

Report on recent research activities of JTTRI

(1) Pathways towards decarbonization in Japan's Aviation Sector

[group research program]

(2) Analysis of Airline Strategies in ASEAN **[Transport Policy Colloquium]**

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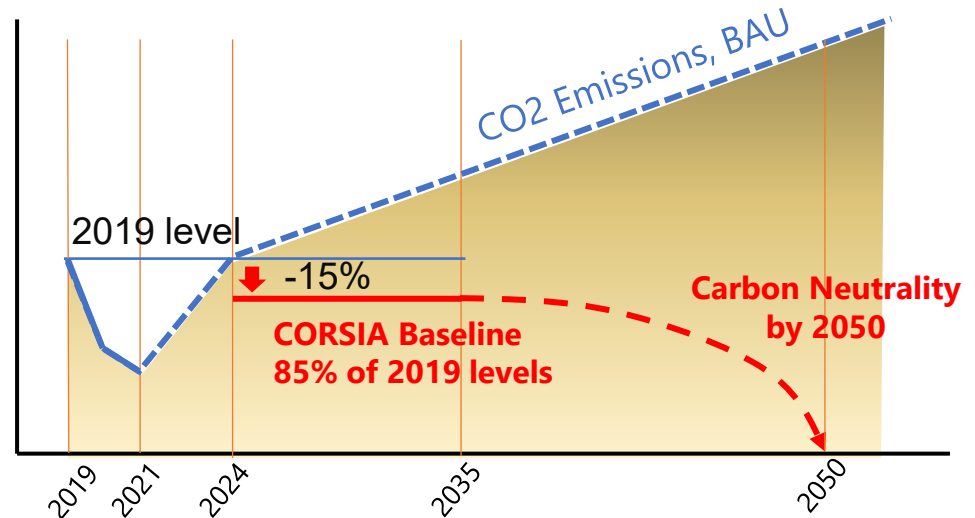
(1) Pathways towards decarbonization in Japan's Aviation Sector

**[JTTRI's group research program
FY 2020-2022]**

Introduction (Background of the Research)

ICAO's Global Aspirational Goals (Oct. 2022)

- Until 2035, No increase of CO2 emissions from international aviation from 85% of CO2 emissions in 2019
- By 2050, Achieving Carbon Neutrality

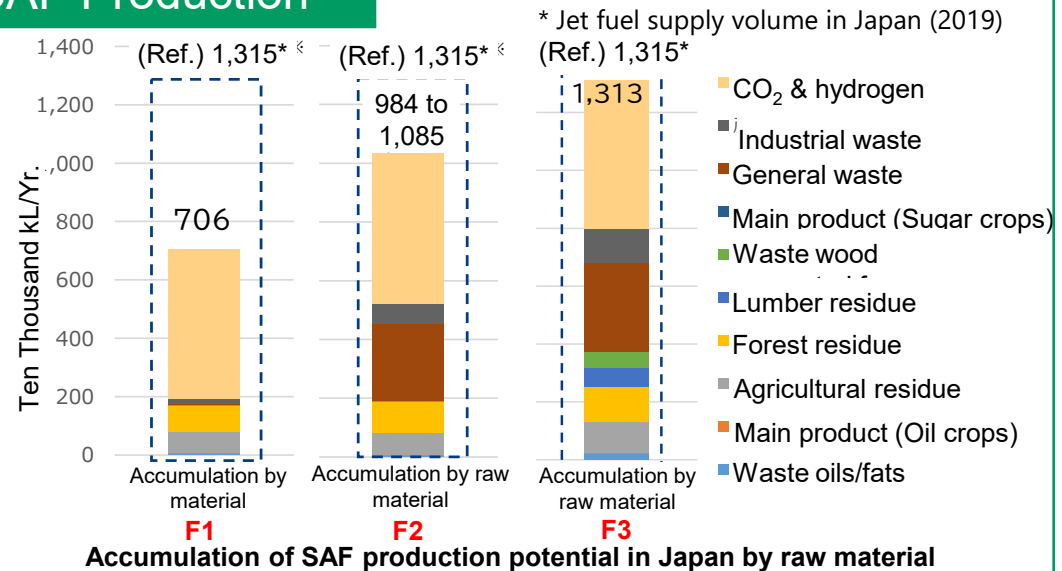


- Is it Possible for Japan's Aviation Sector to achieve ICAO's Goals?
- What is the potential for reducing and offsetting CO2 emissions in Japan by;
 - Introduction of new aviation technologies
 - Operational improvements
 - Leveraging of SAF
 - Carbon credit
- If these potentials are not enough, what additional efforts are required to close the gaps and ensure that targets are achieved?

Potential Long-Term CO2 emissions from Japan's Aviation Sector

Estimation of Potential of Domestic SAF Production

- Investigation of the quantity of feedstock and their current usage in Japan
- Estimation of the potential production volume based on three different fuel scenarios, the availability of feedstock

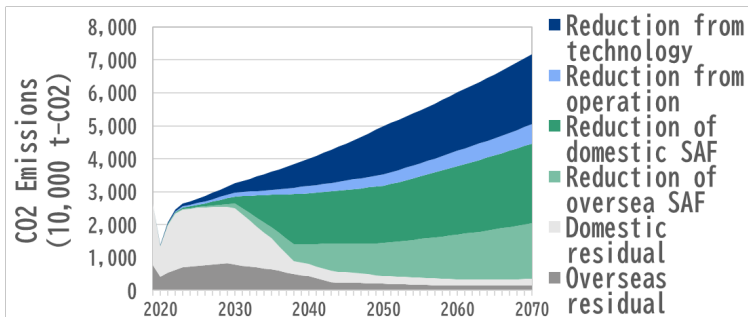


Simulation analysis of Long-Term CO2 emissions from Japan's Aviation Sector

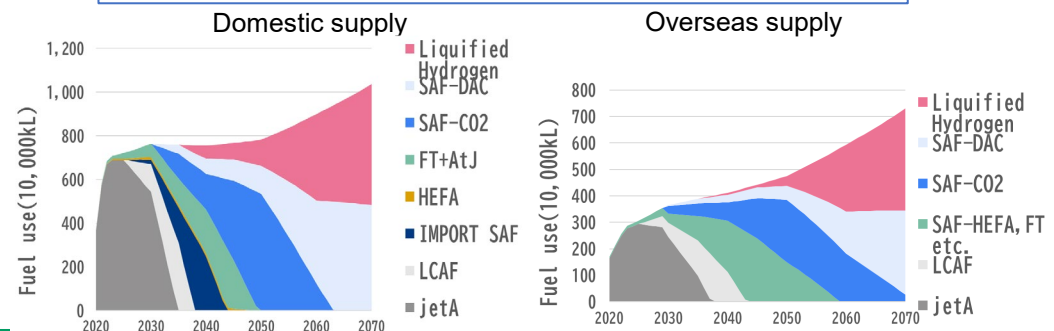
- Based on 9 different scenarios that consider levels of ambition for aviation technology and SAF supply, simulations were carried out to determine the potential reduction in GHG emission

Results of Simulation of CO2 emissions

T3-F3



Transition of SAF in CO2 emissions scenario in the left



Scenarios for Estimating Potential Reduction and Residual of CO₂ Emissions

3 Technology scenarios × 1 Operation Scenario × 3 Fuel scenarios
= 9 scenarios

Aviation-Technology		Operation-Technology		Fuel	
T1	Advanced Tube and Wing	O3	Ambitious	F1	Conservative
T2	Advanced Concept Aircraft			F2	Medium
T3	Advanced Concept Aircraft (E- or Hydrogen Aircraft)			F3	Ambitious

Based on 9 different scenarios, simulations on the following three items were carried out to determine the potential reduction in GHG emission:

- Amount of CO₂ emissions and residual
- CO₂ residual compared to Business as usual (BAU)
- CO₂ residual compared to 2019 level (%)



Estimated Residual CO₂ Emissions by Scenarios

CO₂ emissions in 2030 exceed 85% of 2019 levels in all scenarios.

In 2035, only scenarios with F3 can achieve the target.

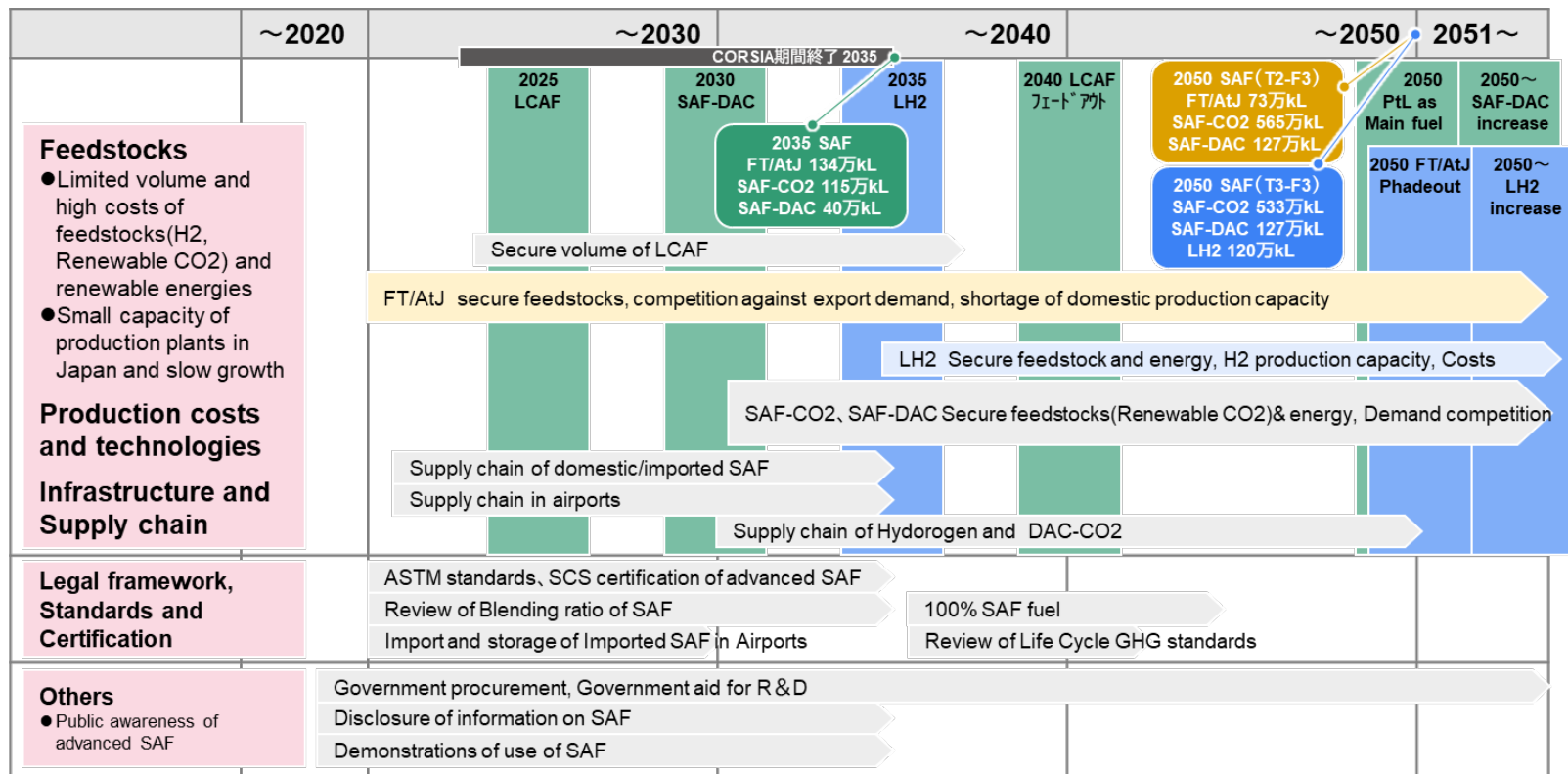
		CO ₂ residual (%) Compared to 2019				
		2019	2030	2035	2050	2070
Internatinal	BAU	100.0%	136.9%	159.4%	249.3%	389.7%
	T1-F1	-	114.5%	111.8%	106.4%	117.5%
	T1-F2	-	111.4%	99.0%	34.3%	52.9%
	T1-F3	-	104.0%	73.1%	27.5%	37.7%
	T2-F1	-	114.5%	111.8%	98.1%	100.9%
	T2-F2	-	111.4%	99.0%	31.7%	42.3%
	T2-F3	-	104.0%	73.1%	25.5%	31.3%
	T3-F1	-	114.5%	111.8%	82.3%	41.2%
	T3-F2	-	111.4%	99.0%	28.6%	24.8%
	T3-F3	-	104.0%	73.1%	22.9%	18.9%

Exceed 85% of 2019 levels

F3 scenarios

Issues to be resolved for securing future SAF in Japan

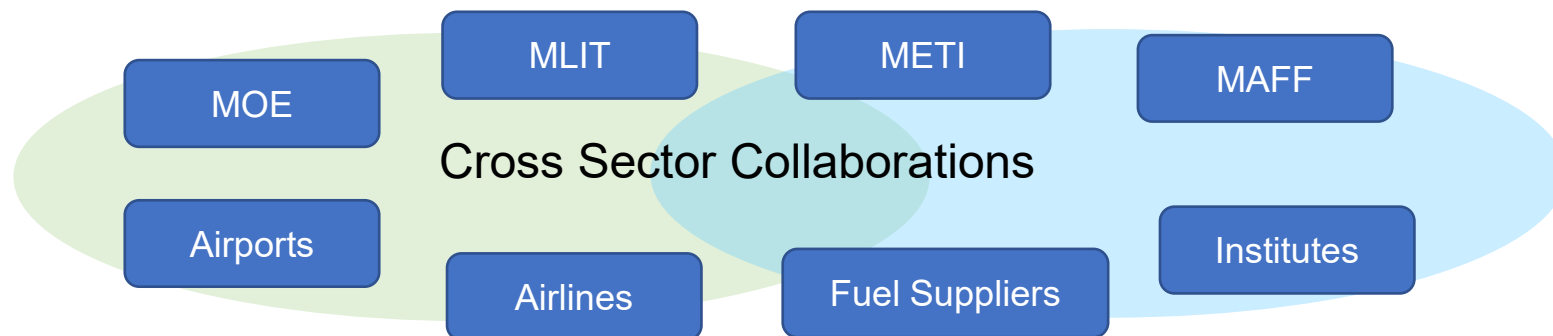
- In order to secure SAF in Japan, **it is important to align with the F3 Scenario, which introduces SAF-DAC by 2030 and LH2 by 2035**. To achieve this, It is important to establish a clear direction for these new fuels and take advanced action
- Key issues to be resolved : **Securing feedstocks for advanced SAF such as Hydrogen and renewable CO2**, analyzing the supply of Renewable energy and feedstocks, including **demand competition among industries**, estimating costs and designing markets, **conducting R&D on technologies to reduce costs**, **building infrastructure for the supply chain**, and **establishing legal frameworks and standards for new fuels**.



Conclusion

- For SAF, the amount of domestically produced SAF based on Japan's potential to procure raw materials has been quantitatively demonstrated.
- For Long-term CO2 reduction goals, simulations were conducted for 9 different scenarios that considered the levels of ambition for aviation technology and SAF supply, as the simulations were made of the potential reduction of GHG emissions. 2 scenarios were presented as the preferred options for Japan to achieve ICAO's short-, Mid-and Long-Term Goals
- With a cognizance of long-term reduction scenarios, as well as the description of short to mid-term challenges and strategies, a summary was provided regarding the medium to long-term barriers to achieving carbon neutrality by 2050 in the aviation sector in Japan and the direction of countermeasures.

This research indicated an urgent need to establish a domestic SAF supply chain and necessary measures for that purpose, and cultivated stakeholders' recognition of this matter and cross sector collaborations.



(2) Extracts from Discussions at the 154th Transport Policy Colloquium (March 2023)

ASEAN-India Regional Report: “Analysis of Airline Strategies in ASEAN”

- Report by YAMASHITA Yukio, Senior Research Fellow and Senior Director ASEAN-India Regional Office (AIRO), JTTRI

1. Characteristics of recent strategies of major ASEAN airlines

- Tendency to reorganize airlines within a group as part of portfolio strategy
- Increase in incidental revenues other than air-passenger revenues and expansion into lifestyle and other non-aviation businesses
- Utilization of customer information and other data obtained from airline business
- Operation in regionwide multiple countries with unified branding
- Challenge for recovery from COVID-19 crisis: to secure human resources and supply volume

2. Insights into the situation in Japanese airlines

- Japan also seems to be following the ASEAN trends
- Acceptance of online apps, etc., by passengers, which is the case in ASEAN, could boost LCCs

- Comments by HANAOKA Shinya, Professor, Tokyo Institute of Technology
 - Characteristics of ASEAN LCCs
 - Aligned with middle-class needs/Regional size suitable for short-haul routes
 - Tony Fernandes, CEO of AirAsia, has outstanding management vision
 - Linkage between regional alliances and regional aviation liberalization policies
 - Companies establish LCC joint ventures in countries outside their home base.
 - This is because ASEAN Economic Community (AEC), unlike EU, recognizes only 5th freedom
- Comment by coordinator YAMAUCHI Hirotaka, President for Research, JTTRI
 - Route expansion, including multiple hubs, is also part of ASEAN airlines' portfolio strategy
- Implications for Japanese airlines toward future with recovery from COVID-19
 - Non-air-passenger revenues and non-aviation businesses are important
 - Address market in a wider economic area such as APEC rather than East Asia

Thank you for your attention !
