ACRP WebResource 21: Environmental Stewardship and Compliance Training for Airport Employees

Airport Resiliency and Climate Adaptation Training Course

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Course Objectives and Overview

This course will provide basic information regarding resiliency and how airports can use resiliency practices to predict, manage and prevent disruptive events. Resiliency will be discussed in terms of climate change, with the understanding that resiliency at airports can encompass a wide variety of topics.

In this course, you will:

- Gain a basic understanding of airport resiliency as it pertains to climate change
- Become knowledgeable about climate adaptation within the aviation context
- Develop an awareness of steps that could be undertaken to minimize extended disruptions

Links to federal references may be modified over time. Please search FAA and other federal websites to find the most current reference material.

Course Objectives and Overview (cont'd)

Additionally, participants will gain an understanding that:

- Airports are constantly at risk of minor and major disruptions to airport operations
- Many risks that airports face can be prevented or mitigated through comprehensive efforts to incorporate resiliency into operations and infrastructure
- Climate risks and adaptations are the specific focus of many aviation resiliency initiatives and the focus of this training

Key Definitions and Terms

- **Airports Council International (ACI)** – ACI "represents the collective interests of airports around the world to promote excellence in the aviation industry . . . by working with governments, regional ACI members, experts, and international organizations like ICAO to develop policies, programs, and best practices that advance airport standards globally" (ACI n.d.)
- **Climate Adaptation** – "taking action to prepare for and adjust to both the current and projected impacts of climate change," as defined by EPA (2024)
- **Climate Change** – "refers to changes in global or regional climate patterns attributed largely to human-caused increased levels of atmospheric greenhouse gases" (EPA 2024)

Key Definitions and Terms (cont'd)

- **International Civil Aviation Organization (ICAO)** – ICAO is funded and directed by 193 national governments to support their diplomacy and cooperation in air transport. "ICAO develops policies and standards, undertakes compliance audits, performs studies and analyses, provides assistance and builds aviation capacity through many other activities and the cooperation of its member states and stakeholders" (ICAO n.d.-b).
- **Irregular Operations (IROPS)** – "exceptional events that require actions and/or capabilities beyond those considered usual by aviation service providers" (Nash et al. 2012)
- **Resiliency** – "the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to the climate" (EDA n.d.)

What is Resiliency?

Resiliency is the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies (FEMA 2015):

- Organizations use business continuity plans and procedures to keep operating during disruptive events
- A resilient organization continuously anticipates changing conditions and disruptions and adjusts to them
- This approach is summarized as prevention, protection, mitigation, response and recovery

Consider establishing an Airport Resiliency Team to adequately assess and create action plans following events.

Source: FEMA. 2015, September. *National Preparedness Goal, Second Edition.*

Why is Airport Resiliency Needed?

In recent years, airports have seen historic disruptions to air travel caused by:

- COVID-19 pandemic, weather events (e.g., wildfires, floods, hurricanes and tornadoes) and airport power outages

These events resulted in:

- Airlines, passengers, and stakeholders demanding that the integrity of the National Airspace System (NAS) no longer be vulnerable to localized disruptive events

Air travel has long been a volatile industry, but the integration of complex systems and economic and environmental constraints has created vastly greater potential for ripple effects of singular disruptions.

Source: ESA. 2022. *A Guide for Resilience Planning at Airports*

Disruptive Events

Discussions of resiliency often turn to catastrophic events that require immediate response. Examples that will be familiar to airport operators include:

- Aircraft emergencies
- Power disruptions
- Severe weather
- Pandemics
- Natural disasters
- Cyberattacks
- Infrastructure failures

Sources of Risk

While disruptive events demand the ability to respond immediately, other sources of risk, if allowed to manifest over time, can result in serious events.

Examples of risks that can accumulate over time include:

- Climate change impacts
- Aging infrastructure
- Supply chain constraints
- Labor shortages
- Deferred maintenance
- Lack of knowledge transfer

Climate Adaptation and Airports

Climate change is presenting new issues for airports:

- Airports are well-equipped to respond to typical daily and seasonal fluctuations in weather
- However, significant changes to climate over time present unique risks to airport operations and infrastructure
- Consequently, much of the focus of resiliency-related topics in aviation is on the impacts of climate change

Ensure your airport is well-equipped for extreme weather by identifying critical supplies that are essential for staff response.

Aviation Climate Impacts

The International Civil Aviation Organization (ICAO) Airport Planning Manual and Climate Change Synthesis defines nine primary climate impacts:

- Sea level rise
- Storm surge
- Increased storm intensity
- Changing average and extreme temperatures
- Changing precipitation (intensity and type)
- Changing icing conditions
- Changing wind
- Desertification (the permanent degradation of land that was once arable)
- Changes in biodiversity

Airports should be aware of the regional and local effects of climate impacts. Wildfires and related smoke impacts, flooding, and increased thunderstorm activity are examples of localized impacts.

Source: ICAO. n.d.-a. *Climate Resilient Airports: Eco-Airport Toolkit.* https://www.icao.int/environmental-protection/Documents/Climate%20resilient%20airports.pdf

Aviation Industry Recommendations

Airports Council International (ACI) members adopted a resolution on resiliency and adaptation to climate change in June 2018 recognizing the potential impact of climate change on airport infrastructure and operations.

The resolution and policy brief recommends member airports:

- Consider the potential impact of climate change when developing Master Plans;
- Conduct risk assessments of operations and infrastructure based on potential climate impacts;
- Develop and incorporate actions at an early stage according to the risk assessment, in line with the overall business and emergency plans; and
- Develop effective communication channels with all airport stakeholders and local emergency management officials.

Source: ACI. 2018, September. *Policy Brief: Airports' Resilience and Adaptation to a Changing Climate*

Federal Aviation Administration Airport Resiliency Project

The FAA recognizes that airports need comprehensive infrastructure plans and guidance from the Office of Airports to address near-term and longer-term climate risks.

- The FAA and U.S. DOT's Volpe Center initiated a project to address these challenges in September 2021
- Research is expected to continue through the near future
- The initiative will assist FAA and airport operators to better incorporate resiliency analysis and prioritization into airport project planning and funding

Planning projects are a great opportunity to consider resiliency and climate adaptation.

Source: FAA. 2022. *Airport Resiliency.* https://www.faa.gov/airports/environmental/resiliency

Achieving Resiliency

An organization achieves resiliency by identifying threats and developing or enhancing prevention and protection by reducing vulnerabilities.

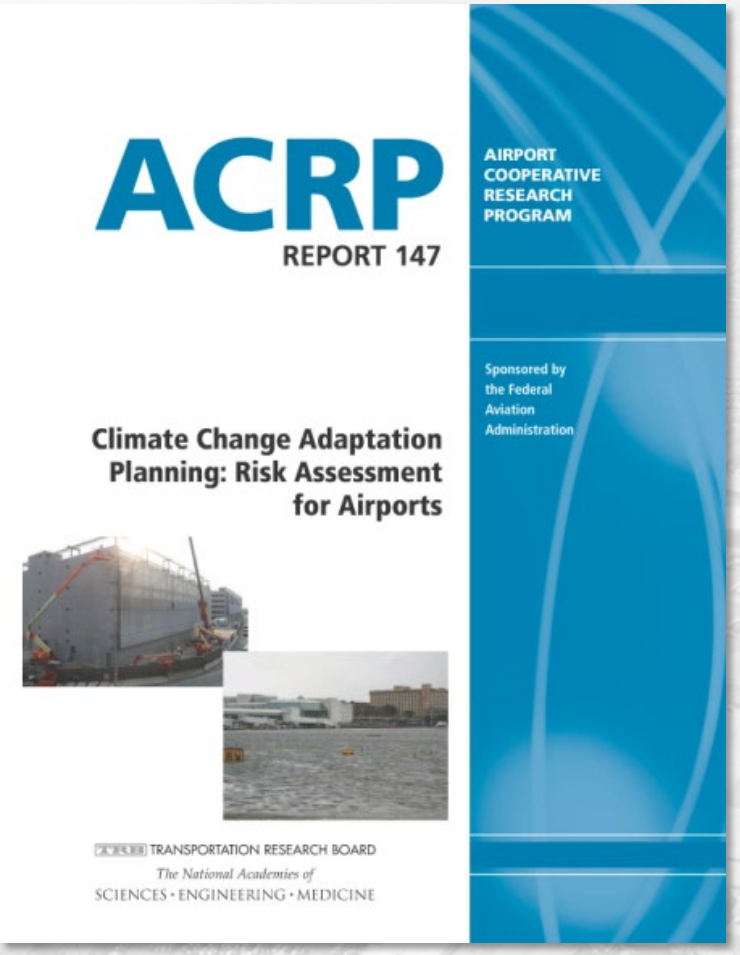
Resiliency to an event occurs in three phases:

- **Before** – Use the resiliency techniques of **prepare** and **plan** (**before** an event occurs)
- **During** – Use the resiliency techniques of **absorb** and **respond** (**during** an event)
- **After** – Use the resiliency techniques of **recover** and **adapt** (**after** an event occurs)

Be knowledgeable about local and regional resiliency challenges and plans.

Source: ESA. 2022. *A Guide for Resilience Planning at Airports.*

Preparation and Planning Before an Event



ACRP Report 147: Climate Change Adaptation Planning: Risk Assessment for Airports identifies steps to incorporate resiliency into event preparation and planning:

- Set resiliency goals
- Identify and inventory critical assets and operations
- Inventory vulnerabilities of critical assets and operations (risk assessment)
- Estimate and prioritize risks
- Develop resiliency-promoting strategies
- Monitor and refine

ACRP Report 147 can be found online at nap.nationalacademies.org.

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Absorbing and Responding to an Event

Responding to events often requires increased resources for airports:

- Operational necessity, stakeholder demand and the regulatory environment dictate that airports develop the ability to respond to and manage disruptive events
- Airport business continuity and emergency plans provide means and develop competencies in event response
- Financial implications, such as extended closures, may occur if adequate planning is not in place
- Irregular Operations (IROPS) plans provide a useful, structured approach to absorbing and recovering from disruptive events

Irregular Operations Planning Resources

Communication, collaboration, and coordination in a holistic manner are required to address varied stakeholder needs during Irregular Operations (IROPS) events.

ACRP has the following reports available for IROPS resources:

- *ACRP Report 65: Guidebook for Airport Irregular Operations (IROPS) Contingency Planning* provides a model plan, sample plans, and worksheets and checklists to develop, evaluate, and update IROPS plans
- *ACRP Report 153: Guidebook for IROPS Stakeholder Communication & Coordination* and *ACRP Research Report 229: Airport Collaborative Decision Making (ACDM) to Manage Adverse Conditions* address planning and decision making for contingent events as well as communication and coordination
- *ACRP WebResource 6: Resources for Managing Small Airports*, Chapter 7.8, which includes IROPS Tabletop Exercise Planning Guide and Scenarios, checklists for communication & coordination, and IROPS Risk Assessment Guide and Tools

You can find ACRP reports online by searching nap.nationalacademies.org for the report title, such as *ACRP Report 65*.

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Recovery and Adaptation after an Event

Risk and criticality assessments, such as local climate change assessments, from the planning phase along with business continuity and emergency planning will inform the development and incorporation of short-term and long-term recovery and adaptation actions.

ACRP Research Report 188: Using Existing Airport Management Systems to Manage Climate Risk identifies specific strategies for addressing risk through various management systems, including:

- Strategic and master planning
- Enterprise risk management
- Safety management
- Capital planning and programming
- Asset management
- Emergency management

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Climate Risk and Adaptation for Airports

ACRP Report 147 provides a guide to help airports understand the specific impacts of climate change and to develop adaptation actions.

Key actions include:

- Set climate resiliency goals
- Assess baseline climate and projected climate changes
- Accompanying the guide is an electronic assessment tool called Airport Climate Risk Operational Screening (ACROS). The ACROS tool uses a formula to compute an estimated level of risk for airport assets and operations
- Update climate information as new data, models, and information become available

Work with local officials to understand regional climate concerns and plan for how the airport can be prepared for future changes.

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ACRP Resources

Other ACRP publications related to resiliency and climate adaptation include:

- *ACRP Report 106: Being Prepared for IROPS: A Business-Planning and Decision-Making Approach*
- *ACRP Research Report 199: Climate Resilience and Benefit–Cost Analysis: A Handbook for Airports*
- *ACRP Synthesis 33: Airport Climate Adaptation and Resilience*
- *ACRP Synthesis 60: Airport Emergency Post-Event Recovery Practices*

What Does this Mean to Your Airport?

What does resiliency mean to your airport?

- Provide the local resiliency statement

Are local initiatives in place? If so, does your airport participate in the initiatives?

- Provide information on state and local initiatives and provide contact information

Do your airport planning documents consider resiliency and climate change?

- Reference resiliency and climate change text in planning documents OR plan to integrate the discussion in future documentation

Does your airport have an IROPS plan? Is it up-to-date? When will it be updated next?

- Reference the latest IROPS plan and point of contact OR plan for the development of an IROPS plan

Are risk and criticality assessments available for your airport?

- Reference any local risk and criticality assessments OR discuss ways to identify risks

Course Wrap-Up

Some key takeaways include:

- Airports are constantly at risk of minor and major disruptions to airport operations
- Many risks that airports face can be prevented or mitigated through comprehensive efforts to incorporate resiliency into operations and infrastructure
- Climate risks and adaptations are the specific focus of many aviation resiliency initiatives

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