



UNITED ARAB EMIRATES
MINISTRY OF ECONOMY

INVESTING IN SPACE SCIENCE AND TECH IN THE UAE



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THE SPACE INDUSTRY CONSISTS OF THREE SEGMENTS

Civil



Non-defense-related government space activities, including launching and managing satellites, conducting research, and exploring the solar system.

National Security



The defense and intelligence sectors are commonly considered together as a “national security” sector.

Commercial



All space-related endeavors—including goods, services and activities—provided by private sector enterprises with the legal capacity to offer their products to nongovernmental customers. Commercial space efforts range from satellite communication to space tourism.

GLOBAL SPACE INDUSTRY OVERVIEW

- Sizing the global space economy is a complex exercise due to the **lack of a unified taxonomy and difficulties in setting up boundaries**. However, a report by PwC estimates the space economy market to be at **USD 371bn in 2020**.
- **The Space Foundation, on the other hand, reported that the global space economy rose to USD 447bn in 2020**, continuing a five-year growth. Commercial space grew **6.6%** in 2020, representing nearly **80%** of the space economy.
- Private investments in space grew by **30.5% in 2017**, as compared to 2016, and over the past 10 years, the average yearly growth of private industry revenue grew at an average rate of **9.6%**.
- In 2018, communications activities (related primarily to consumer television) comprised around **26%** of the total space economy. By 2040, this share is **predicted to grow to over 50%** as the use of satellite and other space-based technology for internet infrastructure comes into use.
- In 2019, government spending comprised around **20%** of the total global space economy, amounting to some **USD 87bn**.
- About **170 space start-up space ventures** attracted **USD 5.7bn total funding** in 2019, the year with the most amount of funding for the space industry.
- The global space economy market is expected to be at **USD 600bn in 2030**.

Global turnover of the space economy from 2009 to 2020 (in billion U.S. dollars)



Source
Space Foundation
© Statista 2021

Additional Information:
Worldwide; Space Foundation; 2009 to 2020

Source: PwC; Space Foundation

GLOBAL DIRECTIONS IN THE SPACE SECTOR VALUE CHAIN

Science	R & D	Manned Spaceflights	Exploration	Launch
<ul style="list-style-type: none"> Global trends have shown an increasing interest in space sciences and astronomy. Increasing interest in performing scientific experiments in space. Main research areas: discovering new space bodies and dark matter, learning from nature, life on other planets, impact of space weather and space environment. 	<ul style="list-style-type: none"> Programs for space technology transfer into other sectors due to the sector's interconnectedness with other vital sectors. Increasing requirement for dedicated and published R&D budgets in the public and private sector. Focus on: small satellites, launch, remote sensing, navigation, communications, robotics and energy. 	<ul style="list-style-type: none"> Increasing global interest from the public and private sector in this field. Especially in the areas of sub-orbital manned spaceflight and space tourism. Many countries are moving towards announcing manned spaceflights to Mars. 	<ul style="list-style-type: none"> Many countries are developing common strategies and missions for space exploration. Focus on: the space station, Moon, Mars, and asteroids. Global direction shows common strategies for robotic and manned spaceflights. 	<ul style="list-style-type: none"> Currently there are 10 launching nations (6 commercial). 80 satellite launches annually, 60% have been geostationary orbit (GEO) in nature. 90 launch vehicles currently available. COVID-19 crisis has provoked the slow-down of the majority of operational activities along the value chain resulting in the delay of launches. Developments: reusable vehicles, light weight cargo vehicles, heavy cargo vehicles, sub-orbital launch vehicles, horizontal launch, and launch from space.

GLOBAL DIRECTIONS IN THE SPACE SECTOR VALUE CHAIN

Ground Systems Manufacturing	Satellite Manufacturing	Applications and Value added	Operations of Ground Stations
<ul style="list-style-type: none"> ▪ The private sector controls the manufacturing of ground stations and networks, fixed systems and mobile devices systems. ▪ There is limited but fierce competition between manufacturing companies. ▪ Increasing interest in mobile devices systems (very small chips), also mobile devices for aircrafts, ships, vehicles, and integration with ground communications. 	<ul style="list-style-type: none"> ▪ Trends show gravitation towards the need for high technology cargo (especially for in-orbit services such as cargo delivery vehicles). ▪ There is an interest in small satellites and the pursuit to develop their utilisations and capacities. ▪ Mass production and the move towards unified standards and automation is of interest to the public and private space sectors. ▪ Operational and manufacturing activities have been impacted by COVID-19. 	<ul style="list-style-type: none"> ▪ Broadband, radio, remote sensing and navigation applications are dominating over space services and applications. ▪ Increased interest in broadband applications and navigation on vehicles and mobile devices of all kinds. ▪ Interest in the integration of space applications with ground applications for advancements in space tech. ▪ The renewal of several major space programmes, towards green economy for example, is expected to create new opportunities for space-based applications and services. 	<ul style="list-style-type: none"> ▪ Increase in the number of operations, control, and surveillance stations due to the increasing number of satellites and small satellites. ▪ The academic sector and amateurs have increased the utilization of small satellite stations. ▪ The US has the biggest capacities for space bodies tracking. ▪ Limited number of nations globally with capacities in deep space stations.



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GROWTH OUTLOOK FOR SPACE INVESTMENTS IN UAE

AED 3 billion (US\$ 816.75 million)
Space sector's added value in the UAE
(2021)

Over AED 22 billion (US\$ 5.99 billion)
UAE's investments in this sector (2019)

57
Space companies and entities currently
operating in the UAE

UAE's GDP spent on Space industry
in 2018 : **1.4%**

\$5.4 billion
Public-Private support for the UAE space
program

AED 190 billion (US\$ 51.7 million)
Public-Private support for the UAE space
program

SPACE INDUSTRY GROWTH ENVIRONMENT IN THE UAE

The space industry could become one of UAE's most promising sectors and a key pillar of economic growth over the next 50 years

- The UAE has spent years investing in space research and development, **founding its own space agency in 2014** after launching satellites in 2009 and 2013 developed jointly with South Korean partners.
- The UAE **spent USD 383 million on space in 2018**, beating Canada.
- The UAE's **first interplanetary mission successfully took off from Japan in July 2020**, sending a Mars probe called Hope aimed at studying the weather there.
- The UAE's government has **launched various campaigns to expand the country's STEM sector**, and it views its growing space program as an important part of that. Enrolment by UAE nationals in STEM university courses has been rising by around **12% a year**, six times faster than the overall trend in enrolment, with the increase highest in women.
- As of December 2020, the UAE had commissioned **14 spacecrafts**, 12 of which are currently operational. While half the fleet has telecommunication purposes, the other half is devoted to Earth observation, science and technology, or space exploration.



Pictured: Hope spacecraft



Pictured: Launch of Hope spacecraft

PRIVATE SPACE SECTOR IN THE UAE

The UAE's space strategy involves creating a vibrant private sector with local companies helping to boost the space economy

- Avenues for collaboration will **focus on enhancing partnerships with the private sector** by supporting the applications of Industry 4.0 and space innovation in a bid to boost the UAE's future economic development.
- The **UAE Space Agency** teamed up with **Virgin Galactic** to launch space tourism flights from the UAE. In 2019, the agency **signed an agreement with Al Ain Airport to use their facilities as a spaceport.**
- The **Mohammed bin Rashid Space Centre** teamed up with **UAE-based Strata** to develop parts for the MBZ satellite, the region's most powerful Earth-imaging satellite.
- At the International Astronautical Congress 2021, the UAE and Blue Origin agreed on developing a cooperation plan through which **Blue Origin will contribute to supporting and accelerating the strategies and plans of the Ministry of Economy regarding the space economy.**



AREAS OF SPACE ECONOMY THAT OFFER INVESTMENT POTENTIAL

Space Mining	Space Stations	Space Settlements	Space law	Space Sustainability and Recycling
<ul style="list-style-type: none">Space mining refers to the extraction of water and minerals, including rare metals, from celestial bodies.The UAE is taking steps to regulate mining for resources in space so private companies can retain full ownership of their spoils.	<ul style="list-style-type: none">Refer to spacecrafts where people can stay for a prolonged period of time in space.Currently, there is only one station operating- the International Space Station.Several private sector players, including Bigelow Aerospace and Axiom Space, are working on commercial space stations projects.	<ul style="list-style-type: none">Refers to the settlement of humans in space.Projects will include extensive planning of infrastructures such as governmental institutions and healthcare to name a few.The Mars 2117 Programme is part of the UAE's aims for space settlement.	<ul style="list-style-type: none">The governance involved in everything from settlement policies to the mining of celestial bodies.Federal Law No. 12 of 2019 on the Regulation of the Space Sector establishes the UAE's legal and regulatory framework for the space sector.	<ul style="list-style-type: none">Refers to the monitoring of waste in space to ensure the bioproducts of human activity in space do not threaten astronauts and satellites in space.Currently, there are global startups working on various models of satellites that will serve as a debris catcher.

Source: UAE Space Agency, Dubai Chamber of Commerce

AREAS OF SPACE ECONOMY THAT OFFER INVESTMENT POTENTIAL

Space Tourism	Space Companies	Space Academies	Space Manufacturing	Spacecraft Component Developers and Manufacturers
<ul style="list-style-type: none">▪ Refers to human space travel for recreational purposes.▪ The UAE is currently working with Jeff Bezos's Blue Origin to bring space tourism flights to the country.▪ The space tourism company was interested in setting up a spaceport in the UAE desert for suborbital flights.	<ul style="list-style-type: none">▪ Refers to companies that focus on flying people to space.▪ Virgin Galactic is the first publicly traded company focused on flying people to space as its primary business. The UAE will work with this company to launch space tourism flights from the UAE in the future.	<ul style="list-style-type: none">▪ Includes preparing astronauts for commercial flights and developing and manufacturing spacecraft components.▪ The UAE Space Agency is helping schools and universities with seed fund to start degree courses in space science, conduct summer camps, and open research centres.	<ul style="list-style-type: none">▪ Involves a comprehensive set of processes aimed at the production of manufactured goods in the space environment.▪ KhalifaSat is one of the most technologically advanced remote sensing observation satellites that was manufactured by a team of Emirati engineers from MBRSC.	<ul style="list-style-type: none">▪ Refers to the development and manufacturing of spacecraft components such as engines, steering systems, and communications systems.▪ AST SpaceMobile, Inc. is looking to the UAE for spacecraft component manufacturing.

Source: UAE Space Agency, Dubai Chamber of Commerce

NOTABLE SPACE VENTURES IN THE UAE

Emirati Interplanetary Mission - 2028

- The mission aims to explore the asteroid belt between Mars and Jupiter, the source of most meteorites that impact earth.
- It is designed to further accelerate the nation's space engineering, scientific research and exploration capabilities, and drive innovation and opportunity in the country's private sector.
- Built on the knowledge and experience gained from the Emirates Mars Mission (EMM), the new mission will involve significant participation from Emirati private sector companies.

Emirates Mars Mission (Hope Probe)

- The Emirates Mars Mission "Hope Probe" is the first probe to provide a complete picture of the Martian atmosphere and its layers when it reaches the red planet's orbit in 2021.
- Its objective is to help answer key questions about the global Martian atmosphere and the loss of hydrogen and oxygen gases into space over the span of one Martian year.

Emirates Lunar Mission - 2024

- The UAE aims to develop a lunar rover in the UAE and send it to the moon by 2024.
- The aim of the mission is to study various aspects such as thermal properties of the lunar surface and the formation and components of the lunar soil.
- The project aims to pave the way for discoveries that can contribute to the development of science and specialised high-precision technologies in the space sector.

The Mars 2117 Programme

- The Mars 2117 Programme aims to establish the first human settlement on Mars in the next century.
- The project aims to build the knowledge and scientific capabilities that will enable the UAE to build the Mars Science City and explore Mars to address the challenges of food, water, and energy security on Earth.

INITIATIVES FOR THE GROWTH OF SPACE IN THE UAE

Space Economic Zones Program

- The UAE Space Agency and Masdar will establish the nation's first Space Economic Zone in Masdar City to create an integrated business ecosystem to propel startups and SMEs.
- It is the first of many space-tech hubs the UAE Space Agency will launch to create a competitive private sector.
- The objective of this initiative is to enhance the competitiveness of companies operating in the space economy, which contributes to enhancing the demand for space applications and services as well as to stimulate innovation and growing the sector's economic contribution to the country's non-oil GDP.
- Businesses will be offered an integrated package of benefits including incubation, office space, mentorship, networking, investment opportunities, priority access to government contracts and closer cooperation with leading global research centres.

National Space Strategy (NSS) 2030

- The National Space Strategy 2030 aims to enhance the space sector's contribution to the national economy and promote the UAE's regional and international presence in the space sector.
- The strategy sets the general framework for UAE's space industry and activities for the years leading up to 2030, including government activities related to space, commercial activities, scientific activities carried out by the public and private sectors and academic institutions and research and development centres.
- The National Space Strategy aims at achieving the UAE's vision in the field of space exploration, technologies and applications. It also constitutes one of the pillars of the regulatory framework for the space sector in the country.

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Source: UAE Government Portal, UAE Space Agency

INITIATIVES FOR THE GROWTH OF SPACE IN THE UAE

Space Investment Promotion Plan

- The initiative aims to develop a space related industry eco-system in the UAE and support the development of technologies that will create spin-off, and access to space data.
- The initiative will increase the UAE space sector's contribution to the diversification of the national economy towards a knowledge based economy through growing the number of new companies and job opportunities, encourage international companies to choose the UAE for its headquarters and activities, and establish the UAE as a regional hub for space.
- The Promotion Plan intends to attract students in STEM and create a highly skilled human capital force that could be beneficial to all UAE industries and increase R&D activities.
- The initiative will also promote partnership at national and international levels by increasing the UAE's visibility on the worldwide space arena.

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Mohammed Bin Rashid Space Centre Strategy 2021-2031

- The MBRSC Strategy 2021-2031 is the centre's ten-year roadmap and a way for it to strengthen its international competitiveness through new collaboration and the development of new national capabilities.
- The strategy focuses on space exploration and technology and covers six key programmes: Hope Probe, Mars 2117, the UAE Astronaut Programme, the UAE Satellite Programme, and the UAE Space Sector Sustainability Programme, as well as the latest Emirates Lunar Mission.



Source: UAE Space Agency, European Space Policy Institute

INITIATIVES FOR THE GROWTH OF SPACE IN THE UAE

National Space Programme

- The UAE launched the National Space Programme under which the UAE will prepare Emirati cadres specialised in airspace sciences.
- The Programme oversees the realisation of the first scientific city on the Red Planet as part of the 2117 Mars programme.
- It will launch the Arab Space Discovery Programme, which intends to transfer knowledge and expertise in space sciences in collaboration with the Arab universities and institutions to benefit from Arab minds and to set common scientific plans for space discovery.



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UAE Astronaut Programme

- The UAE Astronaut Programme was launched in 2017 to train and prepare a team of Emiratis to be sent to space for various scientific missions.
- The Programme aims to contribute to scientific exploration missions by developing the first Emirati astronaut corps and strengthen the UAE's position internationally in the space sector through contributing to manned space missions.



Source: UAE Space Agency, UAE Government Portal

LEGAL AND REGULATORY FRAMEWORKS FOR SPACE SECTOR IN THE UAE

Federal Law No. 12

- Federal Law No. 12 of 2019 on the Regulation of the Space Sector establishes the UAE's legal and regulatory framework for the space sector.
- Federal Law No. 12 translates the international treaties and measures adopted at UNCOPUOS into UAE national law.
- The law defines the competencies of the UAESA and enables the commercial use of space by setting the rules for licensing, the registration of space objects, space debris mitigation, and liability insurance.

UAE Space Court

- In January 2021, a space court was established in Dubai, aimed at settling commercial disputes in the space sector.
- Beyond the creation of a court, this move was part of the Dubai International Financial Centre (DIFC) Courts, and the Dubai Future Foundation (DFF) new global initiative called the Courts of Space.
- The initiative was tasked with creating an international working group of public and private sector experts to explore legal issues in the space sector and provide input to help create a judicial system to keep pace, offering assurance and certainty to support and protect commercial space companies.
- Experts will also help create a Space Dispute Guide consisting of proposals to resolve space-related disputes.
- The Dubai space court will be open to Emirati and foreign companies.



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Source: European Space Policy Institute



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ECO SYSTEM COMPONENTS – INSTITUTIONAL FRAMEWORK



- The **Mohammed bin Rashid Space Center (MBRSC)** is the scientific and technological hub of the UAE. Its activities revolve around scientific research and exploration, satellite and space systems development, satellite imagery, ground station services, observation, and remote sensing.
- The MBRSC aims to compete with developed countries in the field of advanced sciences and in making scientific discoveries and contribute to enhancing the UAE's standing as a leading international hub for space sciences and technologies.

ECO SYSTEM COMPONENTS — RESEARCH CENTERS



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جامعة خليفة
Khalifa University

**NORTHROP
GRUMMAN**

- The **Yahsat Space Laboratory (YSL)** was established by Khalifa University, Al Yah Satellite Communications Company (Yahsat), UAE Space Agency, and Northrop Grumman to support the first multidisciplinary academic space program in the UAE.
- The laboratory's mission is to develop UAE space technologies and provide students with the opportunity to develop and launch Cubesats.



- The **National Space Science and Technology Center (NSSTC)** has been established jointly by UAEU, the UAE Space Agency and the Telecommunications Regulatory Authority.
- The creation of the NSSTC was primarily motivated by UAEU's desire to strengthen its role and contribute to the needs of the nation in terms of Space Science and Space Technology in order to become the Space Science and Technology hub for the region.
- The main focuses of the NSSTC are on research and development, higher education, and community outreach.
- The center's priorities are three-fold: excellence in Space Science, leadership in Space Technology, and providing innovative solutions to social challenges.

ECO SYSTEM COMPONENTS — RESEARCH CENTERS



- The **Sharjah Center for Astronomy & Space Sciences (SCASS)** is affiliated with the University of Sharjah.
- The Center aims at developing and promoting education about astronomy and space sciences in the Arab World in general and the UAE in particular in order to be a destination for science, research, heritage, and education.
- Their research is divided into astrophysics, space sciences, and space technology with specific curricula focusing on the Mars atmosphere and geology, spectrometry, GIS and remote sensing, renewable energy, space robotics, and life support systems.

INCUBATORS AND ACCELERATORS



- The Mohammed Bin Rashid Space Centre (MBRSC) has announced the launch of Space Ventures, a launchpad for global and regional startups in the space sector.
- The purpose-built ecosystem enables businesses to collaborate with MBRSC on long-term projects, gain access to technology and support, and receive aid in communicating with regulatory agencies around the world in order to achieve viability and long-term growth.



- The UAE NewSpace Innovation Program is a joint initiative by the UAE Space Agency and Krypto Labs to accelerate the growth of four tech businesses in the field of NewSpace.
- The program is a 3-month incubation and acceleration program open for ground breaking entrepreneurs, startups, university students and staff, and small and medium-sized enterprises, to transform their space-related ideas and/or MVPs into commercially viable and scalable market-ready products.

EVENTS BY THE UAE GOVERNMENT IN SPACE SECTOR

Illustrative, non exhaustive



- Hosted by the UAE Space Agency, the Global Space Congress brings together over 600 key space agencies, commercial space, academia and end users of space services to evaluate the biggest opportunities in the space sector and to get exposure to the world's most vibrant and energetic new space programmes.



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SPACE SECTOR GOVERNANCE



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<https://www.moec.gov.ae/en/home>

- The UAE Ministry of Economy was established in accordance with Federal Law No (1) of 1972.
- The Ministry set out an growth vision aiming to achieve an internationally competitive and diversified economy driven by efficient and knowledgeable UAE nationals.
- The ministry plays a major role in facilitating and enabling business landscape and formulating business-friendly policies that would consolidate the UAE's reputation as a regional and global business hub.

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<https://space.gov.ae/>

- The UAE Space Agency (UAESA) is a federal agency that was created under Federal Law by Decree No. 1 of 2014 and works in line with the Council of Ministers.
- The Agency aims to encourage, develop, and promote the importance of space activities. Its mission is to organize, supervise, and manage the UAE space sector.
- The Agency has the mandate to grant authorization for space activities, finance projects, represent the UAE, conclude bilateral or international programmes, and provide support and guidance to the space programmes.

SPACE SECTOR GOVERNANCE



<https://tdra.gov.ae/>

- The Telecommunications and Digital Government Regulatory Authority is the federal telecommunications regulatory agency of the United Arab Emirates since 2003.
- The TDRA enacts regulations for the space sector, specifically in the domain of satellite networks and the launching of space satellites.