Advanced Air Mobility in JAPAN 2021

Our Development and Beyond

METI
Ministry of Economy, Trade and Industry

MLIT
Ministry of Land, Infrastructure, Transport and Tourism

Designed by KEN OKUYAMA DESIGN

Introduction

Japan's Advanced Air Mobility Development

Ministry of Economy, Trade and Industry
Ministry of Land, Infrastructure, Transport and Tourism

Studies are currently underway around the world to realize Advanced Air Mobilities (AAM). AAM is expected to solve various regional issues and provide people with new forms of transportation to enrich their lives. Many companies, from venture companies to major corporations, have begun to participate in the development of aircraft and related businesses. This is just the beginning of a new industry for the next generations.

The Japanese government and the private sector have been working together to develop a new market and clarify the regulatory framework. In 2018, the Public-Private Committee for Advanced Air Mobility was established to discuss the development of various services such as passenger transportation, scenic flights, and air ambulance services throughout the country.

This report covers the developments and use cases for AAM in Japan. We sincerely hope that these insights will illustrate the attractiveness of Japan as a new industrial ecosystem and a new market in terms of its proactive preparation towards AAM implementation.

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Japan's Initiatives on Advanced Air Mobility Realization


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Proactive Implementation

Japan aims to implement AAM in society not only for "Expo 2025 Osaka, Kansai, Japan (Expo 2025)" but also for transportation in depopulated areas, mountainous regions, and isolated islands, as well as for logistics in times of disaster. The public and private sectors, including many key players such as relevant government ministries, experts, aircraft manufacturers, and service suppliers, are committed to pursuing studies on technical issues, proactive use cases, and system designs. We would like to welcome players outside Japan and create new concepts of mobility and contribute to SDGs.

Safety - A top priority for the Japanese market

For AAM to be accepted in society, it is essential to ensure its safety. Alongside its active implementation within society, we have conducted research with experts on how to ensure the reliability of safety according to standards of expectation. The Bilateral Aviation Safety Agreement (BASA) between Japan Civil Aviation Bureau (JCAB) and US Federal Aviation Administration (FAA)/ European Union Aviation Safety Agency (EASA) has been taken into consideration to develop appropriate safety provisions covered by BASA for next-generation AAM in Japan.

Advanced Air Mobility Roadmap

	-2025	2025	2025-	2030-
Objectives	**- Completion of operating environments and regulatory framework** **- Launch flight demonstrations**	**- Commercial services launch at Expo 2025** **- Launch package delivery and passenger transportation services**	**- Expansion of package delivery and passenger transportation services** **- Launch air ambulance demonstrations**	**- Launch urban passenger transportation services**
Social Implmentation	- Package delivery services to isolated islands - Scenic flights - Two-point passenger transportation in limited areas	Two-point passenger transportation between aerodrome and gulf coasts	- Expansion of regions and distances for passenger transportation services - Launch air ambulance demonstrations	Passenger transportation between suburban and urban areas, air ambulance transportation, cold district services, and private use
Social Acceptance	Resident acceptance in certain areas	Improve public recognition through Expo 2025	Improve public recognition throughout Japan	Integrated into everyday life
Operating Environment				
Aircraft	- Multirotor - Full electric - Two-seater	- Multirotor, Lift + Cruise, Vectored Thrust - Full electric, hybrid - 2-5 seaters		- Aircraft enlargement - Operation diversification
Operators	- Aircraft manufacturers - Operating companies - Landing area managers	- Aircraft manufacturers - Operating companies - Landing area managers - UAM Traffic Management Service Provider	- Charging pads/infrastructure providers - UAM Traffic Management Service Provider - Communication system suppliers - Weather data service suppliers	
Takeoff and Landing Areas	Flight areas Gulf coast, isolated islands, depopulated areas, etc. Alternative takeoff and landing areas	Flight areas Gulf coast, isolated islands, depopulated areas, etc. Aerodrome utilization	Vertiport (takeoff and landing areas for eVOTL)	Flight areas throughout Japan - Flights between suburban and urban areas - Gulf coast, isolated islands, depopulated areas etc.
Operation Methods	Same standards as conventional aircraft, auto + manual, and remotely piloted →	Improvements in automation level →		Autonomous operations
Flight Distances	Approx.10-50 km →	Approx. 100 km →		Approx. 300 km
Enroute Configurations	Short transportation, scenic flights →	Fixed-route, scheduled and on-demand operations, high traffic density →		Unfixed routes, on-demand operations

May 2021

Public-Private Committee for Advanced Air Mobility

METI and MLIT have jointly established the Public-Private Committee for Advanced Air Mobility, bringing together stakeholders in the public and private sectors to realize AAM in Japan. Through this public-private committee, several working groups (WG) have held discussions to improve the system, including safety standards for aircraft and flight operations, as well as certification of pilot skills. These WGs are scheduled to run by 2023.

Organization

Public-Private Committee for Advanced Air Mobility
Public METI, MLIT, other related ministries
Private Experts, aircraft manufacturers, and service suppliers from 26 organizations

Officials' Meeting
Public METI, MLIT, other related ministries
Private Experts, aircraft manufacturers, and service suppliers from 26 organizations

Use Case Review Meeting
Public METI, MLIT, other related ministries
Private Business operators etc. within the membership of the committee who wish to participate

Aircraft Safety Provisions WG
Public MLIT, METI
Private Experts (aeronautical engineering),The Society of Japanese Aerospace Companies (SJAC), Japan Aerospace Exploration Agency (JAXA), Electronic Navigation Research Institute (ENRI), etc.

Pilot Certificate WG
Public MLIT, METI
Private Japan Aerospace Exploration Agency (JAXA), All Japan Air Transport and Service Association Co.,Ltd., etc.

Operational Safety Standards WG
Public MLIT, METI
Private Experts (aeronautical engineering, aircraft design), Japan Aerospace Exploration Agency (JAXA), Electronic Navigation Research Institute (ENRI), All Japan Air Transport and Service Association Co.,Ltd., etc.

Committee Board Members

Public Sectors

Secretariat

Director-General, Manufacturing Industries Bureau, METI
Director-General, Japan Civil Aviation Bureau, MLIT

Members

Radio Department, Telecommunications Bureau, MIC
Mutual Aid Management Office, FDMA
Ambulance Service Planning Office, FDMA
Logistics Policy Division, Policy Bureau, MLIT
Planning and Coordination Division for Public Works and Construction Equipment, Policy Bureau, MLIT
Urban Policy Division, City Bureau, MLIT
River Management Office, River Environment Division, Water and Disaster Management Bureau, MLIT
Performance Management Office, Planning Division, Road Bureau, MLIT

Private sectors

Experts

Shinji Suzuki, Professor Emeritus, The University of Tokyo. Project Professor, Institute for Future Initiatives, The University of Tokyo Representative Director JUTM
Masaru Nakano, Professor, Graduate School of System Design and Management (SDM), Keio University
Gaku Minorikawa, Professor, Department of Mechanical Engineering, Faculty of Science and Engineering, Hosei University
Japan Aerospace Exploration Agency (JAXA)
New Energy and Industrial Technology Development Organization (NEDO)
Port and Airport Research Institute (PARI)
Electronic Navigation Research Institute (ENRI)
All Japan Air Transport and Service Association Co.,Ltd
The Society of Japanese Aerospace Companies
Chiba Kotaro, Founder/Managing Partner of DRONE FUND, Guest Professor at Keio University SFC, Investor

Service Suppliers (Developers)

ANA HOLDINGS INC.
Japan Airlines Co., Ltd.
AirX Inc.
YAMATO HOLDINGS CO., LTD.
Rakuten Group, Inc.
Air Mobility Inc.
ORIX Corporation
Aioi Nissay Dowa Insurance Co., Ltd.
Aero Facility Co., Ltd
KANEMATSU CORPORATION
Tokio Marine & Nichido Fire Insurance Co., Ltd.
TOYOTA MOTOR CORPORATION
GMO Internet, Inc (GMO Internet Group)
Mitsui Sumitomo Insurance Company, Limited

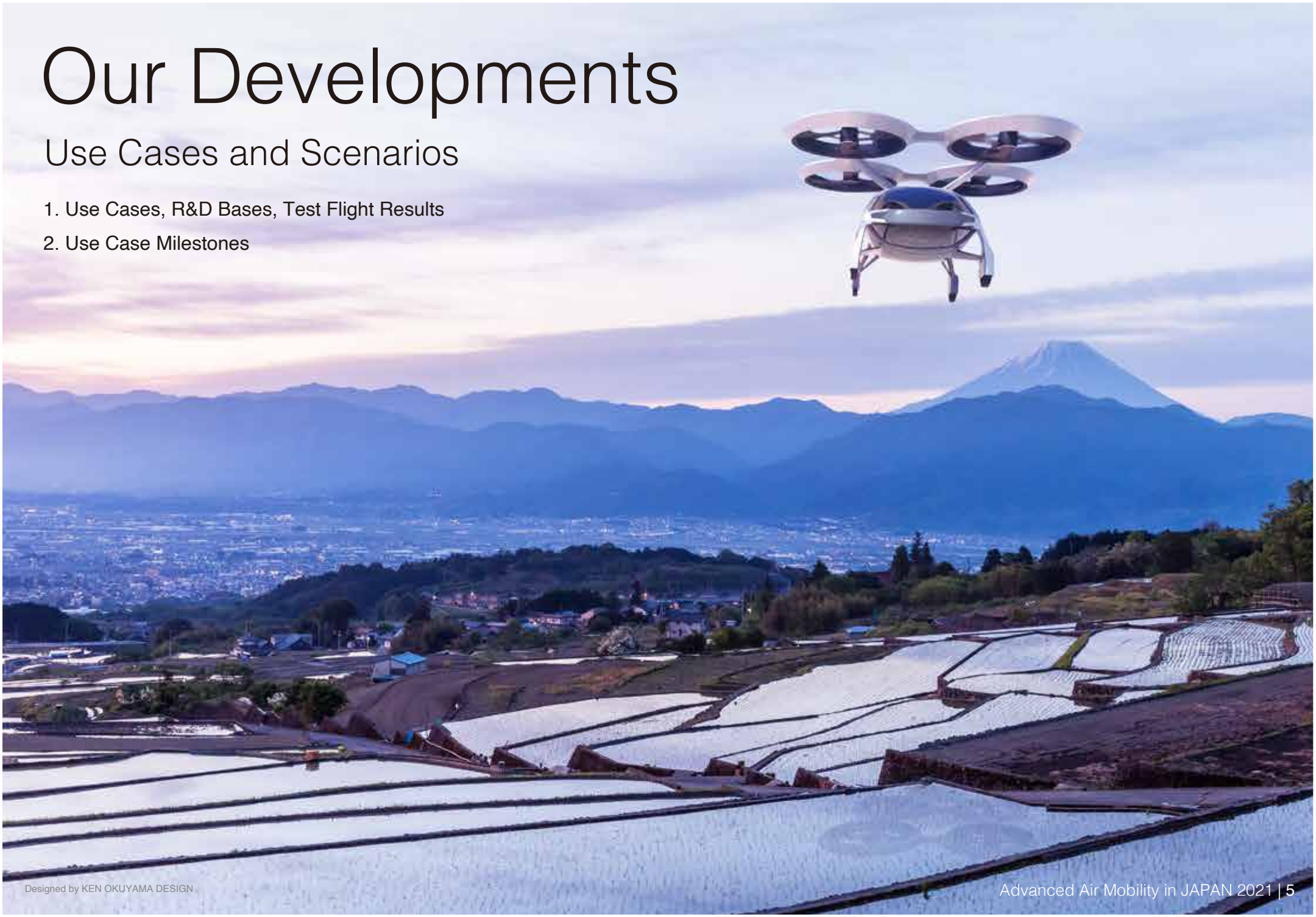
Manufacturers (Developers)

AIRBUS HELICOPTERS JAPAN CO., LTD.
SUBARU CORPORATION
Bell Textron Inc
Boeing
Uber Technologies Inc.
SkyDrive Inc.
Kawasaki Heavy Industries, Ltd.
teTra aviation corp.
NEC Corporation
Autonomous Control Systems Laboratory
Prodrone Co., Ltd
Joby Aviation.
Volocopter GmbH
Skyward of Mobilities Inc.

Our Developments

Use Cases and Scenarios

1. Use Cases, R&D Bases, Test Flight Results
2. Use Case Milestones



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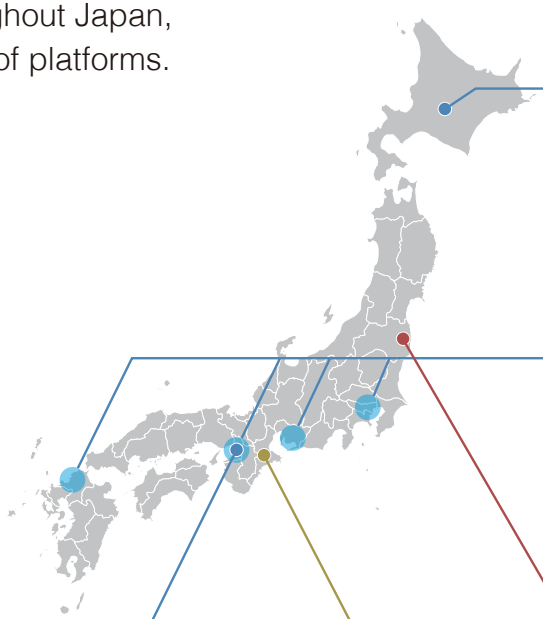
Use Cases, R&D Bases, Test Flight Results

The concept of using AAM is accelerating throughout Japan, and we are actively promoting the development of platforms.



USE CASE

Air ambulance operations

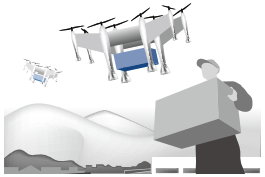
- Emergency transport services in times of disaster, etc.
- Alternative to medical helicopters

USE CASE

Passenger services in cold climates

- Services for particular climatic conditions in cold regions
- Services from New Chitose Airport to resorts and tourist destinations

USE CASE



Package delivery services

- To isolated islands, mountainous and urban areas
- Scheduled package delivery services
- Premium courier services between multiple points with high express delivery capabilities

USE CASE

High density on-demand transportation in urban areas

- Air taxi services
- Long distance and high density passenger transportation

USE CASE

Services in the tourist areas

- Passenger transportation at the Expo 2025
- Passenger transportation to tourist areas
- Scenic flights

TEST FIELD

Fukushima Robot Test Field (RTF)

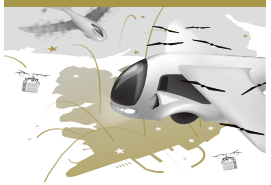
- Major development base for various types of robots and mobilities
- Capable of conducting performance evaluations, operation trainings, and flight demonstrations by reproducing actual environments such as disaster areas

USE CASE

Scheduled passenger transportation

- Between isolated islands and depopulated areas
- Between airports and bay/urban areas
- Between suburbs and urban areas

LOCAL DEVELOPMENT



Use of AAM in local government areas

Mie Prefecture

- Use concept for tourism, transportation, disaster prevention, and civic life
- First non-EU municipality to join UIC2, an association of European municipalities

Use Case Milestones

The Public-Private Sector Committee will expand the use of next-generation AAM with Expo 2025 as a benchmark. We expect these milestones to increase the social presence and acceptance of AAM and promote its use towards 2030.

- 2025

- Completion of operating environments and regulatory framework
- Launch flight demonstrations

The environmental platform required for the AAM will be completed, and demonstration tests will begin in preparation for flights at Expo 2025.

2025

- Commercial services at Expo 2025
- Full launch of logistics and passenger transportation

AAM passenger transport services will be launched at Expo 2025. The service will transport people from the airport to the Expo 2025 site and urban areas. In addition, scheduled package delivery services for isolated islands, mountainous and urban areas will also be realized, alongside the official launch of AAM.

2025 -

- Expansion of package delivery and passenger transportation services
- Launch air ambulance demonstrations

In addition to aerodrome/tourist spots, the number of fixed-route and scheduled services between major metropolitan areas and regional cities will be increased. Flight distances will be expanded to mid-long routes of 50-300 km. The use of AAM for air ambulance (doctor dispatch) services will also expand.

2030 -

- Full launch of passenger transportation in cities
- Realization of a wide range of on-demand operations

Passenger transport services and air ambulance services in suburban and urban areas will now be in full swing. Services in harsh climate environments will be possible, expanding the range of applications nationwide and realizing high-density, on-demand operations.

Operational Standards

Discussion points and collaboration

1. Aircraft Safety Provisions
2. Pilot Certificate
3. Operational Safety Standards

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1. Aircraft Safety Provisions

Summary of Study Results in FY2020

WG Missions

Short Term | 2023-2025

Clarify special conditions for eVTOL (electric Vertical Takeoff and Landing) aircraft to obtain type certifications.

Mid-long Term | 2025 -

Common special conditions for eVTOL and other types of aircraft will be developed as necessary, and new airworthiness categories will be formulated. In addition, safety provisions will be developed based on the use of remotely piloted, automatic/autonomous operations, which are expected to provide convenience and solve social issues.

▶▶▶ Study Results in FY2020

Although various types of AAM are envisioned, the eVTOL, which is currently at the forefront of development, is classified as an aircraft under the Civil Aeronautics Law as it can be used for aviation with people on board.

As a result of organizing the types of aircraft to be considered in the short term (2023-2025) and the mid-long term (2025-), unmanned flights will be included in the short-term screenings.

The workflow of safety provisions developments for eVTOL is in progress.

Requirements are tentatively set based on currently assumed types of eVTOLs (fixed-wing and rotorcraft types) and their performance, such as maximum takeoff weights, number of seats, cruising range, intended use, etc.

Following the workflow above, analysis of design requirements, industrial standard investigations, and preparation of items to be considered as safety provisions will be conducted from FY2021 onwards.

The current status of safety provisions in Europe and the US, as well as future trends, will be closely monitored to reflect appropriate safety provisions for Japan.

2. Pilot Certificate

Prerequisites for studies in FY2020

Requirements for pilots and maintenance engineers who operate eVTOL (including remotely piloted vehicles) were summarized in FY2020 based on use cases to be conducted in the short term (2023-2025).
From FY2021 onwards, the compiled results of the compilation including remotely piloted, automatic and autonomous operations, will be reviewed in depth based on domestic and international trends.

Overview of use case review meetings

Passenger Transportation

Timeline	2023	2025
Overview	Two-point 5 km transportation in Osaka Bay Above Ground Level: 50-150 m	Transportation between airports and Yumeshima, Expo 2025 site (20-30 km) Existing helicopter routes in coastal areas or new corridors (dedicated routes) Above Ground Level: 150 m or more
Aircraft	Multirotor (eVTOL) Full electric	Multirotor ／ Vectored Thrust, etc. Full electric
Operation Methods	Pilot in Command (PIC) Manual + computer-assisted control	Pilot in Command (PIC) Autopilot + manual response in case of emergency
Flight Regulations	Visual Flight Rules (VFR)	Visual Flight Rules (VFR)

Package Delivery Services

2023
Two-point package delivery between isolated islands (5-20 km) Above Ground Level: 300 m above sea level (150 m distance from obstacles)
Multirotor Full electric
Remotely piloted Automatic operations on predefined routes
—

2. Pilot Certificate

Summary of Studies Conducted in FY2020

Basic Concept

Using the current regulatory framework

Using the current regulatory framework is considered a realistic solution to achieve social implementation quickly. However, remotely piloted aircraft and unmanned aircraft, which are expected to be deployed in the mid-long term, will be taken into consideration for additional requirements or exemptions.

Setting requirements according to aircraft and operational developments

For the points not covered by the current regulations, additional requirements will be established based on international trends, aircraft to be developed, and operational characteristics.

Envisioning Visual Flight Rules (VFR) with pilots in command

Requirements for the pilot certificate will be considered based on the VFR use case (remotely piloted etc., will be considered for package delivery services).

Conducting a systematic review for beyond 2025

Regulatory framework for automatic/autonomous operations, including unmanned aircraft operations, which are expected after 2025, will be reviewed concurrently with all of the above.

WG Summary

Pilot and Maintainance Engineer Certificate Requirements

Consideration of progress in remote pilot capabilities

The possibility of changes in pilot certificate requirements must be taken into consideration due to future developments in autonomous operations and other new technologies.

Flight hours and maintenance experience

Required flight time/maintenance experience for each type of eVTOL will be included in the requirements, similar to previous aircraft certification. The reduction of required flight hours and maintenance experience will be explored.

Test applications and items

Determine whether the current tests for each type of aircraft can be applied to knowledge and competence and whether special tests are required for anticipated future flight operations.
If so, test items will be identified. Some items may be removed due to operation types.

Remote Pilot and Maintenance Engineer Certificate Requirements

International trends

The International standard for Remotely Piloted Aircraft Systems (RPAS) will become applicable in 2022.
It is recognized that Japan needs to develop a certificate system for remotely piloted aircraft, which are expected to be used for package delivery services, observing the trends in Europe and other countries.

Skill differentiation

To develop the certification above, it is necessary to clarify the difference between pilot in command and remotely piloted skills.

Remote pilots

There is a need to clarify the aviation medical examination standards that should be required for remote pilots. The requirements will be flexible to increase the number of pilots and ensure safety.

Maintenance of remotely piloted systems

As a requirement for maintenance engineers in remotely piloted systems, knowledge and experience of systems that are not equipped in other aircraft, such as Remote Pilot Station and C3 Links (Command, Control and Communication Links), are particularly essential. The types of knowledge and experience required should be clarified.

3. Operational Safety Standards

Scope to be Addressed in FY2020

The feasibility of eVTOL operations in AAM will be discussed. Issues regarding the operations under the current aviation laws and regulations based on the premise of a short-term use case (2023 to 2025) in which pilots will board and operate eVTOLs will be summarized. The mid-long term issues raised during the discussions are also summarized in the interim report.

Note: Package delivery services by unmanned aircraft will be considered from FY2021 onwards, assuming that operations will start in the short term (around 2023 to 2025).

Overview of use cases based on review meetings

Short term | 2023-2025

Pilot in Command (PIC)

Visual Flight Rules (VFR)

Limited flight routes and areas

Electric

Multirotor/Vectored Thrust, etc.

2-5 passengers

Mid-long term | 2025 -

Pilot in Command (PIC)

Visual Flight Rules (VFR) / Instrument Flight Rules (IFR)

Increase in the number and density of routes

Remote Pilot

Remotely piloted, automatic operations, autonomous operations

Increase in the number of routes and densities

3. Operational Safety Standards

Summary of Studies Conducted in FY2020

The following is an overview of the issues we have identified based on the premise of a short-term (around 2023 to 2025) use case in which pilots board and operate eVTOLs. Specific studies to solve these issues will be carried out from FY2021 onwards.

WG Interim Summary

Requirements and processes for setting flight areas, flight routes, and flight altitudes

Safe flight methods

To ensure safety, it is necessary to establish a flight method that takes congestion into account alongside existing manned aircraft (e.g., limited routes and areas). It is particularly important to clarify flight weather conditions and air traffic management methods for takeoffs and landings at congested aerodromes, based on the flight performance of the eVTOLs. In the mid-long term, flight methods with Instrument Flight Rules (IFR), remotely piloted, automatic and autonomous operations will be established.

UAM Traffic Management

An advanced traffic management system will be necessary when AAM is implemented in society. Existing aircraft and drone coordination will be essential. Operation and management dedicated to AAM (UAM corridors) will be considered.

Flying at a minimum safe above ground level of 150 m

It is necessary to fly at a distance of 150 m or more from people/objects on the ground or water surface (Article 81 of the Civil Aeronautics Law). However, there is no need to follow the rule if there are no people/objects on the ground or water surface within the flight area. Cases will be studied which are not subject to the minimum safe altitude for appropriate reasons, such as short flight distances, and continue to ensure both safety and convenience.

Takeoff and landing area installation

Securing landing areas

Under the current law, in principle, takeoff and landing areas must not be made at locations other than aerodromes (Article 79 of the Civil Aeronautics Law). Thus, it is necessary to review operational methods as required. It will be necessary to consider the installation criteria, including necessary facility requirements such as parking space and battery charging facilities for dedicated eVTOL landing areas (incl. Vertiport), as well as protocols for noise and danger of falling objects to be accepted within society.

Equipment requirements and processes

Equipment requirements specific to eVTOL

Ensure clarification of equipment requirements, such as devices for measuring attitude, altitude, position, or course of eVTOLs, and first aid equipment for an emergency landing when flying over water. Examples including common equipment: attitude and direction indicators, precision altimeters, radiotelephones, flight recorders and cockpit voice recorders, life vests, and emergency floats, etc.

Standards for required onboard fuel adapted for batteries

Examples: Additional battery capacity for in case of emergencies.

Recent News

Public-Private Committee for Advanced Air Mobility

2021.5.21

The public and private sectors discussed the use cases and the status of AAM developed in FY2020 for social implementation. Overseas manufacturers of AAM, such as Joby Aviation and Volocopter, also participated in the event and gave presentations on the use of AAM in Japan.

Air Mobility Revolution Social Implementation The Osaka Round Table

Provided By: Japan Association for the 2025 World Exposition

The Osaka Round Table was established as a consultative body to realize AAM in Osaka, with Expo 2025 as a milestone. The public and private sectors are discussing a realistic vision for the implementation of AAM in the Osaka area and are accelerating efforts for social implementation.

Information

Please contact us if you are considering to enter the Japanese Advanced Air Mobility market or would like to be matched with related companies.

Contact Us

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Advanced Air Mobility Market | Ministry of Economy, Trade and Industry
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For More Information

METI YouTube Channel -Let's drive in the sky.-
https://www.youtube.com/watch?v=7-G_C4DTWXQ

Official Website
Public-Private Comittee for Advanced Air Mobility Official Website
https://www.meti.go.jp/shingikai/mono_info_service/air_mobility/index.html

METI Ministry of Economy, Trade and Industry

MLIT Ministry of Land, Infrastructure, Transport and Tourism

METI's mission is to develop Japan's economy and industry by focusing on promoting economic vitality in private companies and smoothly advancing external economic relationships, and to secure stable and efficient supply of energy and mineral resources.
Please see https://www.meti.go.jp/english for further details.

MLIT is responsible for the comprehensive and systematic use, development and conservation of the national land, along with the development of social infrastructure, the promotion of transportation policies, the development of meteorological services, and ensuring maritime safety and security.
Please see https://www.mlit.go.jp/en for further details.