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Session 8: Building Partnerships for a Sustainable Future



SINGAPORE SUSTAINABLE AIR HUB BLUEPRINT

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CAAS
Civil Aviation Authority of Singapore

SINGAPORE SUSTAINABLE AIR HUB BLUEPRINT

- The Blueprint was launched at the Changi Aviation Summit on 19 Feb 2024, by Mr Chee Hong Tat, Minister for Transport and Second Minister for Finance
- Singapore's action plan for the decarbonisation of its aviation sector
 - Submitted to ICAO as Singapore's State Action Plan
- Sets out Singapore's medium-term and long-term targets, as well as concrete steps that CAAS and the aviation stakeholders will take to decarbonise Singapore aviation
- The Blueprint has incorporated and built upon the recommendations by the IAP



OVERVIEW

Singapore Sustainable Air Hub Blueprint

Reduce domestic aviation emissions from airport operations by 20% from 2019 levels in 2030 and achieve net zero domestic and international aviation emissions by 2050



Airport domain

Maximal efforts to reduce energy use and deploy renewables

- Solar power deployment
- Clean energy airside vehicles
- Building energy efficiency
- Low-carbon electricity imports
- Resource circularity through waste-to-energy



Airline domain

Build ecosystem to support the use of SAF in Singapore

- National SAF target and SAF levy
- Central SAF procurement
- SAF production in Singapore and the region
- Airline fleet renewal and operational improvements



Air Traffic Management (ATM) domain

Operational improvements to increase efficiency and reduce fuel burn

- Advanced demand-capacity balancing implementation
- Performance-based navigation enhancement
- Gate-to-gate trajectory optimisation



Critical enablers

Build coalitions for action

- Policy and regulation
- Industry development
- Infrastructure planning and provision

- Workforce transformation
- International partnerships and collaborations

AIRPORT DOMAIN

Maximal efforts to reduce energy use and deploy renewables

INCREASING SOLAR POWER DEPLOYMENT

- **CAAS will work with CAG to increase solar power deployment at Changi and Seletar Airports, by installing more solar photovoltaic (PV) systems on available rooftop spaces of airport buildings**
 - As of end-2023, Changi Airport has more than 20MWp of installed solar capacity, generating close to 4% of its 2019 electricity consumption of about 700GWh
 - Ongoing plans to install more solar PV systems on available rooftop will further generate 6%
 - Solar panels will be deployed at Seletar Airport as well
- **Changi Airport will commence feasibility study on solar PV systems deployment on airfield, without compromising the safety and efficiency of airport operations**



EXPANDING CLEANER ENERGY USE FOR AIRSIDE VEHICLES

- **CAAS will work with the Changi Airport community to expand the use of cleaner energy for airside vehicles**, to have the entire fleet operate on cleaner energy by 2040, and for all new light vehicles and certain new heavy vehicles registered from 2025 to be cleaner energy vehicles
- CAAS is working with stakeholders to advance three main pathways:
 - Electrification: 20% of around 2,500 airside vehicles at Changi Airport are electric. There are over 100 EV charging stations across the four terminals, increasing to over 300 chargers in the next few years
 - Biofuels: In 2024, CAAS will trial the use of renewable diesel for heavy and specialised vehicles to study feasibility, cost, and operational impact
 - Hydrogen-powered airside vehicles: CAAS will work with stakeholders to conduct hydrogen fuel cell vehicle (HFCV) trials to understand the regulatory challenges, operational impact, and infrastructural changes required to support HFCV adoption



AIRLINE DOMAIN

Build ecosystem to support the use of Sustainable Aviation Fuel in Singapore

NATIONAL SAF TARGET

- **To kickstart adoption of SAF in Singapore, flights departing Singapore will be required to use SAF from 2026, with a target of 1% SAF use**
 - Allow Singapore start transition to SAF and develop an ecosystem for more resilient and affordable supply
 - Provide necessary demand signal for fuel producers to invest in SAF facilities in Singapore and the region
- **CAAS's goal is to raise the target beyond 1% to 3 – 5% by 2030, subject to global developments and the wider availability and adoption of SAF**

SAF LEVY ON USERS OF AIR TRAVEL

- **CAAS will introduce a SAF levy on users (i.e. passengers and cargo) for the purchase of SAF**
 - Pax levy will vary based on factors such as distance travelled and class of travel.
 - Cargo levy will vary based on factors such as distance travelled and cargo weight
- Given SAF market is still nascent and the price of SAF can be volatile, a **fixed cost envelope approach** will be adopted.
 - SAF levy will be set at fixed quantum based on SAF target and projected SAF price
 - As an indication, for a 1% SAF uplift in 2026, we estimate that the levy for an economy class direct flight from Singapore to Bangkok, Tokyo and London to be S\$3, S\$6 and S\$16 respectively. Levies for premium classes will be higher.
- **CAAS will consult stakeholders on the SAF levy and provide more details in 2025 nearer the date of implementation**

CENTRAL SAF PROCUREMENT FUNCTION

- To support the implementation of national SAF target and manage the cost of using SAF, CAAS will centralise the procurement of SAF using the levies collected to aggregate demand and reap economies of scale
- There are also opportunities for businesses and organisations to use the central procurement mechanism for their **voluntary SAF purchases** to reduce their air travel carbon footprint
- Central procurement function can also take on the **management and allocation of SAF credits** generated from SAF use through central purchases
 - For SAF procured under national SAF target, SAF credits will be allocated back to airlines based on the share of SAF levies collected
 - Credits generated from SAF procured voluntarily by businesses and organisations will be allocated based on the amount of SAF bought

ATM DOMAIN

Operational improvements to increase efficiency and reduce fuel burn

OPERATIONAL IMPROVEMENTS TO INCREASE EFFICIENCY AND REDUCE FUEL BURN

- **Advanced Demand-Capacity Balancing**

- Expand suite of Air Traffic Flow Management solutions to include Long Range ATFM (LR-ATFM) and improve coordination and management of longer-haul flights
- Strengthen the integration between meteorology and ATM to improve reliability, timeliness and accuracy of weather forecast information for air traffic controllers

- **Performance-Based Navigation**

- Collaborate with partner ANS Providers to implement more direct routings on a wider scale
- Develop smart tools to facilitate the optimisation of descent flight profiles within Changi Airport to help reduce fuel burn and emissions

- **Gate-to-Gate Trajectory Optimisation**

- Implement a decision support tool for air traffic controllers to optimise the departure intervals between aircraft, which will enhance runway efficiency and increase fuel savings
- Collaborate with stakeholders and partner ANS Providers to work towards Trajectory-Based Operations

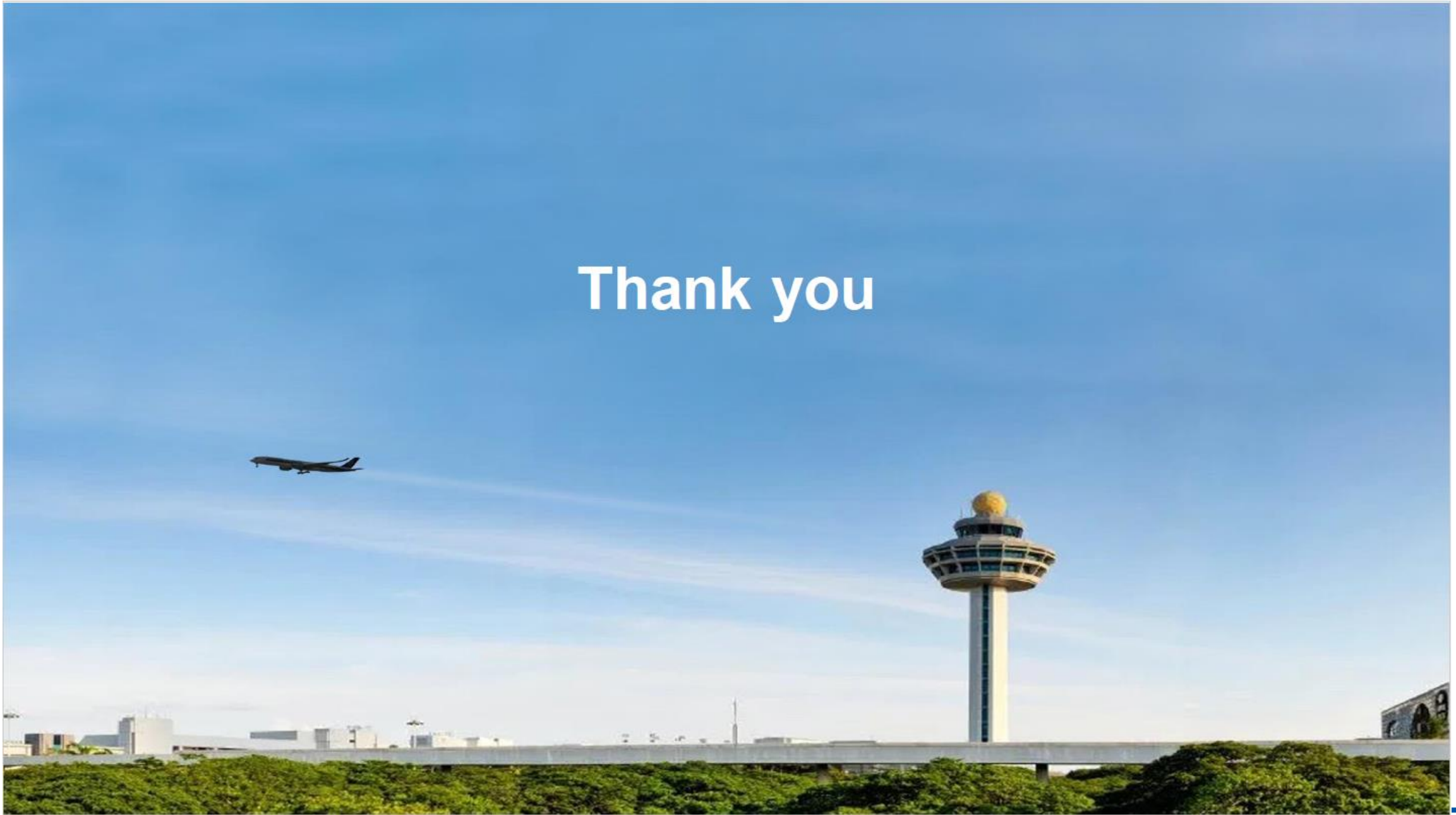
CRITICAL ENABLERS

Build coalitions for action

BUILDING COALITIONS FOR ACTION

- **\$50 million Aviation Sustainability Programme (ASP) was established by CAAS in 2023 to fund sustainable aviation projects**
 - First call for proposals conducted in Apr 2023 and a second call will take place in the coming months
 - As of Nov 2023, CAAS has supported several key sustainability projects, including the feasibility study for the deployment of solar panels on the airfield, a simulation and modelling study for the electrification of airside vehicles, and trials for the use of renewable diesel for ground handling equipment and vehicles
- **CAAS is working with partners to study the technical feasibility of hydrogen adoption and infrastructure requirements for aviation**
 - In Feb 2022, CAAS signed a Cooperation Agreement with Airbus, CAG, and Linde to conduct market analysis on the projected aviation demand and supply for liquid hydrogen, as well as regional readiness and commercial feasibility for the adoption of liquid hydrogen operated aircraft
 - Also evaluate the safety considerations, regulatory challenges, operational impact, as well as infrastructure requirements for hydrogen adoption in an airport

Thank you



Thank You

