International Civil Aviation Organization

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**WORKING PAPER**

# CONFERENCE ON AVIATION AND ALTERNATIVE FUELS

**Rio de Janeiro, Brazil, 16 to 18 November 2009**

**Agenda Item 1: Environmental sustainability and interdependencies**

## DEFINITIONS

(Presented by the Secretariat)

**SUMMARY**

A number of terms related to sustainable alternative fuels for aircraft are commonly used without a harmonized definition. Definitions are proposed for the terms: short-term, medium-term, long-term, drop-in jet fuel blend, and drop-in neat jet fuel.

A description of the term "generation" is included for the benefit of the Conference discussions, but it is not proposed for inclusion in ICAO Doc 9713 "ICAO Vocabulary."

Definitions for additional terms of interest to the Conference from the United Nations Framework Convention on Climate Change (UNFCCC) are also included for reference.

The conference is invited to approve the recommendations in paragraph 5.

## 1. INTRODUCTION

1.1 A number of terms related to sustainable alternative fuels for aircraft are commonly used without a harmonized definition. To ensure that participants in the Conference have a common understanding of these terms when they are used, the definitions listed in paragraph 2 are proposed for adoption for use during the Conference.

1.2 Definitions of additional terms of interest to the Conference from the United Nations Framework Convention on Climate Change (UNFCCC) are included for reference in paragraph 3.

## 2. PROPOSED DEFINITIONS

2.1 The definitions proposed below for short, medium, and long-term are intentionally consistent with the timescales adopted by the ICAO Group on International Aviation and Climate Change (GIACC) and the UNFCCC at the time of publication. The use of those terms should be in conjunction with a description of the phase of the programme that is being discussed relative to the time frame.

2.2 **Short-term**: from the present day through the end of calendar year 2012.

2.3 **Medium-term**: from 2013 through the end of calendar year 2020.

2.4 **Long-term**: from 2021 through the end of calendar year 2050.

2.5 **Conventional jet fuel**: jet fuel that is derived wholly from conventional petroleum sources, including crude oil, natural gas liquid condensates, heavy oil, oil shale and oil sands.

2.6 **Drop-in jet fuel blend**: a substitute for conventional jet fuel, that is completely interchangeable and compatible with conventional jet fuel when blended with conventional jet fuel. A drop-in fuel blend does not require adaptation of the aircraft/engine fuel system or the fuel distribution network, and can be used "as is" on currently flying turbine-powered aircraft.

2.7 **Drop-in neat jet fuel**: a substitute for conventional jet fuel, that is completely interchangeable and compatible with conventional jet fuel. A drop-in neat fuel does not require adaptation of the aircraft/engine fuel system or the fuel distribution network, and can be used "as is" on currently flying turbine-powered aircraft in pure form and/or blended in any amount with other drop-in neat, drop-in blend, or conventional jet fuels.

## 3. GENERATION

3.1 The term generation is widely used in the popular literature in the context of biofuels for aviation as a means of describing the stage of sequential technological innovation. However, there is no accepted definition for each of the generations of biofuels for aviation. Therefore, the definition below should be used for understanding the potential scope of a given generation, rather than be subject to literal interpretation.

3.1.1 **Generation[1]:** the stage of sequential technological innovation, in the context of biofuels for aviation, described in three generations: first, second, and advanced. First-generation biofuels may utilize food-based sources. The use of these sources as fuel competes with food production and utilizes land that is harvestable for food crops and valuable fresh water resources. Second-generation biofuels are those that utilize non-food based cellulosic and agricultural wastes. These sources have the potential to produce larger quantities of biofuels than the first generation, and can be grown on land with no other valuable use. Second generation biofuels require less energy to grow, harvest and process than first generation biofuels, and therefore result in greenhouse gas (GHG) emissions savings over first generation

[1] A description of the term "generation" is included for the benefit of the Conference discussions, but it is not proposed for inclusion in ICAO Doc 9713 "ICAO Vocabulary." It is the view of the CAAF 2009 planning committee that the use of this term should be avoided due to the imprecise nature of the term and the lack of common usage. However, as noted, the term is often used within the context of alternative fuels.

biofuels. Advanced biofuels are produced from crops or processes beyond what is described by second-generation biofuels, and that result in biofuels with low GHG emissions compared to fossil fuels.

## 4. DEFINITIONS FROM THE UNFCCC

4.1 **Jet fuel**: naphtha-type and kerosene-type fuels meeting standards for use in aircraft turbine engines.

4.2 **Kerosene:** a petroleum distillate that has a maximum distillation temperature of 401 degrees Fahrenheit (205 degrees Celsius) at the 10 percent recovery point, a final boiling point of 572 degrees Fahrenheit (300 degrees Celsius), and a minimum flash point of 100 degrees Fahrenheit (37.8 degrees Celsius). Used in space heaters, cooking stoves, and water heaters, and suitable for use as an illuminant when burned in wick lamps.

4.3 **Naphtha**: a generic term applied to a petroleum fraction with an approximate boiling range between 122 and 400 degrees Fahrenheit (50 and 204.4 degrees Celsius).

## 5. RECOMMENDATIONS

5.1 The conference is invited to:

a) accept the definitions in this paper for the purposes of the Conference on Aviation and Alternative Fuels; and

b) recommend that the definitions for drop-in jet fuel blend and drop-in neat jet fuel be incorporated into ICAO Doc 9713 “ICAO Vocabulary” in the next update of the document.

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