ICAO ENVIRONMENT

Climate Adaptation and Resilience and Innovation at Airports

ICAO - ACI Aerodromes Seminar
29 to 30 June 2023

Contents

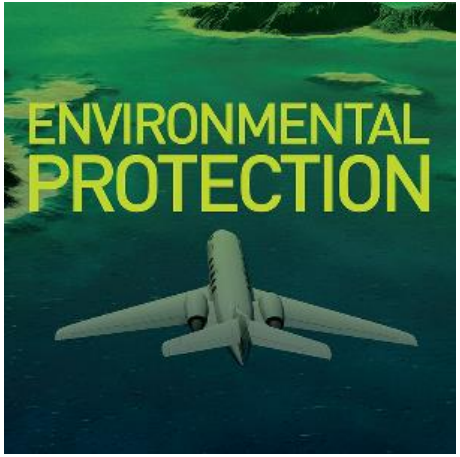
- Climate Adaptation and Resilience
  - ICAO and environmental protection
  - Background and context
  - ICAO/CAEP work on climate adaptation and resilience
- Innovation at Airports
  - Innovation and Aviation
  - Innovation at Airports
    - SAF integration to Airports
    - Cleaner energy transition and sustainable infrastructure
- Conclusion and Next Steps

Climate Adaptation and Resilience

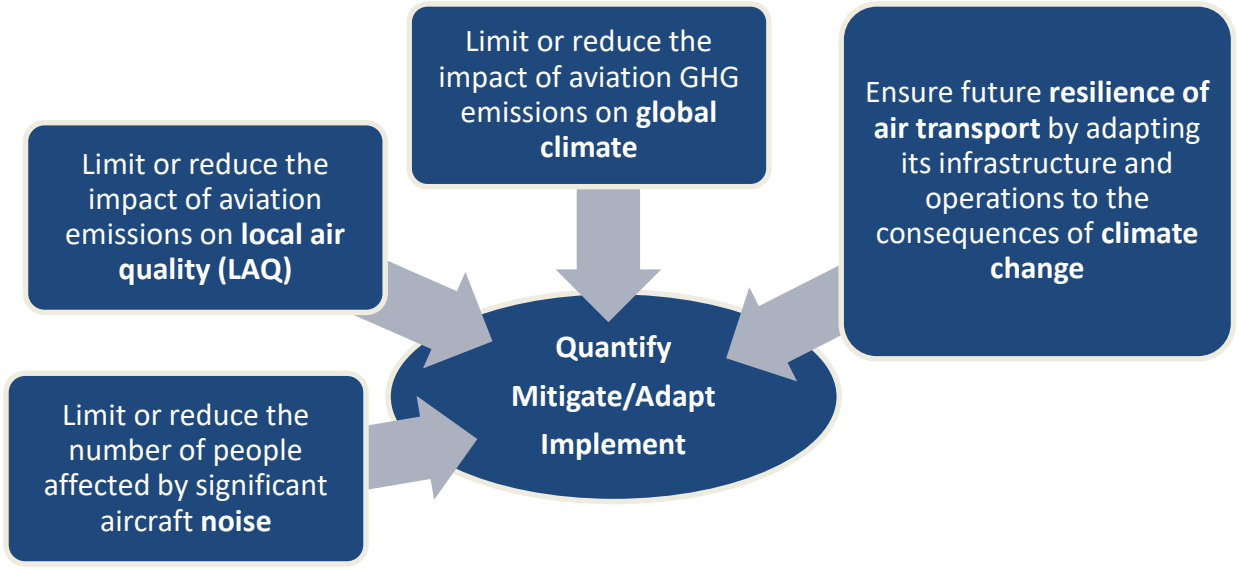
ICAO and Environmental Protection

ICAO Strategic Objective

Minimize the adverse effect of global civil aviation on the environment



ICAO Environmental Goals



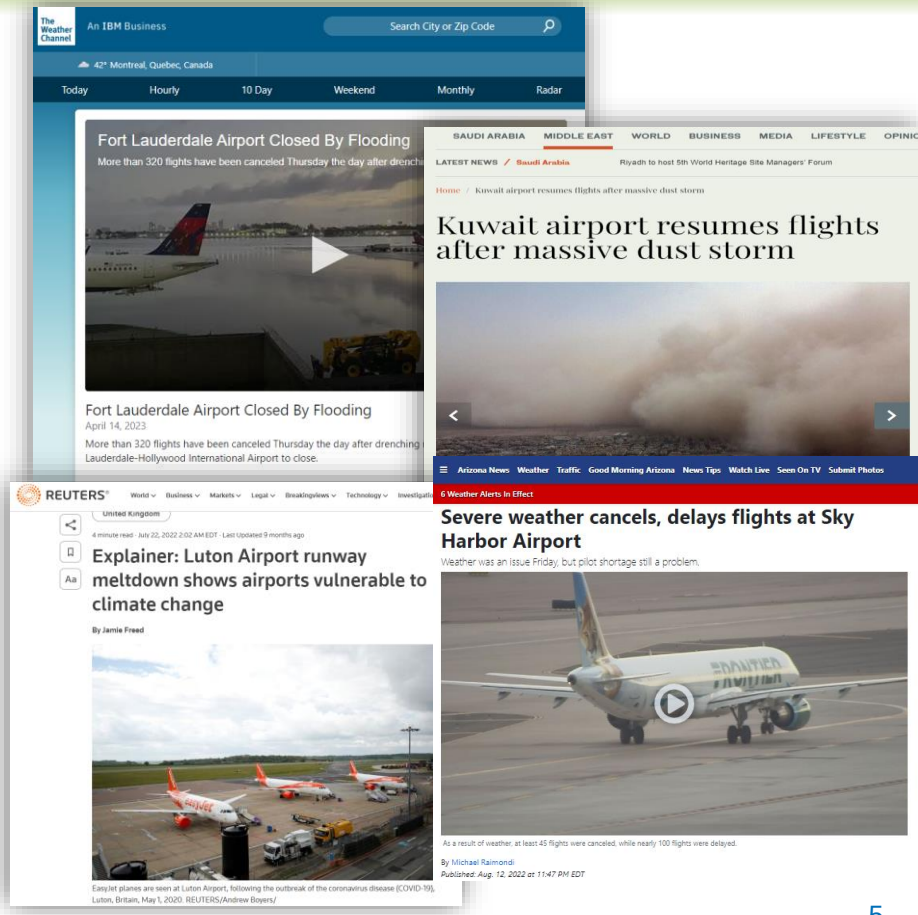
41st Assembly Resolutions on Environment

- **A41-20:** General provisions, noise and local air quality
- **A41-21: Climate change**
- **A41-22:** Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

Climate Adaptation and Resilience (Context)

- Extreme weather events caused by the climate change pose a real and increasing risk to the global aviation industry

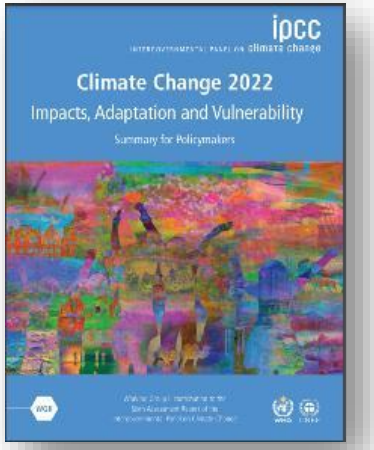
- Aviation stakeholders already experiencing its impacts in the form of:
  - increased intensity of storms
  - higher average and extreme temperatures
  - sea level rises
  - changes in rain, snow, wind, and storm patterns
  - desertification, sand and dust storms
  - more frequent and persistent droughts and wildfires



Climate Adaptation and Resilience (IPCC WG2)

IPCC Working Group II contribution to the Sixth Assessment Report:

- ✓ assesses the impacts of climate change, looking at ecosystems, biodiversity, and human communities at global and regional level
- ✓ reviews vulnerabilities and the capacities and limits of the natural world and human societies to adapt to climate change
- ✓ reveals that global action on adaptation and mitigation needed now to secure a liveable and sustainable future for all



- **Many airports are in the low elevation coastal zone, vulnerable to flooding and sea level rise.**
- **Under a 2 degree scenario, the number of airports at risk of storm surge flooding increases from 269 to 338 or as many as 572 in the highest emissions no-policy baseline scenario, these airports are disproportionately busy and account for up to 20% of the world's passenger routes (Yesudian and Dawson, 2021)**

https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

ICAO Assembly Resolutions on Climate Change

Resolution A38-18 (2013) *Paragraph 33. Requested Council:*

- *to **monitor and disseminate relevant information** on the potential impacts of climate change on international aviation operations and related infrastructure, in cooperation with other relevant international organizations and the industry;*

Resolution A39-2 (2016) *Paragraph 19. Requested Council:*

- *to identify the potential impacts of climate change on international aviation operations and related infrastructure and **identify adaptation measures to address the potential climate change impacts**, in cooperation with other relevant international organizations and the industry;*

Resolution A40-18 (2019) *Paragraph 26. Requested Council:*

- *to identify the potential impacts of climate change on international aviation operations and related infrastructure, identify adaptation measures to address the potential climate change impacts **and develop guidance on climate change risk assessment for international aviation**, in cooperation with other relevant international organizations and the industry*

Resolution A41-21 (2022) *Paragraph 29. Requested Council:*

- *to identify adaptation measures to address the potential climate change impacts and **maintain and enhance guidance on climate change risk assessment and adaptation measures** for international aviation, in cooperation with other relevant international organizations and the industry*

ICAO Work on Climate Change Adaptation

2013

ICAO Joint Support Committee (JSC)

Scoping Study On The Possible Effects Of Climate Change On Air Navigation Services Over The North Atlantic (2015)

2015

38th Session of ICAO Assembly

ssembly \esolution ..

2016

Airport Planning Manual Part II — Land Use and Environmental Management

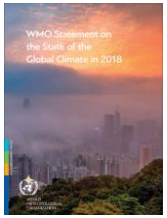
39th Session of ICAO Assembly

ssembly \esolution ..

2018

Eco-Airport Toolkit e-publication on Climate Resilient Airports

WMO Statement on the State of the Global Climate in 2018



ICAO Climate Adaptation Synthesis Report (2018)

2019

40th Session of ICAO Assembly

ssembly \esolution ..

2022

ICAO Climate Risk Assessment, Adaptation and Resilience Guidance (2022)

41st Session of ICAO Assembly

ssembly \esolution ..

2023

ANC Talks on Adaptation and Clear Air Turbulence

ICAO Work on Climate Change Adaptation

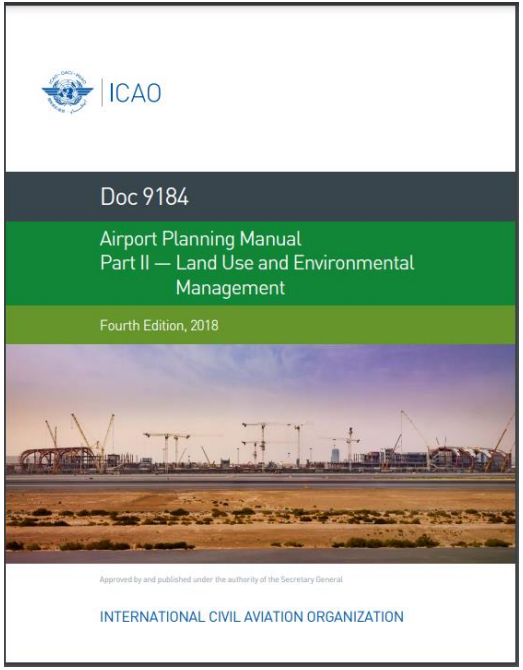
In response to A38-18 (2013):

- ICAO began investigating the effects of climate adaption
- The Secretariat supported the initiative by the ICAO Joint Support Committee to examine potential impacts of climate change on aviation navigation services over the North Atlantic
- The Secretariat worked with Member States to develop the scoping study report
- Impact and Science Group (ISG) of Committee on Aviation Environmental Protection (CAEP) reviewed the scoping study report
- In 2016, it was decided to CAEP would conduct the necessary research and get an understanding of the environmental impacts of climate adaptation

ICAO Work on Climate Change Adaptation

Update to the Airport Planning Manual, Part 2 (ICAO DOC 9184):

- During the CAEP/9 cycle (2010-2013), Committee on Aviation Environmental Protection (CAEP) updated the Airport Planning Manual, Part 2
- The update included elements on eco-friendly airport planning and best practices in land-use planning and management
- During the CAEP/10 cycle (2013-2016) the group tasked to conduct the full review of the document
- Tree new Chapters added:
  - Chapter 4 on " Infrastructure for Environmental Management"
  - Chapter 8 on " Heritage Considerations" and
  - Chapter 9 on " Climate Change Resilience and Adaptation"
- In addition to new Chapters, the manual was updated to include revisions throughout the document, in particular
  - Appendix 2 "Cases of Effective Land Use Management Around Airports" and
  - Appendix 3 "Fact Sheets on land-use planning measures related to airports''



ICAO Climate Adaptation Synthesis Report (2018)

In response to A39-2 (2016):

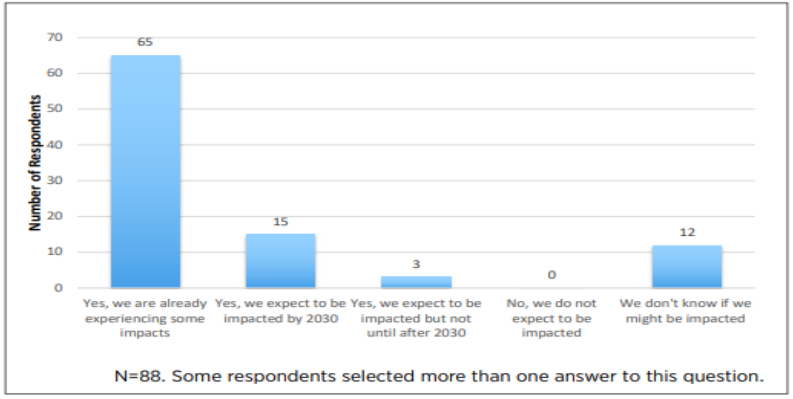
- ICAO Climate Adaptation Synthesis Report, developed by CAEP, synthesizing existing information on the range of projected climate impacts on the aviation sector to better understand risks for:

  airports, air navigation service providers (ANSPs), airlines, and other aviation infrastructure

- Survey conducted to gather input from States and aviation organizations (65 out of 88 responses survey respondents are already experiencing climate change)

- The impacts which most respondents expect to be the biggest challenges were:
  - increased intensity of storms (42 respondents),
  - changing precipitation (38 respondents), and
  - higher average and extreme temperatures (35 respondents)

FIGURE 1: Q1 - Do you expect to be impacted by climate change now or in the future?



ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience (2022)

In response to A40-18 (2019):

- ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience developed by CAEP
- Three interconnected but standalone documents
- Guidance material on risk assessment and adaptation and resilience planning:
  - Includes step-by-step process to carry out a climate change risk assessment and develop and implement a climate change adaptation plan
  - Includes key climate change vulnerabilities for aviation organizations, and
  - Provides menu of adaptation options
- Free of charge on ICAO web-site

Observed Impacts, Effects and Menu of Adaptation Options

Examples of climate impacts and effects on airports:

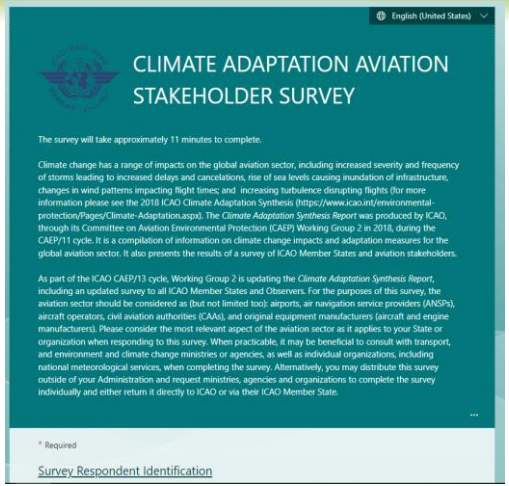
CLIMATE IMPACT	RISK CATEGORY	POTENTIAL EFFECT	MENU OF ADAPTATION OPTIONS
Higher Average and Extreme Temperatures	Operations	Runway length: Limits to operations due to **reduced climb performance** **Increased risk of fire**	- Extend runway length - Cooling runways with recycled water - Pavement design for higher temperatures – design and re-design, maintenance as needed
Increased Intensity of Storms	Business and economics	**Revenue losses** and/or **increased costs** linked to: Flight delays, schedule changes, cancellations, and to operations interruptions and others	- Early warning systems and emergency management plan - Improved weather data availability and quality for flight planning and during flight execution SIDS
Sea Level Rise	Operations	**Temporary closures** of coastal and river airports during recovery from a high tide or storm surge event	- Allow a safe degree of inundation SIDS - Upgrade drainage capacity
Changing Precipitation	Infrastructure	**Flooding** due to insufficient capacity of storm drainage systems , Disruption to ground transport links	- Rainwater catchment systems to adapt to potential water scarcity - Ensure drainage networks are clear, functioning and with sufficient capacity for expected impacts SIDS

The table adapted from ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience

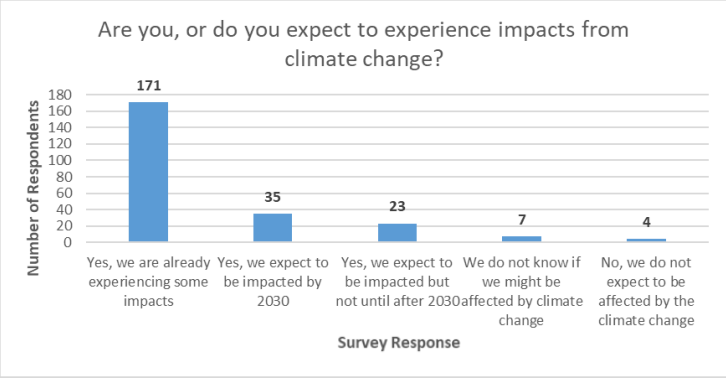
Ongoing CAEP work on Adaptation (2023-2025)

In response to A41-21 (2022):

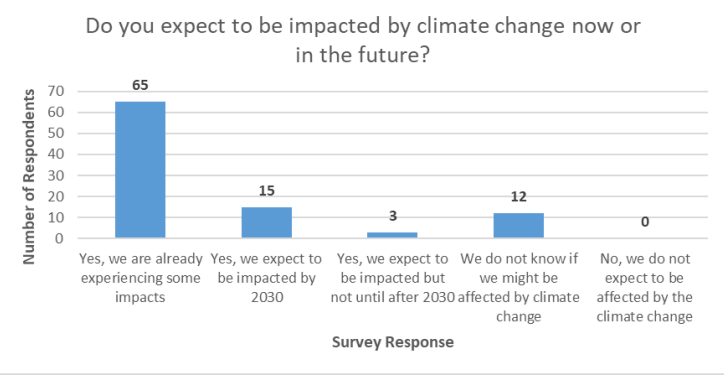
- CAEP WG2 on Airport and Operations
  - Updating the Climate Adaptation Synthesis Report (2018) including re-running the Stakeholder survey
- Preliminary Results Preview
  - Over 250 responses to online survey

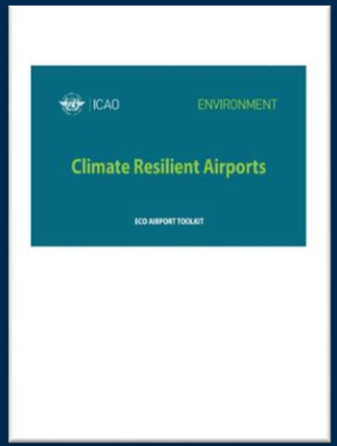


2023



2018





https://www.icao.int/environmental-protection/pages/adaptation.aspx

Innovation at Airports

Innovation and Aviation

- The aviation industry is technology-driven
- Innovations will always be a key driver for the sector and its supply chain
- Innovation is critical for improving efficiency and operational capabilities and for creating value through:
  - ✓ improvements in air traffic management,
  - ✓ transition to cleaner energy,
  - ✓ production and delivery of sustainable aviation fuels,
  - ✓ development of sustainable and resilient infrastructure
  - ✓ transition to digital systems
- New opportunities to advance the sector

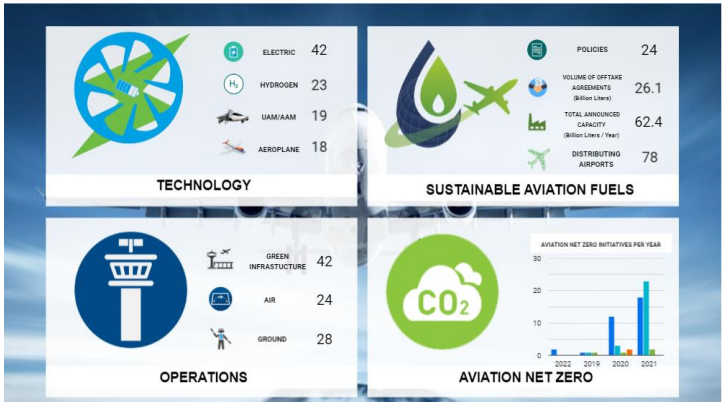
Innovation and Aviation

- ICAO has been at the forefront of driving sustainability initiatives
- Long-term global aspirational goal – LTAG - for international aviation of net-zero carbon emissions by 2050
- Innovation is key for LTAG
- Achievement of LTAG will require collaborative efforts from all stakeholders in the aviation industry

  - ✓ accelerated adoption of innovative aircraft technologies,
  - ✓ implementation of efficient flight operations, and
  - ✓ increased production and use of sustainable aviation fuels - SAF

Innovation and Aviation

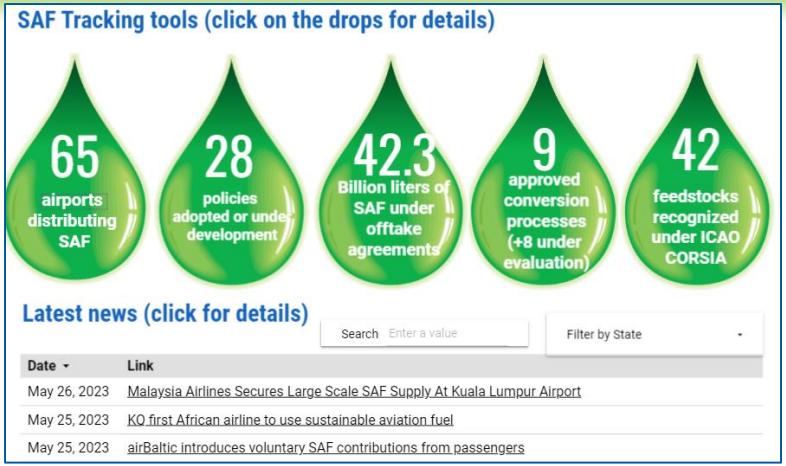
ICAO Tracker Tool

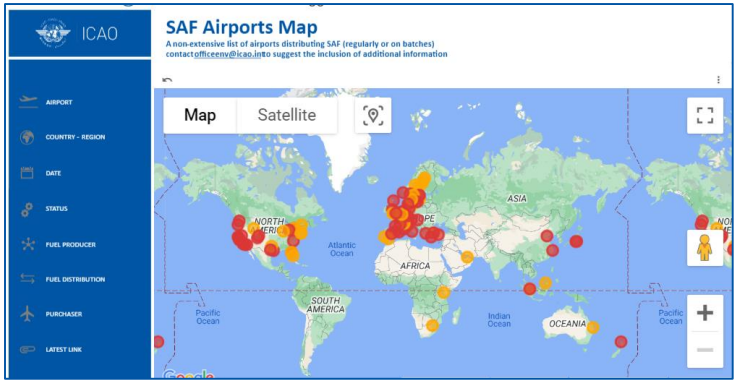


Annual event and continuous process

Integration of sustainable aviation fuels

- Airports have a unique opportunity to facilitate the integration of sustainable aviation fuels
- Airports can create the required supply chain and infrastructure in collaboration with
  - ✓ fuel suppliers, airlines, and government agencies etc.
- Collaboration and engagement with stakeholders across the supply chain can:
  - ✓ drive innovation
  - ✓ increase the production capacity of sustainable aviation fuel, and
  - ✓ address any regulatory or logistical challenges associated





https://www.icao.int/environmental-protection/GFAAF/Pages/Airports.aspx

Cleaner energy transition and sustainable infrastructure

- Successful cleaner energy transition requires a supportive infrastructure framework
- Development of sustainable infrastructure:
  - ✓ deployment of charging stations for electric vehicles,
  - ✓ integration of renewable energy grids,
  - ✓ implementation of smart grid technologies
- Collaboration between airports, governments, and private sector partners for sustainable infrastructure

Conclusion and Next Steps

- Airports are encouraged to conduct risk assessments, develop mitigation measures and take climate resilience and adaptation actions
- Airports hold a critical role in driving a cleaner energy transition and fostering sustainability

Green Airports Seminar in 2024

New Eco-Airport Toolkit publication on "Innovation and Technology in Airport Sustainability"

Continue work closely with other international bodies inside and outside the aviation domain to track latest innovation to reduce the environmental impact of international aviation

ICAO


North American Central American and Caribbean (NACC) Office
Mexico City
South American (SAM) Office
Lima
ICAO Headquarters
Montréal
Western and Central African (WACAF) Office
Dakar
European and North Atlantic (EUR/NAT) Office
Paris
Middle East (MID) Office
Cairo
Eastern and Southern African (ESAF) Office
Nairobi
Asia and Pacific (APAC) Sub-office
Beijing
Asia and Pacific (APAC) Office
Bangkok
THANK YOU