60th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 3: AVIATION SAFETY

ASIA-PACIFIC REFERENCE MATERIALS FOR REGULATORS TO FACILITATE ADVANCED AIR MOBILITY

(Presented by Singapore, China, Cook Islands, Indonesia, Philippines and Thailand, and co-sponsored by Fiji, Japan, New Zealand and Republic of Korea)

SUMMARY

This working paper presents reference materials jointly developed by 24 Asia-Pacific States and Administrations to facilitate Advanced Air Mobility (AAM) operations. In the inaugural Meeting of Asia-Pacific Regulators on AAM and Unmanned Aircraft System (UAS) on 9 November 2023, States and Administrations agreed to develop reference materials which regulators can consider, adapt and use to facilitate commercial operations of electric Vertical Take-Off and Landing (eVTOL) aircraft and to implement complex UAS operations. The reference materials address eight priority areas identified by regulators and industry: six relating to eVTOL aircraft operations (certification and validation, entry into service regulations, inter-agency cooperation, economic policies, capability building, and social acceptance) and two on complex UAS operations (technical guidance for BVLOS operations and CAA personnel capability building). The reference materials were developed with inputs from stakeholders from eVTOL and UAS industry, EASA, FAA, and IATA. An industry consultation conducted in April 2025, garnered over 300 comments from more than 40 eVTOL and UAS stakeholders. The comments were incorporated where appropriate and the reference materials were published on 14 July 2025.

This conference is requested to consider the merit of tabling the APAC Reference Materials for Regulators to facilitate AAM in coordination with ICAO AAM SG at ICAO 42nd Assembly.

ASIA-PACIFIC REFERENCE MATERIALS FOR REGULATORS TO FACILITATE ADVANCED AIR MOBILITY

1. INTRODUCTION

1.1 The rapid advancement of advanced air mobility (AAM) technologies, electric vertical take-off and landing (eVTOL) aircraft and unmanned aircraft system (UAS) offer innovative solutions and economic benefits. While their potential is immense, it is paramount that the challenges of integrating these new technologies into existing civil airspace and aviation frameworks are adequately addressed. ICAO acknowledges these challenges, as highlighted at ICAO 41st Assembly. Consequently, the AAM Study Group was formed by ICAO to develop a vision and framework to address the challenges. It must be emphasized that safety and security considerations must remain at the forefront of our efforts.

1.2 The Meeting of Asia-Pacific Regulators on AAM and UAS was convened on 9 November 2023 to foster collaboration amongst regulators, and between regulators and industry, on facilitating commercial operations of eVTOL and complex UAS operations. As an outcome of the meeting, 24 Asia-Pacific civil aviation authorities have co-developed Reference Materials which can be considered, adapted, and used by regulators to facilitate AAM and complex UAS operations. The Meeting was initially attended by 17 Asia-Pacific civil aviation authorities ("CAAs"), 24 AAM and UAS institutes and companies, with EASA, FAA, ICAO Regional office and IATA as observers.

1.3 The Reference Materials were developed with three primary objectives: (i) to raise awareness of new technologies and regulatory approaches, (ii) to facilitate alignment of regulatory approaches and practices across the APAC region, and (iii) to support adoption of policies and regulations. At the 59th DGCA Conference, DP/3/16 was presented to encourage States to actively participate, support the platform, and co-develop the reference materials. The development of the Reference Materials also benefitted from the recognition of the operational realities unique to the Asia-Pacific region. The paper was widely supported by the conference.

2. DISCUSSION

2.1 The Reference Materials titled "Asia-Pacific Reference Materials for Regulators to facilitate Advanced Air Mobility Operations" covered eight priority areas listed below. The eight priorities span from platform-specific to State-specific considerations, outlining the context and key factors that regulators should consider, and suggested action plans to guide capability building and preparedness for AAM. An overview of the respective topics is presented in the appendix of this paper.

Reference Materials	Areas
eVTOL	(1) Certification, Validation, and Acceptance of eVTOL Aircraft
	(2) Regulation for eVTOL Aircraft Entry into Service (EIS)
	(3) Cooperation Among National Agencies
	(4) Economic Policies and Regulations
	(5) Capability Building
	(6) Social Acceptance
UAS	(1) Technical Guidance for Managing Advanced Beyond Visual Line of Sight (BVLOS) UAS Operations
	(2) Capability Building of CAA Personnel for UAS Operations

2.2 The Reference Materials were developed through close collaboration between regulators and the industry. The initial draft of the reference materials which detailed the context, key considerations and action plan for the eight priority areas was shared with 14 eVTOL and UAS companies for their review and feedback. In total, more than 250 comments were received and reviewed. A three-day focused group meeting was then held in November 2024 between the regulators and

industry to review and incorporate the feedback received. The Federal Aviation Administration (FAA) of the United States of America, European Union Aviation Safety Agency (EASA) and International Air Transport Association (IATA) were also consulted and have provided their comments. Where appropriate, these comments were incorporated into the Reference Materials.

2.3 An open industry consultation for the draft reference materials was conducted from 2 to 23 April 2025 and this garnered another 342 comments from 42 respondents from organisations such as eVTOL manufacturers, potential eVTOL operators, UAS operators, research institutions, standards setting bodies, government agencies and civil aviation regulators. Most respondents were supportive of the contents in the reference materials, with some complimented the good initiative by Asia-Pacific Regulators and asked for greater collaboration across the region to build up eVTOL and UAS capabilities. The participating Asia-Pacific States had reviewed the comments received and where appropriate, had incorporated the comments received into the reference materials.

2.4 A significant number of responses called for the continued development of the materials and supported the Meeting of Asia-Pacific Regulators on AAM and UAS. These responses validated the value of this collaboration platform to continue to further develop reference materials to address other areas such as remotely piloted eVTOL operations and other complex UAS use cases, and the meeting being a valuable platform for industry and regulators to address regulatory challenges for AAM.

2.5 The Reference Materials were published on 14 July 2025. It provides valuable information for reference by regulators to integrate commercial eVTOL and complex UAS operations, through the development of implementation strategies and regulatory frameworks. States are recommended to review the reference materials that is published on Civil Aviation Authority of Singapore website.

2.6 ICAO AAM SG was consulted through a working paper tabled at the AAM Study Group's Fifth Meeting in May 2025. The meeting agreed to incorporate the Reference Materials into AAM SG's work programs. Specifically, the meeting agreed to consider incorporating the section of reference materials related to eVTOL into the eVTOL guidance materials as appropriate.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) Note the reference materials titled "Asia-Pacific Reference Materials for Regulators to facilitate Advance Air Mobility operations";

b) Consider the reference materials when developing regulations and policies to facilitate eVTOL or complex UAS operations;

c) Consider tabling a discussion paper at the ICAO 42nd Assembly; and

d) Encourage States to actively participate and support the meeting of Asia-Pacific Regulators on AAM and UAS.

— END —

Appendix

OVERVIEW OF ASIA-PACIFIC REFERENCE MATERIALS FOR REGULATORS TO FACILITATE ADVANCED AIR MOBILITY OPERATIONS

These Reference Materials guide States of Registry, States of the Operator, and States of the Aerodrome on the eight topics which regulators and industry have identified as priority areas to address for eVTOL aircraft and UAS.

2 Each of these topics are addressed as individual parts in the Reference Materials, and each part consists of five sections: (1) Introduction, providing a brief introduction for the content of the part; (2) Background, that sets the context of the topic with historical precedence or existing practices; (3) Key Considerations that are related to the topic which have been compiled through literature reviews, surveys, workshops, or brainstorming; (4) Action Plan, where the aim is to provide guidance to regulators on steps that may be taken in addressing and being prepared in the respective topic; and (5) References used in the development of the content. Where applicable, each part may be supported by annexes to guide the implementation of the part.

eVTOL Aircraft

3 For eVTOL aircraft, the Reference Materials will serve as a guide for CAAs in countries that are not States of Design1 and cover various possible approaches to facilitate these aircraft for operations. The materials will benefit CAAs in developing their policy frameworks and approaches to regulate various types of eVTOL aircraft. The six focus parts for eVTOL aircraft are:

a. **Certification, Validation, and Acceptance of eVTOL Aircraft:** Several States of Design have received applications for eVTOL aircraft type certification, with some already certifying these aircraft. As eVTOL aircraft technology is novel and does not fall neatly into existing certification frameworks that apply for conventional aircraft, these States have had to develop new pathways for certification. This presents challenges for CAAs in States that facilitate eVTOL aircraft for operations as they may be unfamiliar with the new certification pathways adopted by the States of Design. This part outlines the key considerations behind the certification approaches for eVTOL aircraft, the different certification policy and practices, and provides guidance on how States can validate or accept these certifications.

b. **Regulations for eVTOL Aircraft Entry into Service (EIS):** Entry into service is a crucial regulatory process where the aircraft operator operating the aircraft is operationally certified, registered and approved for commercial operations by State. A structured EIS process is essential to support the safe and efficient commercial operation of eVTOL aircraft at scale. To facilitate the EIS, CAAs will need to develop appropriate regulations for operational and safety oversight. This part reviews existing EIS regulatory frameworks, highlighting key differences with conventional aircraft operations and addressing unique considerations for eVTOL aircraft operations. It also suggests action plans for creating new dedicated eVTOL aircraft regulations or adapting existing ones to facilitate these operations.

c. **Cooperation Among National Agencies:** eVTOL aircraft operations introduce new concepts, technologies, and business models that span the jurisdictions of multiple national agencies, including those responsible for security, urban planning, and emergency response. Clear definition of roles and effective cooperation are needed to avoid duplication or conflicts. This section identifies key areas and activities that require cooperation, outlines the varying roles of stakeholders, and provides methods to facilitate cooperation across agencies.

1 **State of Design** refers to States that are responsible for approving the aircraft's design for certification.

d. **Economic Policies and Regulation:** Economic policies and regulations play a key role in supporting market growth, healthy competition, and innovation, while also ensuring consumer interest is taken into consideration. This part explores topics such as market access and competition, as well as how economic policies and regulations may be used to encourage the development of commercial eVTOL aircraft operations for the benefit of consumers. It also provides guidance for CAAs and other national agencies on how to coordinate the development of economic policies and regulations for eVTOL aircraft operations.

e. **Capability Building:** There is a need to build or enhance capabilities to develop policies and regulations for the safety oversight of eVTOL aircraft operations. This part explores the considerations for building both organisational and personnel capabilities, including how CAAs may need to review and adapt existing principles, procedures, and structures to manage the evolving technologies. It also offers guidance on developing personnel training programmes to address these needs.

f. **Social Acceptance:** Social acceptance is critical to enable commercial eVTOL aircraft operations to scale and develop into a viable market. Studies on public opinion have identified eight areas of concern that need to be addressed to build social acceptance. This part suggests strategic approaches to ensuring social acceptance, focusing on public participation, policy making, and measurement of public sentiment and impact. It also includes ready-to-use sample surveys, that CAAs may utilise to assess and engage the public.

UAS Operations

10 UAS are already deployed in a wide range of commercial applications, including infrastructure inspections, surveillance, delivery, and entertainment in most States. As technology advances, the demand for more complex operations has grown, and regulators face new challenges in managing these sophisticated drone applications. While these use cases unlock opportunities for greater operational efficiencies, productivity, and economic value, they also present higher risks and typically involve operating the UAS beyond visual line of sight (BVLOS). The Reference Materials highlight considerations for facilitating complex UAS operations and offer guidance to CAAs in building up their capability. The two focus areas for UAS are:

a. **Technical Guidance for Managing Advanced Beyond Visual Line of Sight (BVLOS) UAS Operations:** This section provides guidance on managing advanced BVLOS UAS operations, drawing from global best practices. It covers UAS approval management methodologies and considerations for risk evaluation and offers a stepwise approach to identifying and implementing new requirements for these advanced operations.

b. **Capability Building of CAA Personnel for UAS Operations**: The unique characteristics of UAS and the nature of their flight profiles require CAA personnel to deepen their knowledge of both the UAS and the operating environment. This section identifies common training gaps for existing CAA personnel (i.e. safety inspectors) and outlines how different UAS operations and technology affect the required knowledge and skills. It also provides guidance on developing and implementing training programmes for CAA personnel.