

# Japan's Space Policy and Law for Lunar Resource Development

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March 9, 2026

National Space Policy Secretariat  
Cabinet Office, Government of Japan

# Agenda

- I. Japan's Space Policy Overview for Lunar Resource Development**
- II. Study on the Architecture for Lunar Activities**
- III. Japan's Initiatives for Space Resource Activities**

Part I

# **Japan's Space Policy Overview for Lunar Resource Development**

# Government Structure on Space Policy



## Outer Space Development Strategy Headquarters

- Chief: Prime Minister
- Deputy Chiefs: Chief Cabinet Secretary and Minister of State for Space Policy
- Members: All Ministers of State Other than the Chief and the Deputy Chiefs



Minister ONODA

Prime Minister TAKAICHI

-Basic Plan on Space Policy recommendations  
-Implementation Plan (annually)

Committee on National Space Policy



National Space Policy Secretariat (NSPS)

Minister of State for Space Policy

Quasi-Zenith Satellites System Strategy Office

### Cross-governmental Cooperation



National Research and Development Agency  
**Japan Aerospace Exploration Agency**

CSICE: Cabinet Satellite Intelligence Center  
MLIT: Ministry of Land, Infrastructure, Transport and Tourism

MAFF: Ministry of Agriculture, Forestry and Fisheries of Japan

MOE: Ministry of the Environment

MOD: Ministry of Defense

MIC: Ministry of Internal Affairs and Communications

MEXT: Ministry of Education, Culture, Sports, Science and Technology

METI: Ministry of Economy, Trade and Industry

MOFA: Ministry of Foreign Affairs of Japan

NPA: National Police Agency

# The 5th Basic Plan on Space Policy (June 2023)

- **Human activities are expanding into outer space in earnest, the space system contributes to solving various issues on the earth as well as to strengthening security-related efforts.**
- **As the economic and social transformation brought about by activities on the frontier of space (i.e., **space transformation**) is becoming a global trend, Japan needs to **maintain and strengthen its independence in space activities and lead the world.** To realize this, the Basic Plan on Space Policy was revised on June 13<sup>th</sup>, 2023.**

## Goals and Future Vision

(1) Ensure **Space Security**

(2) Ensure **national resilience**, tackle **global-scale issues** and achieve innovation

(3) Create new knowledge and industries in **space science and exploration**

(4) Strengthen **the industrial base** to support space activities

To make the space industry a **growth industry in the Japanese economy**, we aim to **double its market size from 4.0 trillion yen in 2020 to 8.0 trillion yen in the early 2030s.**

## Basic Principles for Space Policy Promotion

(1) Implement policies for actual deployment in missions such as those of **security**, **space science and exploration** as well as **commercialization**

(2) Strengthen technology R&D based on the "**Space Technology Strategy**"

- Implement a cross-sectional study of security and civilian sectors. Strengthen the supply chain

(3) Strengthen **international partnerships with allies, like-minded countries and others**

- Formulate international norms and rules, and promote international cooperation utilizing Japan's strengths, etc.

(4) Support and develop **internationally competitive companies** in a strategic manner

- Support R&D of advanced technologies and private sector-led projects

(5) Strengthen JAXA's role and functions as a **core agency for space development**

- Strengthen **JAXA's** strategic and flexible **funding capabilities**, making it a nodal point for industry, academia and government

(6) Use human, financial and other resources in an **effective and efficient manner**

- **Effective and efficient use of resources based on the "Implementation Plan" and the "Space Technology Strategy"**

## Specific Approaches to Space Policy

# Outline of Space Technology Strategy

- Based on the Basic Plan on Space Policy, we enacted the new **Space Technology Strategy that includes technology roadmaps** for technologies that Japan should develop across the security and civil sectors, which is regularly reviewed and updated.
- The relevant ministries and agencies use this strategy as a **reference for their budget requests and budget executions**, including the **Space Strategy Fund**, which aims to support of 1 trillion yen (about \$6.3B or €5.4B※) over a 10-year period.  
※exchange rate: 1\$=159yen, 1€=185yen (As of January 2026)
- In order to ensure Japan's autonomy in space activities, Japan will promote technological development that contributes to 1) strengthening Japan's **technological superiority**, 2) ensuring the **supply chain autonomy**, etc.

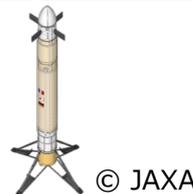
## Satellites



## Space Science & Exploration



## Space Transportation

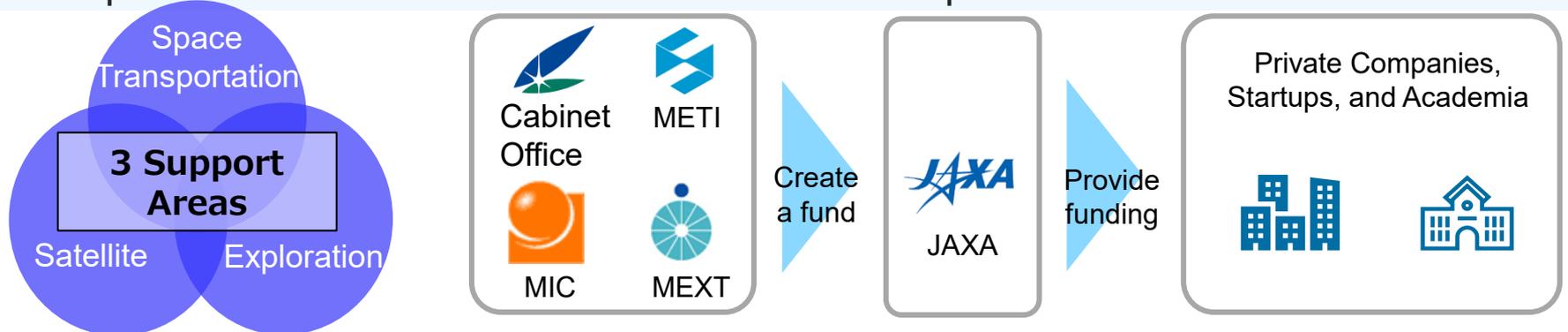


## Common Technologies



# Outline of Space Strategy Fund

- In 2023, Japan established the **Space Strategy Fund** at JAXA, fostering Japanese space policy and activities. This fund enables Japan-based private companies, including startups and non-space-related companies, and academia to further engage in research and development.
- With the target of about **1 trillion yen** (about \$6.3B or €5.4B※) to be reached as soon as possible, the current funding is 0.8 trillion (about \$5B or €4.3B) yen as of 2025. Japan began selecting companies and research institutions in 2024.  
※exchange rate: 1\$=159yen, 1€=185yen (As of January 2026)
- This fund currently supports **65** research and development themes and would plan to expand them for the other research and development themes in the future.



Part II

# Study on the Architecture for Lunar Activities

# Introduction (1/2)

- **The Basic Plan on Space Policy (the Cabinet Decision on June 13, 2023) states**, “In developing and demonstrating the technologies necessary for lunar activities with a view to expanding the area of sustainable human activities and building a new market, **the government and JAXA**, the core agency for space development, **will proceed with the study of the architecture for lunar activities**, while taking into account the progress of the Artemis Program, etc., and will conduct benchmarking of technology development on a regular basis, without delay, to materialize the R&D process with a view to space demonstration and introduction.”
- Therefore, **we have conducted studies through commissioned research with experts and stakeholders from industry, academia, and government on lunar activities in FY2023 and FY2024.**
- In doing so, we summarized an overview of Japan's lunar surface development projects, including JAXA's technology development and exploration projects, projects related to communications and positioning, energy, unmanned construction, and food technology development under the Stardust Program (Strategic Program for Accelerated Space Utilization), the SBIR project (Small/Startup Business Innovation Research), as well as the latest domestic and international trends and specific examples of future lunar surface activities.

# Introduction (2/2)

- Based on this, we examined hypotheses on what kind of overall architecture and realization scenario should be assumed when stakeholders consider future lunar activities, exploration, technological development and demonstration, etc., focusing on their contribution to the international community.
- This document reports the status of **the study on the “Architecture for Lunar Activities”** and is intended as a tool for further discussion with a wider range of stakeholders, both domestic and international. Benchmarking of specific policies and technological developments will be based on the Implementation Plan of the Basic Plan on Space Policy and the Space Technology Strategy, which will be revised periodically.

# Hypotheses for Predicting Future Lunar Activities (1/2)

- As a prerequisite to be considered for an examination, we set up a hypothesis that contributes to the development of the lunar industry(\*).

\*To envision sustainable activities on the Moon, the assumption is that country-specific lunar exploration efforts, resource exploration results, and innovative transportation cost reductions will diverge in a positive direction.

	Factors that influence the consideration of contributing fields	Assumptions (prerequisites) for this consideration
Exploration Trends	<ul style="list-style-type: none"> <li><b>Whether or not to continue the lunar exploration program with international cooperation</b> <ul style="list-style-type: none"> <li>Artemis Program, ILRS</li> </ul> </li> <li>Country-specific lunar exploration programs other than the above</li> <li>Activities of private companies in Japan and overseas                             <ul style="list-style-type: none"> <li>ispace, Astrobotic, and others</li> </ul> </li> <li><b>Manned scientific and exploration activities on the Moon</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Continuous progress of internationally-cooperative and country-specific exploration programs</b></li> <li>Continuation of activities of private companies in Japan and overseas</li> <li>(As a result of the continuation above) Increased frequency and reduced cost of Earth-Moon transportation services</li> <li>Development of manned scientific and exploration activities</li> </ul>
Value of the Moon	<ul style="list-style-type: none"> <li>Whether or not there have been any changes due to the progress of lunar exploration</li> <li>No possibility of change: the closest celestial body to Earth and the vastness of space</li> <li>Possible changes: <b>amount of water resources</b> and soil quality</li> </ul>	<ul style="list-style-type: none"> <li><b>Identified existence of water resources that can be extracted and used</b></li> </ul>
Laws and Regulations	<ul style="list-style-type: none"> <li><b>Establishment of rules, laws, and regulations for lunar activities</b> (with or without restrictions on commercial activities)                             <ul style="list-style-type: none"> <li>International trends: UN, Artemis Accords, and other trends</li> <li>Domestic Trends: Space Resources Act and other legal systems</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>No international laws or regulations imposed that restrict commercial lunar activities</b></li> </ul>
Infrastructures	<ul style="list-style-type: none"> <li>Construction and availability of key infrastructures required for lunar activities                             <ul style="list-style-type: none"> <li>Communication</li> <li>Positioning, electric power, and other facilities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Progress in infrastructure construction based on international cooperation. Infrastructures available for Japan for lunar activities (shared with other countries, some of which may be constructed by Japan)</li> </ul>

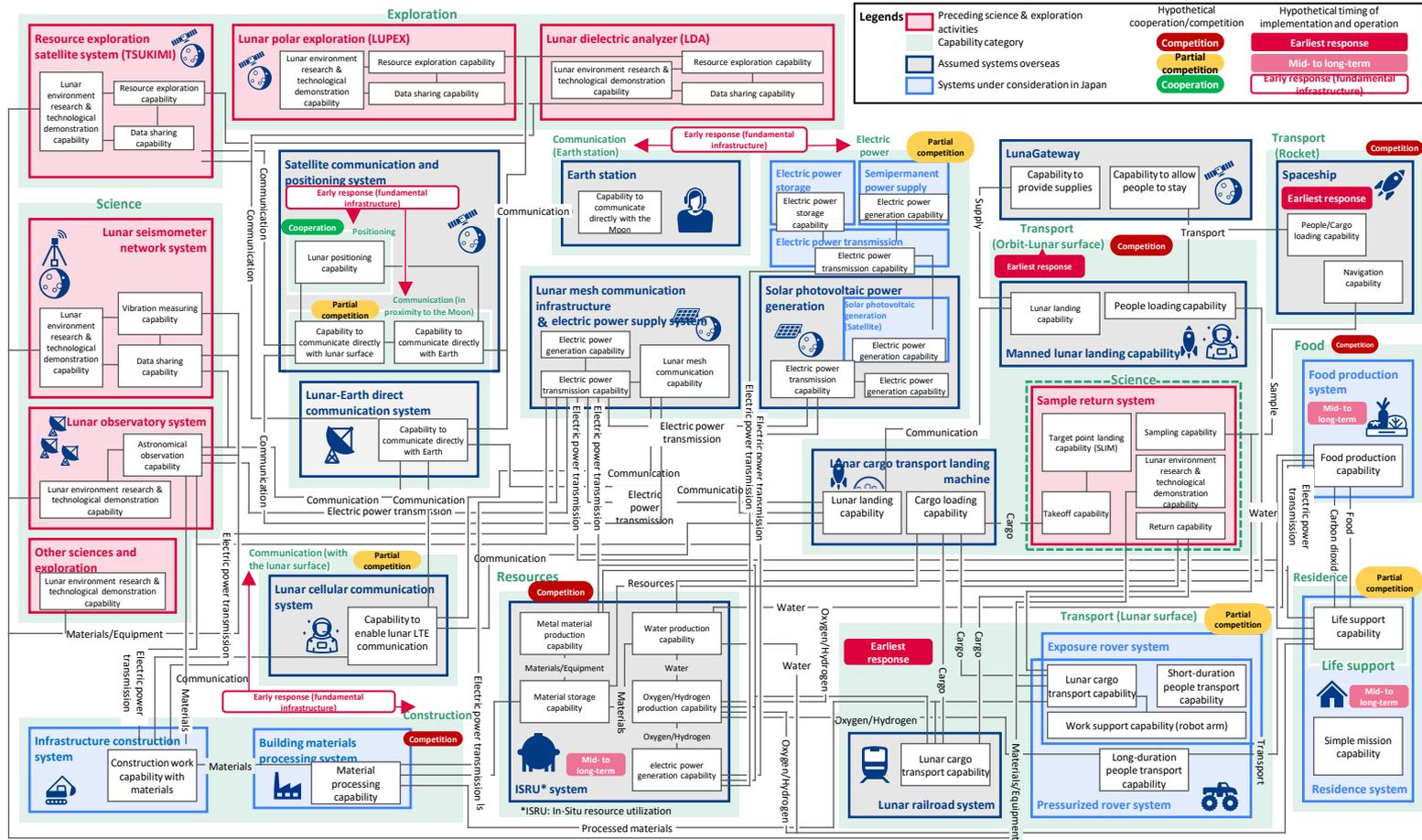
# Hypotheses for Predicting Future Lunar Activities (2/2)

- In order to predict the future of lunar activities and the fields in which Japan will contribute and with reference to international roadmaps and other sources, the assumption is that the private sector will begin industries to promote and provide tourism, deep space, and rockets that travel beyond the Moon in the 2040s and onward.

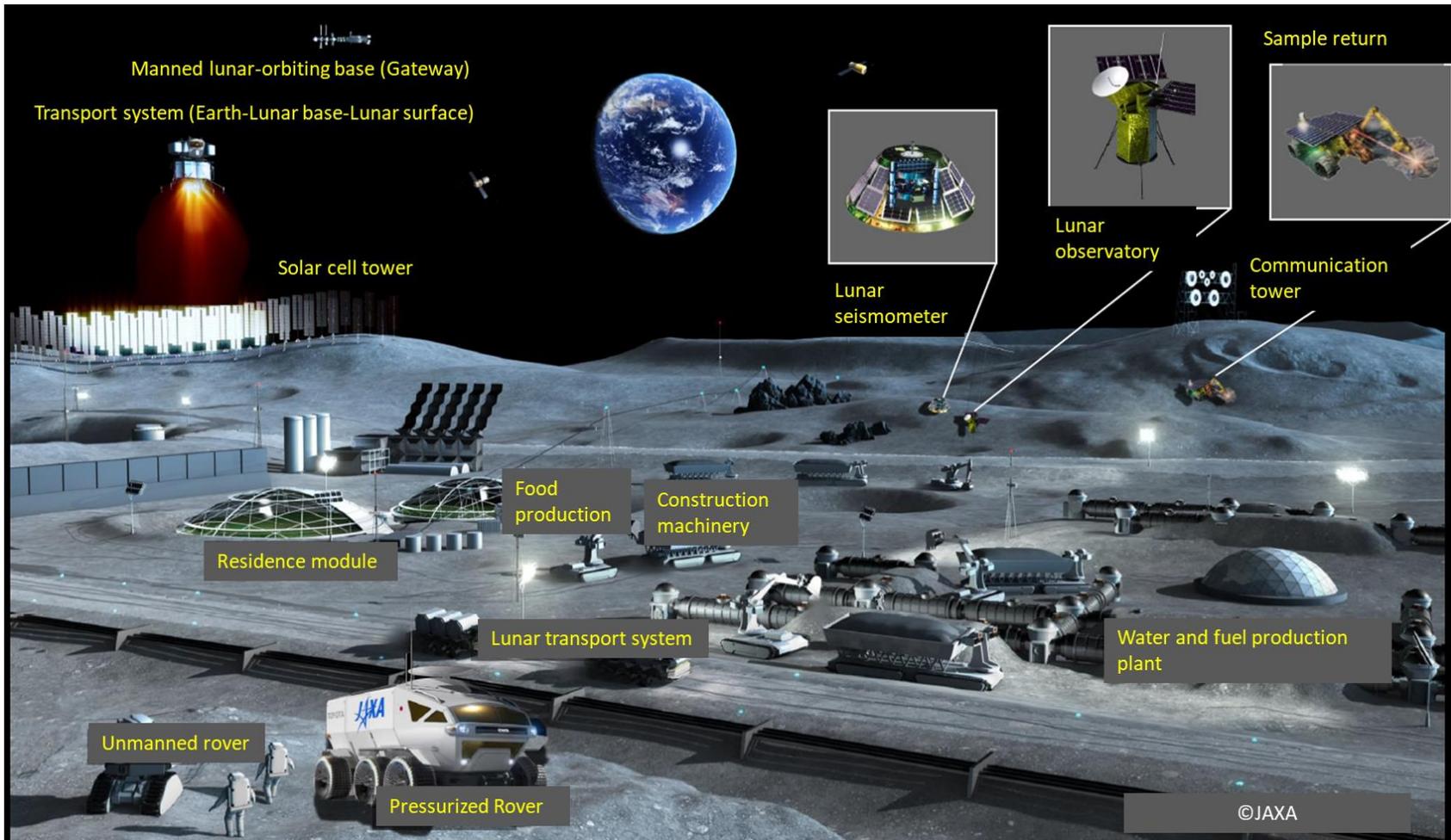
\* ISECG (International Space Exploration Cooperative Group of 27 space agencies)

Age	(1) Dawn (first half)	(2) Dawn (middle)	(3) Dawn (second half)	Assumed age of this consideration		(5) Maturity
	Second half of 2020s	First half of 2030s	Second half of 2030s	2040s and onward		-
<b>Main Programs</b>	ISECG Roadmap: Phase 1 Artemis II to Artemis IV	ISECG Roadmap: Phase 2A Artemis V to Artemis VII and later	ISECG Roadmap: Phase 2B	ISECG Roadmap: Phase 3 (No explicit age given on the roadmap)		-
<b>Assumed Ages for LunA-10</b>	Exploration Age/Foundation Age (The age of self-sufficiency considered to be a prerequisite and technological demonstration and the age of large-scale mobility and MVE-level demonstration)	Industrial Age (The age when large-scale cargo transport, investment recovery, and ISRU* are in full operation)	Jet Age (and Beyond) (Oxygen production of 100 tons per month, multi-site (equator + poles) activities, and reduction of oxygen transported from Earth begin)			-
<b>Possible Future Lunar Activities (Use Cases)</b>	Scientific and exploration activities on the lunar surface using unmanned vehicles (satellites, rovers, landers, and other installed equipment)					
	Scientific and exploration activities on the lunar surface by astronauts			Propellant supply for entities conducting scientific and exploration activities in deep space		
				Tourism on the Moon by civilians (non-astronauts)		
<b>Status of Activities</b>	<p>Government demand</p> <ul style="list-style-type: none"> <li>Still in the very early stages at the dawn of a new age, activities are centered on unmanned aircraft.</li> <li>In addition, short-term manned exploration begins.</li> </ul>	<p>Government demand</p> <ul style="list-style-type: none"> <li>In the middle of the dawn of a new age, implementation and demonstration of infrastructures, mobility, and bases as the basis for future lunar activities are being promoted.</li> </ul>	<p>Government demand</p> <ul style="list-style-type: none"> <li>In the latter half of the dawn of a new age, manned lunar exploration activities are in full operation.</li> <li>Implementation and demonstration of infrastructures, mobility, and bases as the basis for future lunar activities are being promoted.</li> </ul>	<p>Government demand</p> <ul style="list-style-type: none"> <li>During the growth phase, infrastructures and facilities are established and expanded for long-term stays by astronauts.</li> <li>Following the astronauts, civilians (such as wealthy tourists) begin to visit.</li> </ul>	<p>Private demand</p>	<p>Government demand</p> <ul style="list-style-type: none"> <li>During the maturity phase, the lunar industry further develops and the lengths of stay and the numbers of people on-site increase.</li> <li>The numbers of civilians staying and coming/going (such as tourism by wealthy people) increases.</li> </ul>
<b>Number of People on the Moon</b>	4 people or more			40 to 100 people		Hundreds of people or more
<b>Attributes of People</b>	Astronauts	Astronauts	Astronauts, industrial workers (related to infrastructures etc.)	Astronauts, industrial workers (related to infrastructures workers etc.), civilians		Astronauts, industrial workers (related to infrastructures, tourism, etc.), civilians
<b>Bases of Manned Exploration</b>	Gateway (+ Antarctic lander)	Gateway (+ Antarctic lander)	Gateway + Antarctic base	Gateway + Antarctic base + Several bases over a wide area		Gateway + Antarctic base + Many bases over a wide area
<b>Scope of Activities</b>	Around the lunar South Pole (Lander)	South Pole (Lander) + several hundred to several thousand kilometers around	Lunar Antarctic base + approx. several thousand to tens of thousands of kilometers around	Lunar South Pole base, several bases + approx. several thousand to several tens of thousands of kilometers around		Lunar South Pole, many bases + approx. several thousand to tens of thousands of kilometers around
<b>Length of Stay/Frequency</b>	Up to 14 days (daytime: no overnights)/Once a year	14 to 42 days (daytime + nighttime + daytime: 1 overnight)/Once a year		Several hundred or more days (long stay)/Several times a year		Several years/Several times per year

# Proposed Lunar Activities Architecture



# Image of Possible Lunar Activities



# Part III

## **Japan's Initiatives for Space Resource Activities**

# International Trends in Space Resource Activities: Status of Activities by Countries

- Countries are planning and conducting a variety of space resource activities related to the Moon and asteroids.

March 2026

Major Lunar Exploration Programs		Projects Related to Space Resources
<p>U.S.</p> 	<p><b>Artemis Program</b> (International cooperation for sustainable lunar exploration and crewed Mars missions) / Moon to Mars, LunA-10, etc.</p>	<p>1969 - 1972: Apollo Program - lunar exploration and sample collection 1994: Launch of Clementine spacecraft, global lunar mapping 2020: NASA selects 4 companies including ispace for lunar resource commercial contracts 2023: OSIRIS-REx's sample return from an asteroid <b>2028 - : Artemis Program - aiming for lunar exploration and sample acquisition</b></p>
<p>Russia</p> 	<p>2016–2025 Federal Space Program / Cooperating with the International Lunar Research Station (ILRS) (China)</p>	<p>1959–1976: Luna Program – lunar exploration and sample return (USSR) 2029: Luna 27 – aiming for regolith drilling and analysis 2030: Luna 28 – aiming for sample return of 2 kg of drilled regolith 2030s: Aiming for space resource utilization targeted within ILRS</p>
<p>EU</p> 	<p><b>Cooperating with the Artemis Program (U.S.) /</b> Habitat modules, Lunar communication and navigation constellation (Moonlight Programme)</p>	<p>Cooperating with U.S. Artemis Program (U.S.) : Participating in logistics supply for astronauts, standalone robotic technology demonstrations, and lunar return missions</p>
<p>China</p> 	<p>Chang'e Program (Lunar exploration and long-term human stay plans) / International Lunar Research Station (ILRS)</p>	<p>2020: Chang'e 5 successfully returns lunar soil samples 2024: Chang'e 6 returns soil samples from the lunar far side 2026: Chang'e 7 aims for south polar drilling with a rover, etc. 2028: Chang'e 8 aims for in-situ resource utilization (ISRU) experiments in south pole <b>2030s: Aiming for resource utilization activities within ILRS</b></p>
<p>India</p> 	<p>Chandrayaan Programme (Lunar Exploration Missions) / <b>Cooperating with the Artemis Program (U.S.)</b></p>	<p>2008: Chandrayaan-1 launch, detection of lunar water resources 2028: LUPEX launch (India–Japan joint mission) to study lunar polar water resource utilization potential</p>
<p>Japan</p> 	<p><b>Cooperating with the Artemis Program (U.S.) /</b> Contributing to Lunar orbiting manned base habitational function, Logistic supply, data sharing, lunar surface transportation, etc.</p>	<p>2007–2009: Kaguya (SELENE) global lunar exploration 2010: Hayabusa - asteroid sample return 2020: Hayabusa2 - asteroid sample return 2022 &amp; 2025: ispace's attempts lunar resource transfer to NASA 2028: LUPEX launch (India–Japan joint mission) to study lunar polar water resource utilization potential</p>

# Overview of Japan's Initiatives for Space Resource Activities

- Countries are planning and conducting a variety of space resource activities related to the Moon and asteroids.
- In 2021, Japan became the fourth country in the world to establish the legislation on space resources (after the U.S., Luxembourg and UAE). The Space Resources Act aims the accurate and smooth implementation of conventions concerning the development and use of outer space, and promotion of business activities related to space resources by private business operators, disseminating information for the proper implementation of the Act and the promotion public understanding.
- Japan will contribute to the development of its space industry by taking a leading role in discussions aimed at forming international norms and rules together with allies and like-minded and other countries.

## Promotion of Space Resources Activities

- Japan aims to promote efficient space resource development by appropriately implementing the Space Resources Act and accumulating successful commercial activities by private operators under the Act.
- In 2022 and 2024, Japan granted licenses under the Act to ispace Inc.'s lunar landing missions and published its business activity plans on the Cabinet Office website to ensure transparency.
- The government will continue to support technological demonstrations and commercialization related to the exploration and development of space resources, including through the Space Strategy Fund.



## Leading Role in International Rule Making

- As space resource activities continue to expand worldwide, active international discussions on the principles that should govern space resource activities, such as those within the United Nations, are taking place.
  - In 2021, Working Group on Space Resources was established under the Legal Subcommittee of the UNCOPUOS.
  - The Artemis Accords, which Japan signed, provides, for example, that activities for development and utilization of space resources should be executed in a manner that complies with the Outer Space Treaty.
- Building on strengths that having domestic legislation and advanced technologies across both the public and private sectors, Japan is promoting the development of international rules for the development and utilization of space resources, including commercial applications, by introducing best practices for transparency, etc.

# Act on the Promotion of Business Activities for the Exploration and Development of Space Resources (Space Resources Act)

## 1. The Purpose of the Act

Promulgated in June 2021 (enforced in December of the same year). **The fourth space resources act in the world**

### ● **the accurate and smooth implementation of conventions concerning the development and use of outer space and promotion of business activities for the exploration and development of space resources by private business operators (Article 1)**

- establishing special provisions for license under the provisions of the Space Activities Act in accordance with the basic principles of the Basic Space Act.
- specifying the rules for the acquisition of ownership of space resources and other necessary matters

## 2. Overview of the Act

### Definitions (Article 2)

- **space resources:** water, minerals and other natural resources that exist in outer space
- **exploration and development of space resources:** any activities listed in any of the following sub items (excluding those conducted exclusively as scientific research or for the purpose of scientific research)
  - (a) examination of the existence of space resources that contribute to the mining, extraction and other similar activities specified by Cabinet Office Order**
  - (b) mining, etc. of space resources and related processing, storage** and other acts specified by Cabinet Office Order (transportation of space resources)

### Special Provisions for Licenses for the Control of Spacecraft (Article 3)

Applicants must state, in application forms required to be submitted under Article 20, paragraph (2) of the Space Activities Act, besides the matters listed in the items of said paragraph, a business activity plan in which the following matters are specified as provided in the provisions of Cabinet Office Order:

- (i) the purpose** of business activities for the exploration and development of space resources
- (ii) the period** of the business activities
- (iii) the place** where the exploration and development of space resources are to be conducted;
- (iv) the methods** of exploration and development of space resources
- (v) the contents of the business activities**
- (vi) other matters** specified by Cabinet Office Order (**a financial plan and system for implementing business activities**)

### Promote Business Activities Under International Cooperation (Article 4)

The Prime Minister, when a license, etc. for the exploration and development of space resources has been granted to promote business activities related to the exploration and development of space resources under international cooperation and contribute to the prevention of disputes related to the exploration and development of space resources, shall give public notice thereof and of the following matters

- (i) The name** of the person who obtained the license, etc.
  - (ii) business activity plan**
- However, in cases specified by Cabinet Office Order as those in which the interests of a person who engages in business activities related to the exploration and development of space resources by obtaining said license, etc. for the exploration and development of space resources are likely to be unjustly harmed by said public notice, the whole or a part of such matters may be withheld from being publicly notified.

### Acquisition of Ownership of Space Resources (Article 5)

A person who conducts business activities related to the exploration and development of space resources shall acquire the ownership of space resources that have been mined, etc. in accordance with the business activity plan pertaining to the license, etc. for the exploration and development of space resources, by possessing said space resources with the intention to own them.

### Sincere Implementation of International Agreements, etc. (Article 6)

**Establishment of International Systems and Securing Coordination, etc. (Article 7)**  
**Technical Advice, etc. (Article 8)**

# Status of the Implementation of Space Resources Act

- To promote space resource activities carried out in a manner coordinated with the international community and prevent conflicts, Japan publishes on the Cabinet Office's website all licenses related to the exploration and development of space resources under Article 4 of the Space Resources Act.

## Applying for a License Related to the Exploration and Development of Space Resources

### 3. License List

#### License, etc. for Exploring and Developing Space Resources

Date	License Number	Name of Licensee	Business Activities Plan
November 4, 2022	S22-019	ispace inc.	<a href="#">Business Activities Plan (PDF:681KB)</a> 📄
December 17, 2024	S24-025	ispace inc.	<a href="#">Business Activities Plan (PDF:873B)</a> 📄



**Thank you very much.**



Cabinet Office

Appendix.

**Space Strategy Fund: 65 themes**

# Technology Development Themes - 1<sup>st</sup> phase (total 22)

## Transportation

**[MEXT]** Innovative technology for light weight- high performance and lower cost. (12B Yen)



©JAXA

**[METI]** Mass production technology development for main materials of solid rocket motor. (4.8B Yen)

**[MEXT]** Ground systems for future transportation. (15.5B Yen)



©JAXA

**[METI]** Development of integrated navigation system for space transportation. (3.5B Yen)



Experiment of Solid rocket booster.

## Satellite

**[MEXT]** Optical observation satellite system with high resolution/high frequency. (28B Yen)

**[METI]** Accelerating commercial satellite constellation deployment. (95B Yen)

**[MIC]** Development/verification of satellite communication technology with quantum cryptography. (14.5B Yen)

**[MEXT]** Innovative satellite LiDAR technology utilizing high power laser. (2.5B Yen)

**[METI]** Development/verification of parts/components for establishing satellites supply chain. (18B Yen)

**[MIC]** Supporting implementation of communication technology required for satellite constellation. (1.9B Yen)

**[MEXT]** High accuracy satellite formation flight technology. (4.5B Yen)

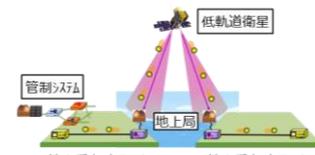


Formation Flight image

**[METI]** Feasibility study of overseas demonstration of satellite data utilization system. (1B Yen)



Satellite Constellation



Quantum Cryptography Network

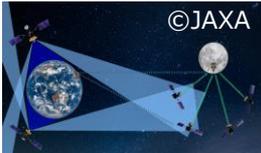
# Technology Development Themes - 1<sup>st</sup> phase (total 22)

## Exploration

### Lunar Development

【MEXT】 Development of Lunar Positioning System Technology (5B Yen)

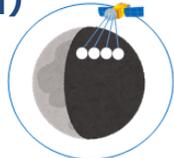
【MEXT】 Development of Regenerative Fuel Cell System (23B Yen)



Lunar Positioning System Image

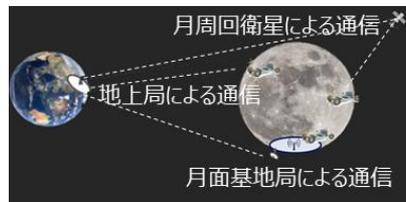
【MEXT】 Fundamental technology for Semipermanent power supply. (1.5B Yen)

【MIC】 Technology for lunar water resource exploration. (6.4B Yen)



Lunar water resource exploration image

【MIC】 Feasibility Study for development/verification of Cislunar communication. (0.5B Yen)



Cislunar communication system Image

### LEO Utilization

【MEXT】 Technology for cargo delivery system with international competitiveness and independence. (15.5B Yen)

【MEXT】 Technology for LEO autonomous flying module system. (10B Yen)

【MEXT】 Technology for LEO universal experiment system (2B Yen)



Autonomous flying module image

### Mars Exploration

【MEXT】 Fundamental low cost technology for atmospheric entry/aerodynamic damping. (10B Yen)



Expanded Aeroshell Image

### Common Development

【MEXT】 SX research and development site (11B Yen)



See next slide

# Technology Development Themes - 1<sup>st</sup> phase (total 22)

## **[MEXT] SX Research and Development Sites Related to Space Resources**

- Space Resource Development Hub for Lunar Surface Development
- Space Equipment Development and Human Resource Development Hub for the Industrialization of Lunar Exploration and Utilization



# Technology Development Themes – 2<sup>nd</sup> phase (total 24)

## Transportation

**【MEXT】 Fundamental system technology to realize “smart launch site”**

**【MEXT】 Fundamental technology to secure safety of manned space transportation systems**

**【METI】 Development of rocket parts, components and etc. for high-frequency launches.**

**【METI】 Feasibility study on the common range facilities for high-frequency launches**

**【METI】 Innovation of rocket manufacturing process for high frequency launches**

# Technology Development Themes – 2<sup>nd</sup> phase (total 24)

## Satellites

### ● On-orbit Servicing

- [MEXT] Technology to realize flexible spatial mobility
- [MEXT] Technology to realize flexible utilization of on-orbit environment

### ● Telecommunication Servicing

- [MIC] Research and development for data relay services with satellite optical communications
- [MIC] Development of terminal interconnection technology to expand the deployment of satellite optical communications
- [MIC] Development of frequency sharing, etc. for integrated satellite and terrestrial operations

### ● Satellites Common Technology

- [MIC] Feasibility study for satellite bus and terminal for optical communications

### ● Satellite Data Servicing

- [MEXT] Advanced technology to accelerate the use of Earth observation data
- [METI] Implementation of satellite data utilization system

### ● Satellites Common Technology

- [MIC] Technology for globally competitive communications payloads
- [MEXT] Technology to enhance capability of next generation earth observation satellites
- [METI] Innovative Satellite Mission Technology

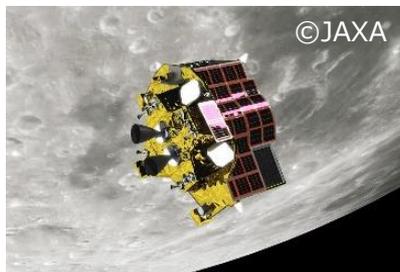
# Technology Development Themes – 2<sup>nd</sup> phase (total 24)

## Exploration

### Lunar Development

#### **【MEXT】 Technology to realize high-precision landing in the lunar polar region**

Developing and demonstrating high-precision landing technology for the lunar polar region and other regions that are challenging for private businesses by advancing the high-precision landing technology acquired through the SLIM project.



#### **【MEXT】 Elemental technology for lunar surface infrastructure**

Developing key elemental technologies contributing to lunar surface infrastructures by using small payloads to quickly produce results, which lead to acquisition of lunar environment data and to quickly demonstrate key technologies for future lunar activities.



# Technology Development Themes – 2<sup>nd</sup> phase (total 24)

## Exploration

### LEO Utilization

**【MEXT】 Technology to develop LEO orbital data center**

**【MEXT】 Technology to improve efficiency of LEO external environment utilization**

**【MEXT】 Technology to develop high frequency return cargo system from LEO**

## Common Development

**【MEXT】 Space diversion and new space industry seeds creation site**

**【MEXT】 SX (space transformation) core area breakthrough researches**

**【METI】 Solutions for spacecraft environmental testing challenges**

# Technology Development Themes – 3<sup>rd</sup> phase (total 19)

## Transportation

**[MEXT] Marine application technologies for launch systems**

**[MEXT] Thermal protection technologies for atmospheric re-entry of space transportation vehicles**

**[METI] Acceleration of private-sector rocket launch demonstration**

**[METI] Efficiency improvement and functional enhancement of rocket flight operations**

## Exploration, etc.

### ● Lunar Development & Deep-space Exploration

- **[MIC] Development and demonstration of ground stations required for lunar–earth communication infrastructure**
- **[MEXT] Technologies for the moon, asteroid, and other space resource utilization**

### ● Low Earth Orbit Utilization, ISS, etc.

- **[MEXT] Technologies to promote LEO utilization**
- **[MEXT] LEO base reboost technologies**

## Common Development

**[METI] SX technology seeds integration and human resource development hub**

**[METI] Research in development of SX foundational areas**

# Technology Development Themes – 3<sup>rd</sup> phase (total 19)

## Satellites, etc.

### Satellite Common Technologies & On-orbit Servicing, etc.

**[MIC]** Development and demonstration of security technologies related to satellites (technologies against jamming and interception of radio signals)

**[METI]** Reforming satellite development and manufacturing processes and technology development and demonstration for function enhancement based on digital technologies

**[MEXT]** Optical and quantum sensing technologies for satellite applications

**[METI]** Development and demonstration of technologies to achieve low-cost, high-frequency on-orbit demonstration using satellites to expand opportunities for demonstration in space

**[MEXT]** Innovative space system technologies enabled by physical AI, etc.

**[METI]** Acceleration of commercialization to secure autonomy for space traffic management

### Telecommunication & Observation

**[MIC]** Development of general-purpose ground antennas to expand the use of satellite communications

**[MIC]** Development and demonstration of Q/V-band, etc. communication equipment

**[MIC]** Development and demonstration of innovative onboard satellite antennas for next-generation satellite communications