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ICAO: UNITING AVIATION ON CLIMATE CHANGE

# ICAO Colloquium on Aviation and Climate Change

**Measurement, Reporting, Verification and  
what they mean for international aviation**

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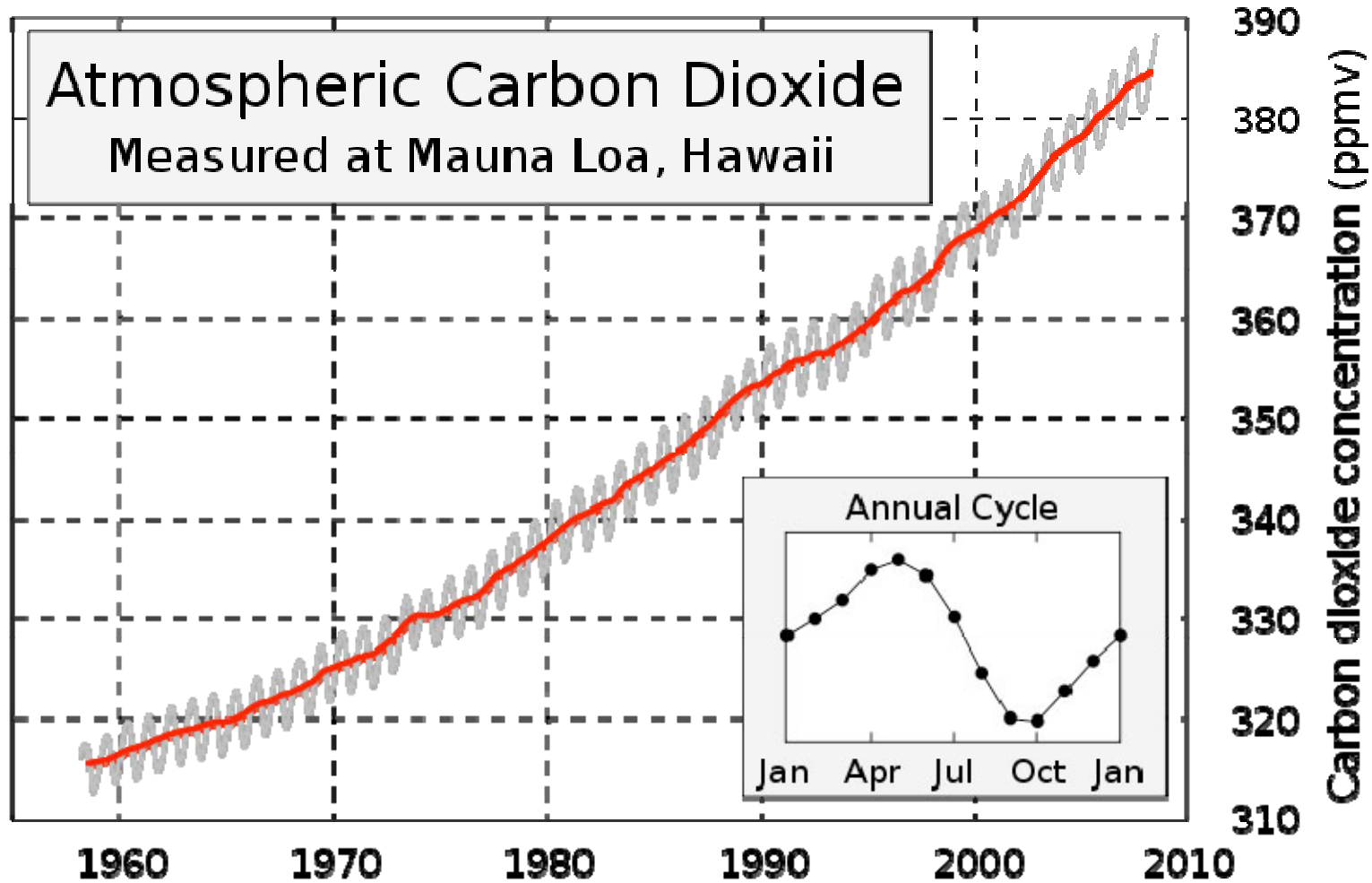


# Impacts

- Climate change is a side-effect of human actions
- More than 30 billion tonnes of CO<sub>2</sub> annually
  - ca. 950 tonnes added every second
- ca. 0.8°C global average temperature increase since the early 1900s
- Economic losses attributed to natural disasters (not specifically to climate change)
  - US\$75.5 billion in the 1960s
  - US\$659.9 billion in the 1990s
  - increasing further in 2000-2010

# CO<sub>2</sub> concentrations

Source: NOAA





## At the same time...

- 6.5 billion people today, but over 8.2 billion people by 2030
  - Increased needs for energy, food, water, shelter, transportation...
  - Electrification of developing countries
  - Eradication of poverty
- Sustainable development is key to our future
  - 50% reduction of GHG emissions by 2050
    - Greening the economy
  - Radical changes in the global production and consumption patterns



# International response

- UNFCCC agreed in 1992 – no legally binding commitments, but overall framework
- Kyoto Protocol agreed in 1997 – legally commitments for 2008-2012
- 5% reduction in about 50% of global emissions (1990)
  - ca. 3% without the USA
- Flexible mechanisms (IET, CDM, JI)
  - CDM a real success story
    - 2,000 registered projects (1,740,000,000 tCO<sub>2</sub> by 2012)
    - +2,000 projects in pipeline (+1,200,000,000 tCO<sub>2</sub>)
  - ca. 100 billion US\$ - carbon market (incl. EU-ETS)
- Compliance mechanism



# The role of GHG data

- Backbone of Convention and Kyoto Protocol
- Used for different purposes and at different levels:
  - International: to assess compliance of Parties with commitments (UNFCCC/KP)
  - Regional: to identify key sectors/gases
  - National: to design appropriate activities
  - Project: to monitor effectiveness

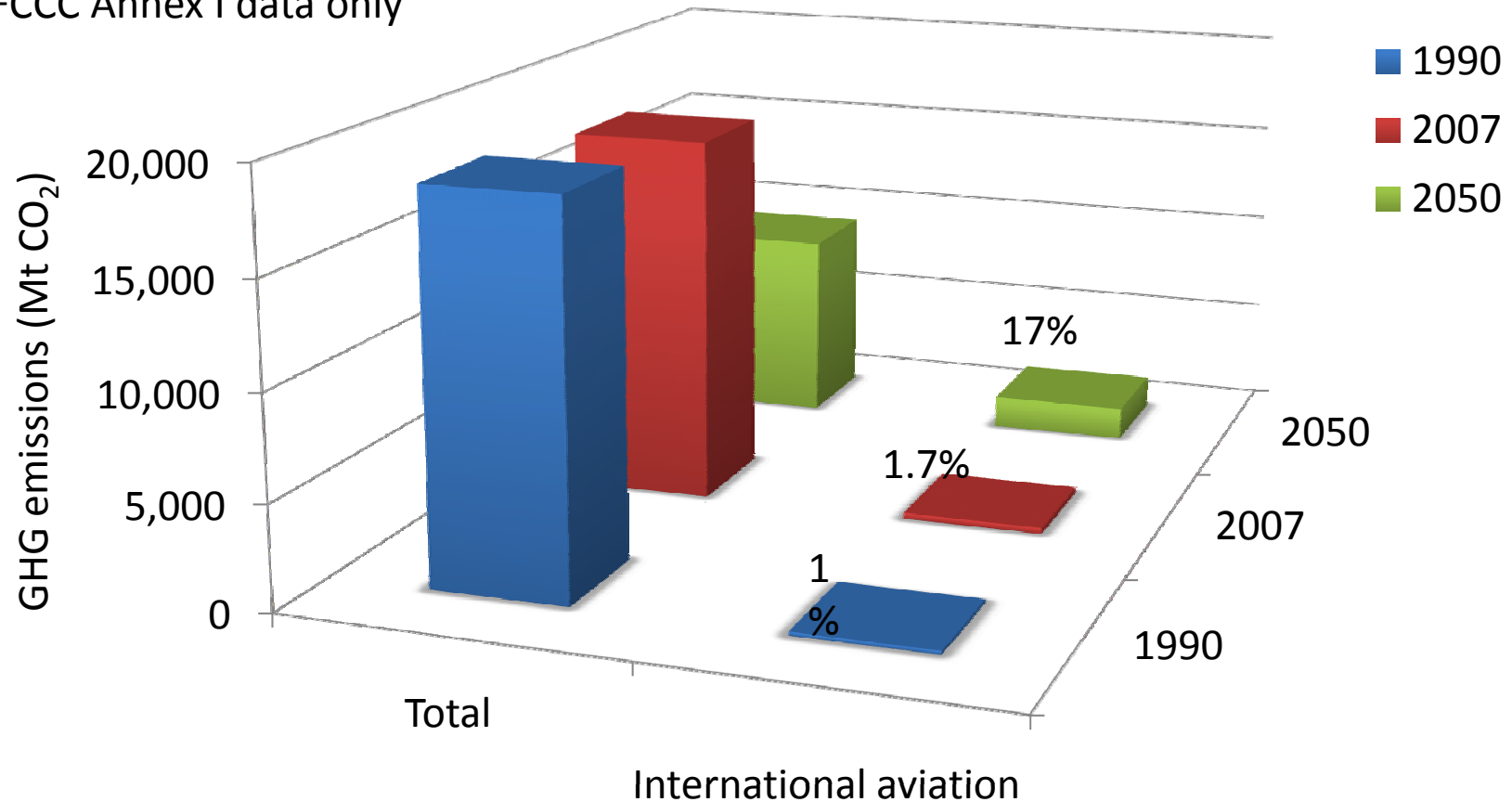


# Emissions from international aviation

- Excluded from international totals and reported separately
- Not subject to the legally binding targets
- Limitation/reduction of emissions through governments' work within ICAO
  
- Expected to be treated similarly under a future regime

# Total vs international aviation

UNFCCC Annex I data only







## Some key considerations

- How to accurately measure and account for GHG reductions?
- How to make sure that durable, lasting, and real reductions are taking place?
- How to ensure that the system of enforcing these reductions is fair and transparent?



# Current provisions

- National/International level:
  - UNFCCC reporting of GHGs in the context of national GHG inventories and national communications (all countries with CBDR)
  - Review process (developed countries only)
- Project/International level:
  - CDM/JI measurement/estimation; reporting; and verification procedures



# Implementation aspects

- Use of internationally developed and accepted methodologies – IPCC Guidelines
- Use of best available national data and emission factors (peer reviewed)
- Review of information:
  - QA/QC
  - Comparison with other countries' data
  - Comparison with international data sources
  - Assessment of uncertainties



# GHG data on international aviation

- Current situation:
  - The UNFCCC does not have a complete picture of the level of international aviation GHG emissions in all Parties
  - Reporting requirements differ among developed and developing countries



# Reporting by Annex I Parties

- Emissions of the main three GHGs (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O)
- Estimates of emissions from international aviation are provided by all Annex I Parties
- General compliance with the provisions of the IPCC Guidelines and the UNFCCC reporting guidelines (all gases and all years)



# Reporting by non-Annex I Parties

- Primarily CO<sub>2</sub> emissions for 1990 or 1994
  - 56 Parties (46 per cent of all reporting) provided a breakdown into marine and aviation emissions
  - 13 Parties provided a total estimate including both aviation and marine emissions
- General compliance with UNFCCC reporting Guidelines, but no reliable assessment can be made about the compliance with the IPCC Guidelines since there is no review process for non-Annex I Parties



# Reporting issues

- In general, the quality and quantity of GHG inventory information reported by Annex I Parties have improved
  - Result of the technical review of GHG inventories
- Improvements relate to both the completeness of the estimates provided and the provision of more detailed methodological and supporting information
- Some of the most common findings by review experts relate to:
  - Need for more information on the distinction between domestic and international fuel use, and
  - Need for more information on methodological issues such as selection of emission factors



# Domestic vs. international emissions

- One of the biggest challenges: obtaining disaggregated fuel data
  - Depends on national circumstances
  - In some countries different national agencies use different definitions of international transport
- No uniform approach among Annex I Parties - various ways used by national statistical agencies:
  - Information on fuel taxation
  - Information on the flag or country of registration of carriers
  - Information received from oil companies or from operators
  - Data on total amount of fuel used and surrogate data, e.g.
    - LTO cycles and “default” fuel consumption factors
    - Fuel expenditures and information on the flag of carriers
- Problems of national statistical systems have led (in some cases) to the allocation of all fuel used to either international or domestic transport



## Definition of international and domestic aviation according to the IPCC

According to 2006 IPCC Guidelines:

<b>Journey type between two airports</b>	<b>Domestic</b>	<b>International</b>
Departs and arrives in same country	Yes	No
Departs from one country and arrives in another	No	Yes

- Based on past experience, difficulties have been identified regarding the international/domestic split, in particular obtaining the information on passenger and freight drop-off and pick up at stops in the same country that was required by the 1996 IPCC Guidelines/GPG2000.
- The 2006 IPCC Guidelines therefore have slightly simplified the data needs as compared to the GPG2000. It is very unlikely that this change would make a significant change to the emission estimates.

## Methods to estimate emissions from aviation fuel use

- IPCC provides advice on estimation methods at two or three levels of detail (= tiers) so that inventory compilers can use methods consistent with their resources.

	1996 Guidelines / GPG2000	2006 Guidelines
Tier 1	Calculation based only on aggregate fuel consumption data	Calculation based only on aggregate fuel consumption data
Tier 2	Calculation based on fuel consumption data as well as statistics on the number of LTOs  Tier 2a – at the aggregated level Tier 2b – at the level of individual aircraft type	Calculation based on fuel consumption data as well as statistics on the number of LTOs
Tier 3	Not explicitly defined	Calculation based upon actual flight movement data

## Summary of data requirements

<b>Data, both Domestic and International</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3A</b>	<b>Tier 3B</b>
Aviation gasoline consumption	X			
Jet Fuel consumption	X	X		
Total LTO				
LTO by aircraft type		X		
Origin and Destination (OD) by aircraft type			X	
Full flight movements with aircraft and engine data				X

(from 2006 IPCC Guidelines)



# MRV in a future agreement

- Key element of Bali Action Plan
- Provisions in Copenhagen Accord:
  - Mitigation actions (and pledged finances) by developed countries to be measured, reported and verified
    - Internationally agreed guidelines
  - Two tracks for mitigation actions in developing countries:
    - Domestically supported actions to be subject to a **domestic MRV mechanism** – to be reported every two years
    - Mitigation actions that receive international support will be subject to **international MRV**



# Future implementation

- Mentality “shift”
- Robust system that addresses most (if not all) imperfections of the present system
  - Make use of ICAO experience on collecting and processing data
- Reliable procedures and processes
  - International/national/project level
- Dedicated resources



# Future human requirements

- Diverse community of qualified, well-trained and ethical greenhouse gas accountants, verifiers, and managers
- GHG professionals to support global systems for managing and reducing greenhouse gas emissions worldwide



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**Thank you!**