

Table of Contents

ICAO ENVIRONMENTAL REPORT



- Foreword**
- 1** **BAN Ki-moon**, Secretary General of the United Nations
- Introductory Messages**
- 2** **Roberto Kobeh González**, President of the Council of ICAO
- 3** **Raymond Benjamin**, Secretary General of ICAO
- ICAO Environmental Protection Programme**
- 4** **Folasade Odutola**, Director of the Air Transport Bureau
- Report Overview**
- 5** **Jane Hupe**, Chief of the Environment Branch
- Introduction to ICAO Environmental Activities**
- 8** ICAO Programme of Action on International Aviation and Climate Change
- A1** Assembly Resolution on International Aviation and Climate Change (A37-19)
- 13** The Committee on Aviation Environmental Protection (CAEP)



- AVIATION OUTLOOK**
- 18** Aviation Outlook Overview
- 19** Air Traffic Outlook
- 22** Noise Outlook
- 27** Local Air Quality Outlook
- 31** Climate Change Outlook



Chapter 1 AVIATION'S CONTRIBUTION TO CLIMATE CHANGE

- 38** Aviation's Contribution to Climate Change – Overview
- 42** Aviation Greenhouse Gas Emissions
- 47** Meeting the UK Aviation Target – Options for Reducing Emissions to 2050
- 51** Greenhouse Gas Management at Airports
- 56** Models and Databases – Review and Recommendations
- 59** The ICAO Carbon Emissions Calculator
- 62** Building on the ICAO Carbon Emissions Calculator to Generate Aviation Network Carbon Footprint Reports



Chapter 2 AIRCRAFT TECHNOLOGY IMPROVEMENTS

- 68** Technology Improvements – Overview
- 72** Pushing the Technology Envelope
- 79** ICAO Technology Goals for NO_x - Second Independent Expert Review
- 83** Environmental and Economic Assessment of NO_x Stringency Scenarios
- 87** Development of an Aircraft CO₂ Emissions Standard
- 91** Subsonic Civil Transport Aircraft for a 2035 Time Frame



Chapter 3 OPERATIONAL OPPORTUNITIES

- 96** Operational Opportunities - Overview
- 98** ICAO's Global Air Traffic Management Operational Concept and Global Air Navigation Plan
- 101** Opportunities for Air Traffic Operations to Reduce Emissions
- 106** NextGen and the Environment – The U.S. Perspective
- 109** SESAR and the Environment
- 112** The Atlantic Interoperability Initiative to Reduce Emissions - AIRE
- 116** The ASPIRE Project
- 118** Operational Measures to Reduce Carbon Dioxide Emissions from Aviation: New Zealand
- 122** Environmental Benefits of New Operational Measures - Brasília Terminal Area



Chapter 4 ECONOMIC INSTRUMENTS

- 128** Economic Instruments – Overview
- 132** Status and Structure of the Carbon Market
- 137** Introduction to Carbon Markets and the Clean Development Mechanism
- 140** Designing an Emissions Cap and Trade Program
- 144** A taxing question ...
- 146** Market Based Measures Task Force - Overview of Reports from CAEP/8
- 152** Voluntary Measures to Address Aviation Greenhouse Gas Emissions from Aviation
- 154** IATA's Carbon Offset Program



Chapter 5 ALTERNATIVE FUELS

- 158** Sustainable Alternative Fuels for Aviation – Overview
- 161** Sustainable Aviation Fuel Research – Masdar's Sustainable Bioenergy Research Project
- 164** Long Term Potential of Hydrogen As Aviation Fuel
- 168** Sustainable Biofuel Raw Material Production For the Aviation Industry
- 172** A Global Fuel Readiness Level Protocol
- 175** Estimating Life Cycle Greenhouse Gas Emissions From Alternative Jet Fuels
- 178** Proposal To Adopt A Global Fuel Qualification and Certification Protocol
- 182** From "Alternative" Fuels to "Additional" Fuels: Overcoming the Challenges to Commercial Deployment



Chapter 6 ADAPTATION

- 188** Aviation and Adaptation to Climate Change - Overview
- 191** Adaptation to Climate Change – Challenges Facing Civil Aviation Stakeholders
- 195** European ATM and Climate Adaptation - A Scoping Study
- 199** Adapting to Climate Change at Airports



Chapter 7 FINANCING

- 204** Aviation and Financing of Emissions Reduction Measures - Overview
- 207** Climate Finance – Challenges and Responses: World Bank perspective
- 210** Financing Biofuels in Latin America and the Caribbean
- 213** The African Development Bank and Climate Change Mitigation in Africa



Chapter 8 ACT GLOBAL: Uniting Aviation on Climate Change

- 218** Act Global
- 219** Liaison With Other UN Bodies
- 222** Green Economy—Time for Take Off?
- 223** International air transport and the global effort to address climate change
- 224** Greening the Blue: Moving the UN Towards Climate Neutrality...
- 227** Moving ICAO Toward Carbon Neutrality