vertiport, in Blackstone, VA. **3** - Drone deliveries of prescription drugs on the Eastern Shore by Riverside Health, VISA/ODU, VIPC, DroneUp and ANPDC. **4** - High school students attending a VSGC academy at NASA Langley meet astronaut Roger Crouch. **5** - A child learns robotics and engineering using Cubelets at the NASA Langley Open House event.