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Agenda Item 1: Developments in research and certification of aviation alternative fuels

Agenda Item 2: Financing and assistance programmes for aviation alternative fuels

Agenda Item 3: Challenges and policy making

EFFORTS OF JAPAN TOWARD THE REALIZATION OF COMMERCIAL FLIGHTS USING ALTERNATIVE JET FUELS

(Presented by Japan)

SUMMARY

This paper introduces the present status of the research and development, and the study on establishment of a supply chain being conducted in Japan toward the realization of commercial flights using alternative jet fuels produced in Japan.

1. INTRODUCTION

1.1 In order to tackle the global warming issue, improving fuel efficiency by 2 per cent per annum and keeping the net carbon emissions from 2020 at the same level were adopted as Global Aspirational Goals for the international aviation sector at the 37th ICAO Assembly in 2010. In order to achieve this goal, there are the basket of measures for reduction of greenhouse gases such as introduction of aircraft technologies and operational improvements. Japan has been proactively introducing new type of aircraft and efficient flight operation so far and, on top of those, now believes that an introduction of alternative jet fuels is indispensable.

1.2 Japan is now tackling the tasks including research and development, and is also conducting political supports to put commercial flights using alternative jet fuels produced in Japan into practice at the timing of 2020 Tokyo Olympics and Paralympics which will possibly attract many tourists from all over the world, as a “milestone” toward a full-scale practical use.

2. PRESENT STATUS OF THE STUDY IN JAPAN TOWARD INTRODUCTION OF ALTERNATIVE JET FUELS

2.1 In May 2014, “Initiatives for Next-generation Aviation Fuels” (INAF) was organized by the University of Tokyo, Boeing Company, Japanese air operators, biofuel producers and airport operators, etc. to study establishment of a supply system of next-generation aviation fuels.

2.2 INAF has advanced discussions on commercialization of next-generation aviation fuels. As a result, a roadmap toward the establishment of supply chains for six types of feedstocks was published in July 2015.

2.3 In the discussions at INAF, it was confirmed that in order to realize commercialization of next-generation aviation fuels, it is important to develop and implement a promotive policy to introduce next-generation aviation fuels thereby leading to cost-cutting and technological innovation in cooperation with industry, government and academia. Based on the discussions, in July 2015, Civil Aviation Bureau, Ministry of Land, Infrastructure, Transport and Tourism, and Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry organized a committee titled “The study committee aiming to realize flights using bio-jet fuel in 2020”.

2.4 The study committee consists of members not only from airlines and biofuel producers but also from fuel suppliers and other stakeholders. The committee has been so often discussing issues concerning prospective airports, types of alternative fuels, approximate volume to be introduced, etc. taking into consideration various restrictions. Major points at issue are as follows.

2.5 With regard to airports to be introduced, in order to use a common oil depot for refuelling, required conditions, transportation method and consensus building concept among parties concerned were discussed.

2.6 With regard to alternative jet fuels to be introduced, in order to produce fuels that can be supplied to the common oil depot by 2020, production planning, its progress, production volume and the overall schedule were discussed.

2.7 The study committee made a study on respective issues in a phased manner as described above, and compiled an action plan in September 2016. In the action plan, the goal is to establish an integrated system to produce alternative jet fuels which meet international standard specification for alternative jet fuels (ASTM D7566, etc.). With regard to a supply chain, it was decided to develop facilities by 2020 covering acceptance, blending, storage, quality identification and shipment of alternative jet fuels produced in Japan, assuming that Haneda Airport is the prospective airport for alternative jet fuels.

3. RESEARCH AND DEVELOPMENT EFFORTS BY PRIVATE SECTORS IN JAPAN TOWARD PRODUCTION OF ALTERNATIVE JET FUELS

3.1 Biofuel producers in Japan have been addressing research and development of the technology to produce fuels from a variety of feedstocks such as micro-algae and cellulose, which meet the international standard specification for alternative jet fuels (ASTM D7566, etc.), and also conducting verification tests thereof toward commercialization. Major examples are shown below.

3.2 A biofuel producer has been conducting the technology development employing the Fischer-Tropsch (FT) process defined in ASTM D7566 Annex1 with the use of wood biomass as a feedstock. It is scheduled to conduct experimental operations from now.

3.3 A biofuel producer has been conducting the technology development employing Hydroprocessed Esters and Fatty Acids (HEFA) process defined in ASTM D7566 Annex2 with the use of micro-algae as a feedstock. It is scheduled to conduct experimental operations toward an increase of the production scale.

3.4 A biofuel producer has been conducting the technology development employing Alcohol to Jet (ATJ) process defined in ASTM D7566 Annex5, and is now conducting research and development of an integrated production process of alternative jet fuels, the process of which is first to produce isobutanol through fermentation by adding corynebacterium glutamicum into cellulosic non-edible biomass as a feedstock and then to convert isobutanol to hydrocarbon.

3.5 A biofuel producer has been developing a production process that is not yet certified by ASTM D7566 is now developing the technology based on Biofuels ISOCONVERSION Process that uses various biomass fats and oils such as micro-algae and non-edible vegetable oils as feedstocks. They plan to conduct experimental operations from now with the aim to obtain the ASTM D7566 certificate.

4. POLITICAL SUPPORTS TOWARD PRODUCTION OF ALTERNATIVE JET FUELS IN JAPAN

4.1 In Japan, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO) are offering various political supports with budgetary provision to domestic producers of alternative jet fuels.

4.2 NEDO started up “Technology development project to establish biofuel production system” and they have been undertaking the task to establish an integrated production process using feedstocks such as micro-algae and cellulose that would not compete with foodstuffs. From FY2014, budgetary support has been conducted and the amount of the budget in FY2017 is 660 million yen.

4.3 Also, METI started up “Verification project of biofuel production using micro-algae” with the goal to establish an integrated process to produce alternative jet fuels from native micro-algae by utilizing CO₂ and heat generated by thermal power stations and nutrition in sewage water. From FY2016, budgetary support has been conducted and the amount of budget in FY2017 is 250 million yen.

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