INTRODUCTION TO THE ICAO BASKET OF MEASURES

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Introduction to Global Emissions

The main greenhouse gases (GHGs) emitted by aviation are CO_2 and water vapour (H_2O), and aviation is responsible for two percent of anthropogenic CO_2 emissions [IPCC Fourth Assessment Report, 2004], and approximately 65% of this two percent are from international aviation (i.e. approximately 1.3% of anthropogenic CO_2 emissions). Aviation also emits nitrogen oxides (NOx) that impact the concentrations of other GHGs, mainly ozone (O_3) and methane (CH_4). Black carbon (soot) is a directly emitted aerosol, and sulphur oxides (SOx), NOx, and hydrocarbons (HC) lead to aerosol production after emission. Water vapour emissions in combination with emitted or background aerosol lead to contrail formation, and persistent contrails increase cloudiness. Additionally, aviation aerosols may modify natural clouds or trigger cloud formation. There is substantial scientific understanding of the components of aviation impacts on the climate and it is estimated that aviation contributes to surface warming. While CO_2 is particularly understood, there are important uncertainties regarding some of the non-CO_2 impacts and the underlying physical processes which require further investigation. Further information on Aviation Impacts on Climate: State of the Science can be found on page 99.

One of the most valuable references on the effects of aviation on the global climate is the Intergovernmental Panel on Climate Change (IPCC) Special Report on Aviation and the Global Atmosphere, published in 1999 [IPCC, 1999]. This was prepared at the request of ICAO in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer, and was the first IPCC Special Report to consider an individual industrial sector. The report, which is based on data and studies dating back to 1992, highlights the state of understanding of the relevant science of the atmosphere, aviation technology, and socio-economic issues associated with aviation and its climate impact. As the twentieth anniversary of the report approaches, the tenth meeting of the Committee on Aviation Environmental Protection (CAEP/10) considered a number of options to update some of the information contained in the 1999 IPCC Special Report. The meeting agreed that it is premature to ask the IPCC to update the Special Report of 1999, and acknowledged that other means exist to provide independent scientific information to CAEP that is peer reviewed. Led by the ICAO Secretariat, options are currently being explored to update some of the scientific information leading up to the CAEP/11 meeting in February 2019.

ICAO Basket of Measures to Reduce International Aviation CO_2 Emissions

Resolution A38-18, adopted by the 38th ICAO Assembly in 2013, sets forth an overarching policy for the Organization to address the impacts of international aviation on the global climate. It affirmed the global aspirational goals for the international aviation sector of improving annual fuel efficiency by 2%, and stabilizing the sectors' global CO_2 emissions at 2020 levels (carbon neutral growth from 2020).

With a view to achieving the global goals and ultimately the sustainable future for international aviation, ICAO has made important progress, focusing on the development and implementation of a "basket of mitigation measures" to reduce CO_2 emissions from international aviation. The "basket" includes advancements in aircraft technology, operational improvements, sustainable alternative fuels, and market-based measures.

Addressing CO_2 emissions from international aviation through the basket of measures is the ICAO's long-standing comprehensive approach, and provides flexibility for States to mix and match such elements in light of their circumstances.

Aircraft Technology and Standards

Technology can play a major role in reducing emissions; aircrafts produced today are about 80 percent more fuel efficient per passenger kilometre than in the 1960s. A major area of activity of the Organization in the field of aviation and climate change is the development of Standards and Recommended Practices (SARPs), with a view to ensure that the latest technology is incorporated to aircrafts. In particular, the development of a CO_2 emissions certification Standard for aeroplanes has been one of the most challenging tasks being undertaken by the Organization under its Committee on Aviation Environmental Protection (CAEP), which achieved a major milestone at CAEP/10 meeting in February 2016. This new Standard, as the first global Standard for CO_2 emissions of any sector, will apply to new aeroplane type designs from 2020 and to aeroplane type designs that are already in-production in 2023 (see article page 112).

Operational improvements

Operational measures are also among the elements in the basket of measures available to States to reduce aviation CO_2 emissions. Improved operational measures defined in the ICAO Global Air Navigation Plan (GANP) reduce fuel consumption, and in turn,

CO_2 emissions. For every tonne of fuel reduced, an equivalent amount of 3.16 tonnes of CO_2 are saved.

For example, CAEP, in partnership with the operational community, has been assessing the environmental benefits of the Aviation System Block Updates (ASBUs), which is a major initiative to improve global air navigation efficiency (see article page 120).

Sustainable Alternative Fuels

Impressive progress in the development and deployment of sustainable alternative fuels for aviation has been achieved, including commercial flights using sustainable drop-in fuels from a variety of feedstocks and a number of aviation alternative fuel initiatives are currently underway worldwide.

ICAO continues to be at the forefront in facilitating the timely availability of such fuels in sufficient quantities for use in aviation in a sustainable manner, supporting States and stakeholders in their efforts (see article page 153).

Global Market-Based Measure (MBM) Scheme

Since the decision by the 38th ICAO Assembly in 2013, governments and other stakeholders have been working together to develop a proposal for a global market-based measure (MBM) scheme for international aviation, which will play a complementary role as part of the basket of measures to fill the emissions gap and achieve the carbon neutral from 2020.

Significant efforts have been put in place, in particular to find practical means to accommodate special circumstances and respective capabilities of countries that would best fit for the international aviation sector, for decision by the 39th ICAO Assembly in October 2016 (see article page 141).

Sustainable Development Goals