Commercial Space

FAA's Office of Commercial Space Transportation (AST) licenses and regulates U.S. commercial space launch activities including launch and reentry of vehicles and operation of non-federal launch and reentry sites authorized by Executive Order 12465 and Title 51 U.S. Code, Subtitle V, Chapter 509 (formerly the Commercial Space Launch Act). Title 51 and the Executive Order also direct the U.S. Department of Transportation to encourage, facilitate, and promote U.S. commercial launches. FAA's mission is to license and regulate commercial launch and reentry operations and non-federal launch sites to protect public health and safety, the safety of property, and the national security and foreign policy interests of the United States.

FAA licenses launches or reentries carried out inside the U.S. and by U.S. persons (which includes U.S. corporations) inside or outside the United States. FAA does not license launches or reentries the U.S. Government carries out for the Government (such as those owned and operated by National Aeronautics and Space Administration (NASA) or the Department of Defense). Amateur-class rockets do not require an FAA license or permit.[12]

To accomplish its mission, FAA performs the following major functions:

- Maintains an effective regulatory framework for commercial space transportation activities,
- Provides guidance to prospective commercial operators on how to comply with regulatory requirements for obtaining an authorization and operating safely,
- Evaluates applications for licenses, experimental permits, and safety element approvals for launch and reentry operations and related commercial space transportation activities,
- Evaluates applications for licenses for launch and reentry site operations,
- Monitors and enforces regulatory compliance through safety inspections of launches, reentries, sites, and other regulated commercial space activities,
- Provides U.S. Government oversight of investigations associated with the mishap of an FAA authorized launch or reentry,
- Facilitates the integration of commercial space launch and reentry operations into other modes of transportation including the National Airspace System (NAS) by establishing appropriate hazard areas and limits to ensure the protection of the public,
- Coordinates research into the safety and operational implications of new technologies and the evolving commercial space transportation industry,

[12] Per 14 CFR Chapter 1, Part 1, section 1.1: Amateur rocket means an unmanned rocket that is propelled by a motor or motors having a combined total impulse of 889,600 Newton-seconds (200,000 pound-seconds) or less; and cannot reach an altitude greater than 150 kilometers above the earth's surface.

- Conducts outreach to the commercial space industry by hosting working groups and speaking at conferences,
- Collaborates with Government partners, such as the Department of Defense and NASA to assure consistent approaches to regulations, policy, and standards, and
- Conducts outreach to international counterparts to promote the U.S. regulatory framework across the world.

In addition to AST headquarters offices in Washington, D.C., AST maintains staff with assigned duty locations near active launch ranges to facilitate communication with space launch operators and to implement FAA's regulatory responsibilities more efficiently. AST personnel are currently assigned to duty locations near Kennedy Space Center and Cape Canaveral Space Force Station in Florida; Johnson Space Center in Texas; Wallops Flight Facility in Virginia; FAA's Western-Pacific Regional Office; Vandenberg Space Force Base, and the Mojave Air and Space Port in California. FAA also directly supports NASA's commercial space initiatives by providing on-site staff at both the Johnson Space Center and Kennedy Space Center to coordinate FAA's regulatory and compliance activities with NASA's development and operational requirements for commercial space.

FAA Regulatory Safety Oversight Activities

FAA supports commercial space oversight and operations throughout the regulatory process. There are many activities performed by FAA during this process. The most notable activities are described here.

Pre-Application Consultation for Licenses, Experimental Permits, and Safety Element Approvals

Prospective applicants seeking commercial space transportation licenses, experimental permits, or safety element approvals are required by regulation to consult with FAA before submitting their applications. During this period, FAA assists them in identifying potential obstacles to authorization issuance and determining potential approaches to regulatory compliance. In addition, many new operators are seeking to incorporate new technologies, vehicle types, or operational models creating opportunities for FAA to assist in determining the applicable regulations or approach to regulatory compliance.

Licenses, Permits, and Safety Element Approvals

FAA authorizes commercial space transportation activities via the issuance of licenses, permits, and safety element approval. Typically, FAA issues a license with a narrow scope to a single vehicle configuration and mission trajectory. With the dynamic commercial space industry, these

licenses are required to be modified to add additional vehicle configurations and mission profiles. FAA's new regulatory regime under Part 450 intends to allow flexibility by allowing authorization to conduct launch or reentry activities for various vehicle configurations and trajectories from multiple sites.

Within safety and oversight is the requirement to conduct both policy and payload reviews. When conducting a policy review, FAA determines whether the proposed launch, reentry, or site operation presents any issues that would adversely affect U.S. national security or foreign policy interests or be inconsistent with international obligations of the United States. If not otherwise exempt from review, FAA reviews a payload proposed for launch or reentry to determine whether the payload would jeopardize public health and safety, the safety of property, U.S. national security or foreign policy interests, or the international obligations of the United States. The policy and payload determination becomes part of the licensing record on which FAA's licensing determination is based.

FAA issues launch and reentry site operator licenses and license renewals. FAA coordinates with Federal, state, and local governments and with the commercial range operators or users for commercial space licenses and operations. As part of the evaluation of applications for launch licenses, reentry licenses, and site operator licenses, FAA also conducts environmental reviews consistent with its responsibilities under the National Environmental Policy Act.

FAA anticipates issuing a growing number of safety element approvals for space launch systems equipment, processes, technicians, training, and other supporting activities. FAA reviews, evaluates, and issues safety approvals to support the continued introduction of new safety systems, safety operations applications, and safety element approval renewal applications.

Safety Analyses

FAA conducts flight safety, system safety, maximum probable loss, and explosive safety analyses to support the evaluation and issuance of licenses and permits. FAA also evaluates and analyzes the performance of a vehicle operator's safety systems including safety-critical systems and any associated crew involved in the function of the safety system to determine how they affect public safety risk.

Inspections and Enforcement

FAA currently conducts as many as 750 pre-flight/reentry, flight/reentry, and post-flight/reentry safety inspections per year. Inspections often occur simultaneously at any of the 14 licensed commercial space launch sites, as well as at 4 Federal launch ranges and 3 exclusive use launch sites. The establishment of non-federal launch sites requires additional inspections in areas such as ground safety that have traditionally been overseen by the U.S. Air Force (now the U.S. Space

Force) at Federal ranges. At spaceports and launch sites with high launch rates (e.g., Cape Canaveral Space Force Station, Kennedy Space Center, and Vandenberg Air Force Base), at least 70 percent of inspections are typically conducted by locally based field inspectors. Currently, FAA intends to leverage a risk-based approach to respond to a dynamic operational tempo, minimize costs, and increase efficiency.

Mishap Investigations

Mishap events have demonstrated that FAA needs to have the capacity to oversee the investigation of at least two space launch or reentry mishaps or accidents simultaneously anywhere in the world, and to lead/oversee as many as nine investigations during a single year. FAA anticipates an increase in mishaps with new operators coming online. FAA reviews all applicant mishap plans and accident investigation procedures as part of the license and permit evaluation process.

NAS Integration

AST works in partnership with all FAA offices, notably the Air Traffic Organization (ATO) and Office of Airports (ARP), to support the safe and efficient integration of commercial launch and reentry operations through the NAS and its system of airports and air traffic managed by the ATO. Further, AST works with the ATO and the Airspace Modernization Office (AMO) as FAA develops technologies to facilitate safe and efficient integration of commercial launch and reentry operations through the NAS, including technologies to improve the integration of launch and reentry data into FAA air traffic control systems and technologies to improve the timely and accurate development and distribution of notices of aircraft hazard areas.

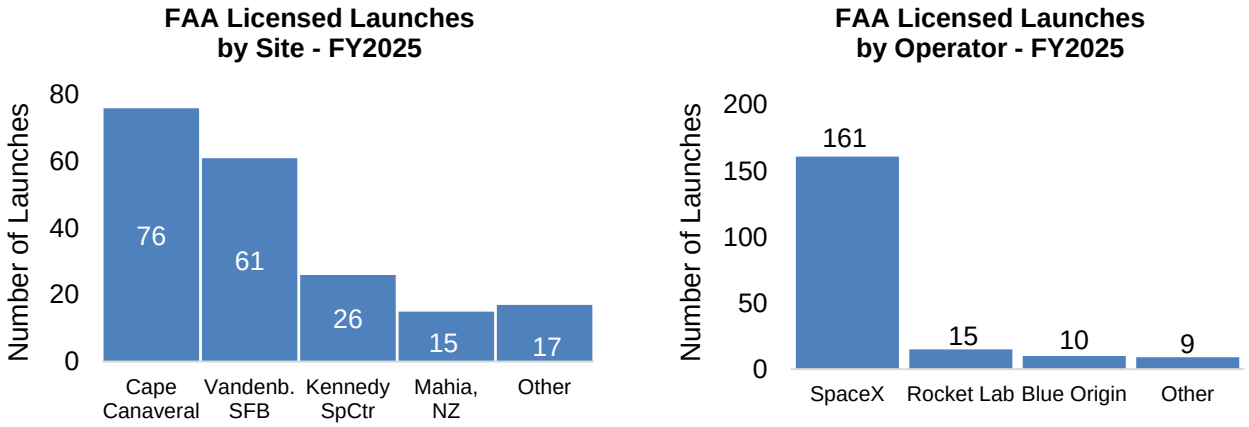
FY 2025 Results

Between 1989 and 2025, FAA licensed a total of 982 launches and reentries. Most of this activity has taken place in the past five years (2021–2025). During this period, FAA authorized 603 space operations, representing approximately 61.0 percent of all activity since 1989. In FY2025, launch and reentry operations reached 204, the highest annual total in U.S. history.

Most licensed launches occurred at a small number of sites. Of the 195 licensed launches in FY2025, 163 took place at one of four primary locations—three located in the United States and one international site. The leading U.S. launch sites were Cape Canaveral, Florida (76 launches); Vandenberg Space Force Base, California (61 launches); and Kennedy Space Center, Florida (26 launches). An additional 15 U.S.-licensed launches occurred at Mahia, New Zealand. The remaining 17 launches were distributed across three other sites. [13]

[13] Boca Chica, Texas; Van Horn, Texas; Mojave Air & Space Port, California.

The 195 licensed launches were conducted by six operators with Space Exploration Technologies Corporation (SpaceX) accounting for 83.0 percent of the total with 161 launches. The remaining 17 percent were carried out by Rocket Lab (15 launches), Blue Origin (10 launches), United Launch Alliance (4 launches), Stratolaunch (4 launches), and Firefly Aerospace (1 launch).



A total of nine licensed reentries occurred during FY2025. Four took place in the Pacific Ocean, three in the Gulf of America, and two at the Koonibba Test Range in South Australia. Seven of the nine reentries were conducted by SpaceX, while the remaining two were conducted by Varda Space Industries. Six of the nine reentries involved human spaceflight.

Launches supported a wide range of missions, with more than 68.0 percent of all missions involving deployment of satellite constellations. Other activities included space tourism, International Space Station crew and cargo transportation, lunar surface payload delivery, scientific research, and Earth observation.

In FY2025, eight licensed operations resulted in a mishap. The Federal Aviation Administration helps prevent commercial space launch mishaps by regulating public safety through licensing, oversight, and enforcement. Before issuing a launch license, FAA requires operators to perform detailed hazard analyses, demonstrate acceptable public risk levels, and implement approved flight safety systems. The agency reviews operational procedures, safety-critical systems, and trajectory analyses to ensure risks to people and property are minimized. If a mishap occurs, FAA can suspend operations and require corrective actions before allowing a return to flight, helping prevent repeat incidents.

Forecast

FAA's launch and reentry forecast is based on data provided by licensed operators and prospective applicants, linking projected activity directly to anticipated operations by commercial space transportation companies known to the agency.

To support government and industry planning — and to account for uncertainty in the pace of future activity — the forecast is presented as a range, including both low-case and high-case scenarios. These scenarios reflect potential variability in the timing and frequency of launches and reentries. The forecast encompasses all FAA-authorized commercial space operations, regardless of where the activities occur.

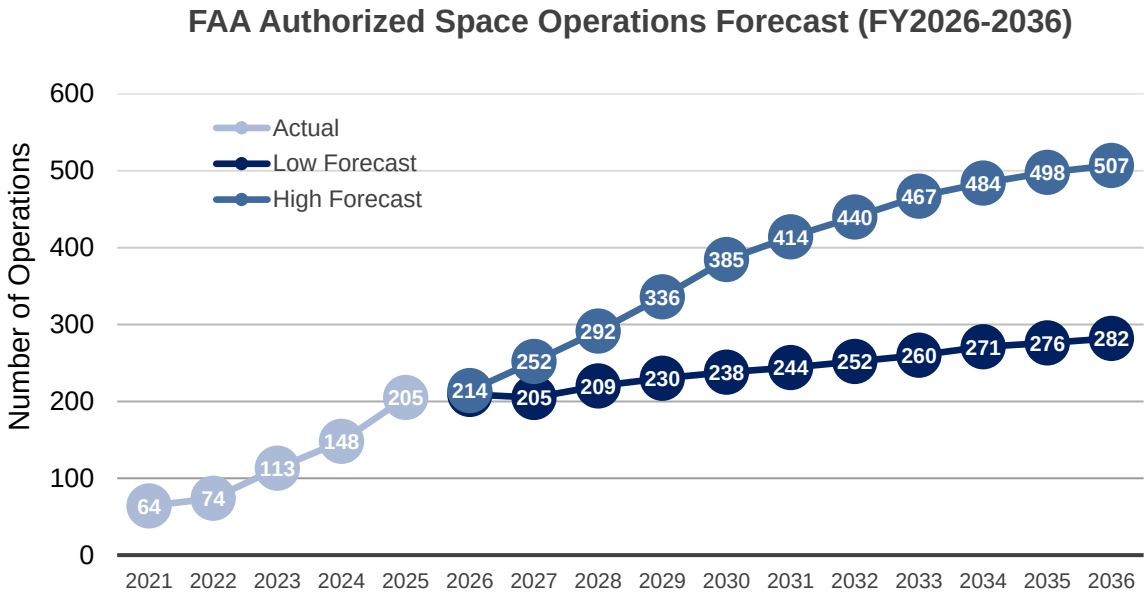
Outlook for FAA Authorized Space Operations

Under the high-case scenario, FAA projects 4,288 operations over the forecast period, rising from 214 operations in FY2026 to 507 in FY2036. The low case scenario has operations increasing from 209 to 282 over the same period, for a total of 2,687 operations over the forecast period. The projected growth reflects anticipated demand for cislunar missions such as satellite deployment and refurbishment, crew and cargo transportation, in-orbit servicing, assembly, and manufacturing (ISAM), development of lunar outposts, space tourism, and Mars settlement efforts. [14]

A comparison of the high-case scenario for the period FY2026–2034 from last year's forecast to the current outlook shows a net reduction of 545 operations. The reduction mainly reflects slower Mars colonization, a launch provider's shift toward missile defense, and a temporary pause in Blue Origin New Shepard operations until at least 2028.

By contrast, a comparison of the low-case scenarios from the prior forecast to the current forecast shows a net increase of 234 operations. This upward adjustment signals growing confidence in the commercial space sector, driven by routine rocket landings, sustained mission success, declining launch costs, expanding public-private partnerships, and the development of more defined revenue models.

[14] ISAM (In-orbit servicing, assembly, and manufacturing) is an emerging field within the aerospace industry that involves the use of robotic technology to perform tasks in space, such as repairing and maintaining satellites. Cislunar operations are those that would extend up to the Moon's orbit and may include commercial activities such as resource mining, placing satellites to enhance global communications networks, and providing lunar habitats as a base for scientific research and tourism.



Uncertainties in Forecasting Commercial Space Operations

The commercial space transportation industry is evolving rapidly. Growth driven by technological innovation and the emergence of new markets introduces increased complexity in forecasting launch and reentry operations. Several factors make predicting the number of launches and reentries in any given year particularly challenging. These factors include:

- a dynamic and changing list of companies conducting or planning launches,
- ongoing development and introduction of new technologies,
- variable launch rates for reusable launch vehicles,
- commercial spaceflight activities involving both government astronauts and private citizens,
- the evolving nature of flight test programs within an industry that has yet to scale operations,
- changes in regulatory requirements, whether loosening or tightening, and
- operational mishaps or anomalies.[15]

Together, these factors contribute to significant uncertainty in projecting commercial space transportation activity.

[15] New technologies [*e.g.*, reusable launch vehicles] allow a faster operational tempo, and at the same time, early use of these technologies can increase the probability of a mishap. The time between mishap investigations and subsequent "return to flight" for impacted entities can take months, drastically impacting launch plans.

Satellite Deployment

Many missions in the launch forecast involve initial satellite deployment and subsequent replacement as satellites reach the end of their operational life. Deployment timing can significantly affect forecast accuracy. For example, the FY2024 forecast included the launch of Boeing's V-Band constellation. Boeing surrendered their license for this constellation during that year, stating that surrendering their license was a business decision regarding spectrum allocation.[16]

The current forecast includes (but is not limited to) Amazon's Kuiper and SpaceX's Starlink. Kuiper deployment began in 2025, with full deployment expected by 2031 and replenishment starting in 2032. Starlink's LEO network reached full deployment at the end of 2025, with replenishment operations commencing the same year.

Changes to the List of Firms Intending to Launch

There is potential for additional launch service providers not currently included in this forecast to enter the market and begin operations. Conversely, one or more existing providers may exit the market during the forecast period. The roster of firms intending to launch remains dynamic, particularly as smaller providers face challenges in an increasingly competitive environment. New entrants encounter significant barriers to entry, including high development costs and strong competition from established providers offering reliable, frequent, and cost-efficient launch services.

Recent market developments highlight the sector's volatility. In 2023, Virgin Orbit filed for bankruptcy protection, ceased operations, and sold its assets to other aerospace firms. In November 2024, ABL Space Systems announced its withdrawal from the commercial launch market to concentrate on missile defense programs for the Pentagon. In January 2026, Blue Origin announced a pause in operations of its New Shepard vehicle to redirect resources toward its New Glenn rocket and human lander programs. Additional market realignments and operational shifts may emerge over the forecast period.

Move to Larger Launch Vehicles

Larger launch vehicles possess several key attributes that will enable operators to lower costs on a per launch basis. A brief description of these attributes as they pertain to Starship, New Glenn, and Terran R are provided below.

SpaceX is continuing development of its 398-foot rocket, Starship. Starship's first launch occurred in April 2023 and since then has conducted nine additional launches (as of September 2025).

[16] Klotz, Irene. "Boeing Relinquishes License For LEO Broadband Constellation." *Aviation Week Network*, October 30, 2023. https://aviationweek.com/space/commercial-space/boeing-relinquishes-license-leo-broadband-constellation.

Blue Origin's 320-foot New Glenn rocket successfully launched to orbit during its first test flight in January 2025, however the goal of recovering the reusable first stage booster during reentry was not achieved. The New Glenn was launched again in November 2025, and this launch was fully successful with the landing of the reusable first-stage booster on a recovery ship in the Atlantic Ocean.

Relativity Space is developing Terran R, a 216-foot rocket. The Terran R is not expected to be launched until late 2026.

Increased Payload Mass: Next generation launch vehicles such as the Terran R, New Glenn, and Starship are designed to significantly increase payload capacity to low Earth orbit (LEO). In reusable configurations, these vehicles are expected to deliver approximately 24, 45, and 150 metric tons, respectively, to LEO[17]

For comparison purposes, the Atlas V, an expendable launch vehicle, can carry up to 18.9 metric tons to LEO.[18] The newer systems therefore represent a substantial increase in lift capability.

***Increased Payload Volume*:** Heavy-lift vehicles are likely to lower overall mission costs on a per-kilogram basis by reducing the number of launches required to place a given payload into space. Larger launch vehicles provide greater payload volume, enabling the deployment of larger and more complex cargo in a single mission including satellites, spacecraft, telescopes, and other mission-critical hardware.

Achieving the same orbital capability with smaller rockets would typically require multiple launches, increasing operational complexity and expense.

Reusability of Launch Vehicles: Reusability of launch vehicles allows high-cost components to be flown multiple times, spreading fixed production costs across numerous launches and improving economic efficiency and is a key design feature of next-generation systems:

- **Starship** is intended to be a fully reusable launch vehicle, with projections of up to 100 flights before retirement. [19]
- **New Glenn** is designed with a reusable first stage with plans for a reusable second stage. The company is targeting at least 25 missions per vehicle, with a long-term goal of up to 100 missions. [20]

[17] Relativity Space. "Terran R." Accessed April 13, 2026.https://www.blueorigin.com/new-glenn; Accessed April 13, 2026; SpaceX. "Starship." Accessed April 13, 2026.

[18] Atlas V." Wikipedia. Accessed April 13, 2026. https://en.wikipedia.org/wiki/Atlas_V.

[19] Passant Rabie, "Buckle Up: SpaceX Aims for Rapid-Fire Starship Launches in 2025," *Gizmodo*, November 14, 2024.

[20] https://www.blueorigin.com/new-glenn; Accessed April 13, 2026 .

- **Terran R** will feature a fully reusable first stage, while its second stage will initially be expendable. The vehicle is expected to be capable of approximately 20 reuses in its initial design.[21]

***Increased Launch Frequency*:** Higher launch frequency enables faster payload deployment and supports a more rapid expansion of space-based infrastructure. By 2026, Starship is expected to support 25 launches per year versus New Glenn which is projected to reach 24 launches per year. Terran R has a goal of achieving 24 launches per year by 2028.[22]

Commercial Space Transportation Enters a New Era

The commercial space transportation sector is evolving at a rapid pace. In contrast to the past—when space activity was dominated by government agencies such as NASA and the former Soviet Union's space program—private companies are now driving growth in the global space marketplace.[23] Space data, products, and services provide tangible benefits and economic opportunities to people worldwide.[24]

SpaceX continues to lead the world with its launch cadence. During FY2025, SpaceX conducted 161 missions--45 missions over the previous year's total of 116--and is on track to surpass that total again. Since beginning operational launches in 2019, SpaceX has deployed approximately 10,000 satellites for its broadband constellation, Starlink.

In January 2025, Blue Origin launched the maiden flight of its heavy-lift, reusable, orbital launch vehicle, New Glenn. The inaugural mission reached orbit successfully, albeit the first-stage booster was lost after telemetry failed and it crashed into the ocean. A second launch in November 2025 successfully landed the booster on a barge in the Atlantic Ocean. New Glenn's third launch is scheduled for late February 2026.

Blue Origin reached a notable milestone in April 2025 when its fully reusable suborbital vehicle, New Shepard, carried an all-female crew of six on a mission to suborbital space. This mission was

[21] Relativity Space, "Relativity Space Shares Updated Go-to-Market Approach for Terran R, Taking Aim at Medium to Heavy Payload Category with Next-Generation Rocket," April 12, 2023. Accessed April 13, 2026.

[22] Space Launch Delta 45, https://www.patrick.spaceforce.mil/Resources/Environmental-Information/FileId/125061/. Using the pull-down menu under the heading "Completed NEPA Documents" select "2024 CCSFS Environmental Assessment for Relativity Terran R Launch Program.pdf." See Page 23. Accessed April 13, 2026.

[23] "The Future of Space: Economic Opportunities and Challenges | New Space Economy" Accessed April 13, 2026.

[24] NTD Newsroom, "Free Starlink Service Coming to Los Angeles Areas Hit by Wildfires, Musk Says," *NTD*, January 9, 2025, https://www.ntd.com/free-starlink-service-coming-to-los-angeles-areas-hit-by-wildfires-musk-says_1039603.html. Accessed April 13, 2026.

the vehicle's 11th crewed flight and 31st overall. Prior to announcing a pause in operations New Shepard completed 38 suborbital launches, 17 of which carried crew.

In March 2025, Firefly Aerospace became the first commercial company to achieve a successful Moon landing. Its Blue Ghost lander operated on the lunar surface for more than 14 days, the longest commercial lunar surface mission to date, before its solar-powered batteries were depleted.[25] During that time, the lander transmitted scientific data to Earth, deployed payload instruments, and conducted experiments.

Expanding Markets and Emerging Capabilities

The commercial space economy continues to broaden. In the near term, Vast Space aims to become the first private company to operate a commercial space station in low Earth orbit. Its planned station, Haven-1, is expected to launch by 2027 aboard a Falcon 9 rocket. Haven-1 will support research in life sciences, materials science, plant biology, biotechnology, and pharmaceutical development. .[26]

Over the near to mid-term, U.S. launch providers are investing in technologies to increase launch frequency and efficiency. Economies of scale and continuous operational improvements are driving down costs and improving reliability. These advancements are strengthening U.S. competitiveness while accelerating growth in space exploration, tourism, satellite deployment, and in-orbit servicing, assembly, and manufacturing (ISAM).

Looking further ahead—beyond the next decade—U.S. companies are planning crewed missions to Mars with the long-term objective of establishing a self-sustaining human presence. SpaceX's fully reusable launch system is designed to enable in-orbit refueling and transport both cargo and passengers to the Red Planet. Initial efforts would focus on building foundational infrastructure to support a commercial or mixed-use settlement. Realizing this vision, however, will require overcoming substantial technical, physiological, economic, regulatory, and logistical challenges, including launch safety, life-support systems, infrastructure development, and the high cost of interplanetary travel.

Taken together, these developments underscore that commercial space transportation has entered a fundamentally new era. What was once an experimental, government-dominated domain is now a dynamic, capital-intensive marketplace characterized by rapid innovation, aggressive competition, consolidation, and strategic realignment. Launch providers are scaling cadence, pursuing

[25] Firefly Aerospace, "Blue Ghost Mission 1," Firefly Aerospace, accessed April 13, 2026, https://https://www.google.com/search?q=fireflyspace.com/missions/blue-ghost-mission-1/.

[26] Vast, "Vast Announces Three Additional Payload Partners for the Haven-1 Lab: JAMSS, Interstellar Lab, and Exobiosphere," Vast Space, April 8, 2025, https://www.vastspace.com/updates/vast-announces-three-additional-payload-partners-for-the-haven-1-lab-jamss-interstellar-lab-and-exobiosphere.

reusability, and diversifying into defense, constellation deployment, and emerging in-space services, while weaker entrants exit or pivot in response to market pressures.

U.S. Position in Global Space Activity

The global space economy has expanded into a more than $500 billion annual industry, driven by the growing contributions of both government programs and private-sector enterprises in space exploration, satellite deployment, and related technologies. [27] According to *Global Space Industry by Country*, the United States accounts for approximately $130 billion of that total through its commercial space sector. The report highlights the United States' leadership across key indicators—including government investment, commercial activity, company participation, and launch frequency—surpassing the combined output of the next five largest space actors (China, Europe, Japan, India, and Russia) whose total contributions exceed $55 billion collectively.

U.S. leadership is particularly evident in the satellite sector. In 2024, the industry was valued at $293 billion, according to the Satellite Industry Association. [28] American companies produced roughly 83.0 percent of commercial satellites launched worldwide and captured 69.0 percent of global satellite manufacturing revenue. Of the 2,695 satellites deployed that year, the United States accounted for a 65.0 percent market share.

Together, these figures underscore the nation's continued dominance in satellite manufacturing, launch services, and supporting technologies, reinforcing its central role in shaping the global space market and sustaining its competitive advantage in the years ahead.

[27] New Space Tracker. "Global Space Industry by Country: Market Analysis 2025." Last modified January 23, 2025. https://newspacetracker.com/articles/global-space-industry-by-country. Accessed April 13, 2026

[28] Satellite Industry Association, *SIA President's Report - SIA News & Filings for May 2025*, (May 2025), https://sia.org/wp-content/uploads/2025/05/Presidents-Rep25-SIA-News-Page-May-FINAL-.pdf. Accessed April 13, 2026.