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**SMART AND GREEN AIRPORT STRATEGY –  
THE HONG KONG EXPERIENCE**

Presented by Hong Kong, China

**INFORMATION PAPER**

**SUMMARY**

Airport operators are constantly faced with the challenges of meeting the demand for air traffic growth, improving safety and efficiency as well as ensuring the sustainability of the airport. This information paper outlines the on-going efforts taken by Hong Kong, China in implementing various smart and green airport initiatives, and the multifaceted strategy in using innovation and technologies to enhance airfield safety, efficiency and sustainability.

## SMART AND GREEN AIRPORT STRATEGY – THE HONG KONG EXPERIENCE

### 1. INTRODUCTION

1.1 The Hong Kong International Airport (HKIA) has been one of the world’s busiest airports since its opening on 6 July 1998. As the number of flights, passengers and cargo throughout continue to grow, the HKIA is constantly faced with the challenges of improving safety and efficiency while ensuring its sustainability. It is thus important for the HKIA to adopt a strategy which would enable it to continue to operate in a smart and green manner.

1.2 The paper introduces the smart and green airport strategies that have been adopted by the HKIA, which are both crucial to the journey of ensuring environmental sustainability and low carbon transformation, and also continually enhancing safety and operational efficiency in line with the ICAO Global Air Navigation Plan (GANP) and Global Aviation Safety Plan (GASP) initiatives.

### 2. DISCUSSION

#### **Smart and Green Management of Airside Vehicle and Ground Service Equipment (GSE)**

2.1 The use of electric vehicles (EVs) is now a proven technology for replacing fossil fuel vehicles to reduce local carbon emission and air pollution. Back in 2010, the HKIA had begun its 3-phase journey to electrification of 1,360 of its airside vehicles. Phase 1 of the EV programme was launched in May 2012, with the progressive replacement of all fossil fuel saloon cars with electric powered cars by July 2017. Phase 2 immediately commenced in August 2017 to extend the coverage to private cars with gross vehicle weight (“GVW”) of under 3 tonnes. Phase 3 is planned for 2019 which will include all light goods vehicles with GVW of under 5.5 tonnes. Meanwhile, HKIA has begun replacing its entire airside passenger bus fleet with electric buses. When the replacement is completed by 2024, this will contribute to an annual reduction of carbon emission by 1,200 tonnes. This green initiative plays an important role in lowering the carbon footprint at the HKIA and is a particularly vital step towards constructing a zero emission apron.

2.2 The implementation of the Airport-wide Vehicle / Motorized GSE Tracking System by the HKIA in Q1 2017 also brings multiple advantages. Not only could the system ensure better management of driver discipline and the GSE, but the installation of Global Positioning System (GPS) locators in all vehicles and GSE also enables the HKIA and its Ramp Handling Operators (RHOs) to conduct real-time tracking on vehicle and GSE location, speed and engine status for better equipment utilization and maintenance planning. Track records are also available so that driving behaviors can be closely monitored to support the investigation of apron traffic incidents and fine-tuning of apron driving guidelines. This initiative will contribute to improving airfield safety as a whole.

2.3 In addition to the GSE Tracking initiative, a new business model of “GSE Pooling Scheme” (“the Scheme”) is also established and commenced in July 2018. Under the Scheme, the airport operator of the HKIA buys, owns, manages and maintains the GSE and then stations them on each parking stand for RHO rental use. Hence, RHOs will always have the GSE ready on stand which would eliminate the need to search for and transport the GSE from one stand to another. This also reduces the need of waiting for the GSE which could cause delay in aircraft turnaround handling. All GSE procured in the Scheme will be proven electric powered (or zero-emission) models available in the market. When the Scheme is fully implemented in 2024, the HKIA will own 1,000 units of GSE with over 95% being electric powered GSE (EGSE) and become the world’s first international airport to adopt pooling of motorized EGSE to such a scale. Apart from the environmental benefit that can be brought by the Scheme, the provision of critical GSE on stand can also reduce unnecessary aircraft ground delays caused by late positioning of GSE, thus contributing to the enhancement of aircraft on-time performance and airport operating efficiency.

### **Technologies for Improving Runway Surveillance**

2.4 Foreign Object Debris (FOD) can jeopardize runway safety, if not prevented and removed promptly. Yet, with increasing runway movements, the time allowed for runway inspections would inevitably be affected. To maintain runway capacity without affecting runway safety, a new FOD Detection System (FODDS) has been put in place at the HKIA which provides continuous surveillance for the detection of foreign objects on the two runways. The FODDS was put into operational trial in August 2017 and was fully commissioned in April 2018. With the new system, a refined workflow has been established between the air traffic control and airfield operations at the HKIA to ensure that runway inspections and FOD removal can be achieved in a timely manner. This initiative further enhances safety and efficiency of aircraft operations at the HKIA.

2.5 Besides, with the busy HKIA traffic, the limited availability of the runway maintenance window has been a challenge for performing runway maintenance at the HKIA. To address this challenge, new technologies (e.g. unmanned aircraft system (UAS) and laser scanner) are being explored for enhancing the efficiency and effectiveness of runway maintenance. A trial on the use of UAS to capture images of the runway pavement was conducted in February 2018. Another trial on the use of three-dimensional laser scanner for conducting runway pavement survey was also conducted in April 2018. With the use of new technologies, multitude of pavement data can be collected within a short period of time. Subsequent analyses of these data can help formulate preventive and corrective maintenance strategies. This initiative aims to enhance runway safety and the quality of surveillance while meeting the need for increased air traffic demands and improving the overall airport operational efficiency.

### **Better Monitoring and Green Strategy for Airfield Lighting**

2.6 There are about 12,700 units of Airfield Ground Lighting (AGL) in the HKIA airfield. The conventional way of conducting manual and visual inspection on the condition and serviceability of AGL is always a challenge. The HKIA developed an Airfield Ground Lighting Scanning and Inspection System (AGLSIS), which is the world's first automated system to conduct scanning and inspection of AGL. With big data processing ability and machine learning capability, the AGLSIS helps to save over 83% of inspection time while ensuring inspection accuracy in all-weather conditions.

2.7 Besides, as a green measure for airfield lighting, the HKIA conducted a three-month trial on the use of environmental friendly Light-emitting diode (LED) Movement Area Guidance Sign (MAGS) in 2018. Upon completion of safety and risk assessment, all taxiway and runway MAGs at the HKIA would be replaced with LED MAGS in stages. In parallel, the HKIA has also started the replacement of 242 units of High Mast Lighting with LEDs in July 2018 which is planned for completion in Q2 2019. Together with the replacement of other traditional lightings inside the terminal, this lighting replacement programme is estimated to achieve a saving of a total of 18 million kWh of electricity consumption and reduction of 11,500 tonnes of carbon emissions. It further demonstrates HKIA's vision to become the "world's greenest airport".

## **3. ACTION BY THE CONFERENCE**

3.1 The foregoing paragraphs outline the on-going efforts taken by Hong Kong, China in implementing various smart and green airport initiatives, and the multifaceted strategy in using innovation and technologies to enhance airfield safety, efficiency and sustainability at the HKIA.

3.2 The Conference is invited to note the information contained in this Paper.