

China's Sustainable Aviation Fuel (SAF) Policies and the Rising Industry

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The "14th Five-Year" Civil Aviation Green Development Plan on SAF

In Nov. 2021, Civil Aviation Administration China (CAAC) issued SAF road map:

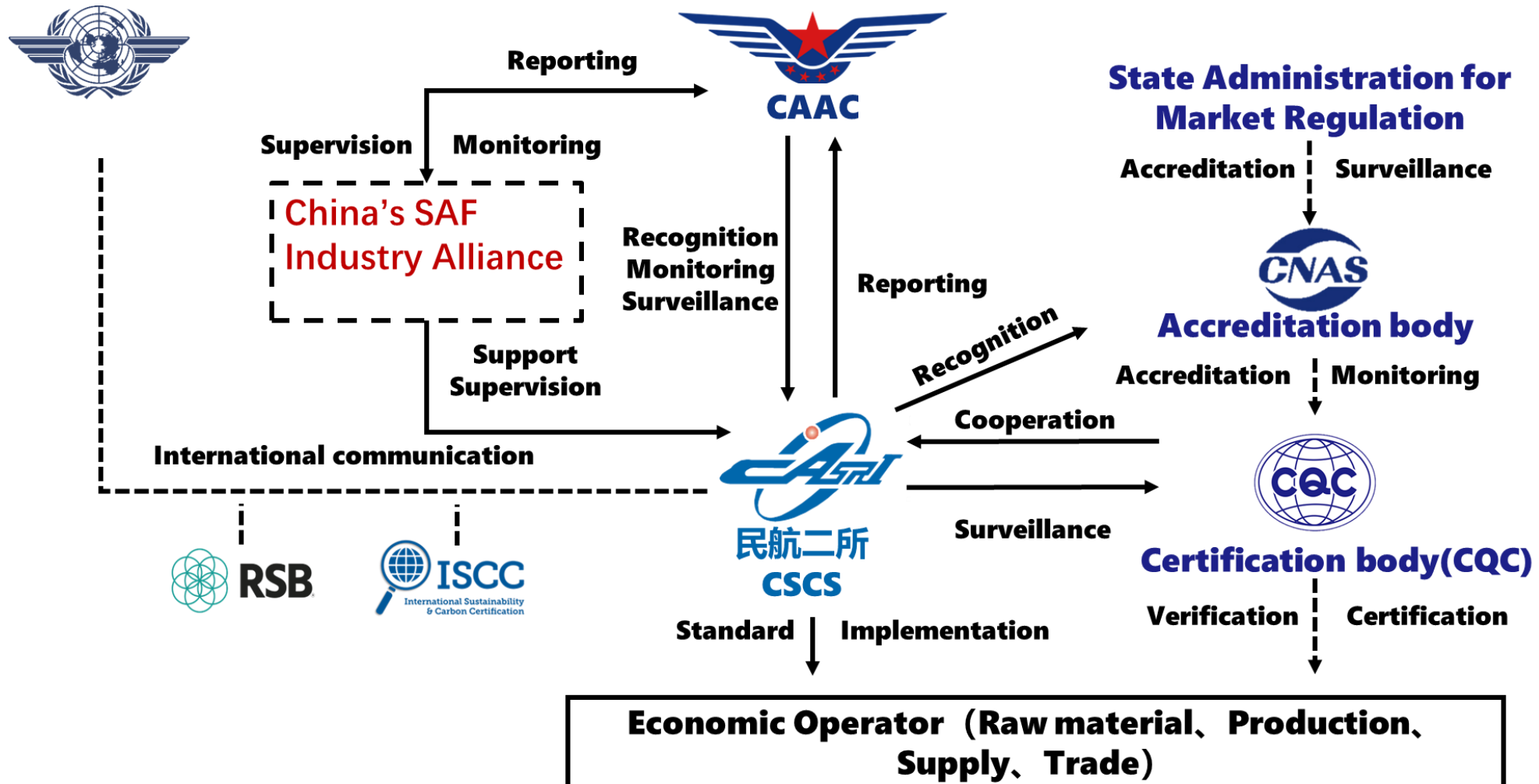
- ✓ By 2025, the accumulative consumption of SAF will be 50,000 tons, 2025 alone reach 20,000 tons.
- ✓ To accelerate the formulation of SAF standards and promote industrial development
- ✓ To accelerate the establishment of a SAF certification system, and the construction of a SAF airworthiness certification system
- ✓ To carry out demonstrations on the regular application of SAF, pilot models of SAF
- ✓ To build the civil aviation decarbonization technology R&D and verification laboratories.

China's First SAF Technical Center Opened

- ✓ The center opened on 1 July, 2024 in Chengdu, China
- ✓ The center's missions include setting up industry policies and products standards.
- ✓ SAF testing facilities are ready to go.



A Chinese certification system for sustainable fuel in testing stage



Current SAF Production in China

- ✓ **SINOPEC Zhenhai Refining** uses waste cooking oil to produce SAF, it has a annual capacity of **100,000** tons
- ✓ **EcoCeres** also uses waste oil to produce SAF, its capacity reaches **300,000** tons per year.
- ✓ **Henan Junheng Industry Group Biotechnology Co. LTD** , with annual capacity of 10,000 tons, uses POME (palm oil mill effluent) and other waste bio- oil for SAF



Commercial aircraft corporation of China Ltd completed the first flight using sustainable aviation fuel (SAF) with an ARJ21 and a C919.

Existing SAF Technology-HEFA

Currently, global SAF production is dominated by the HEFA pathway.

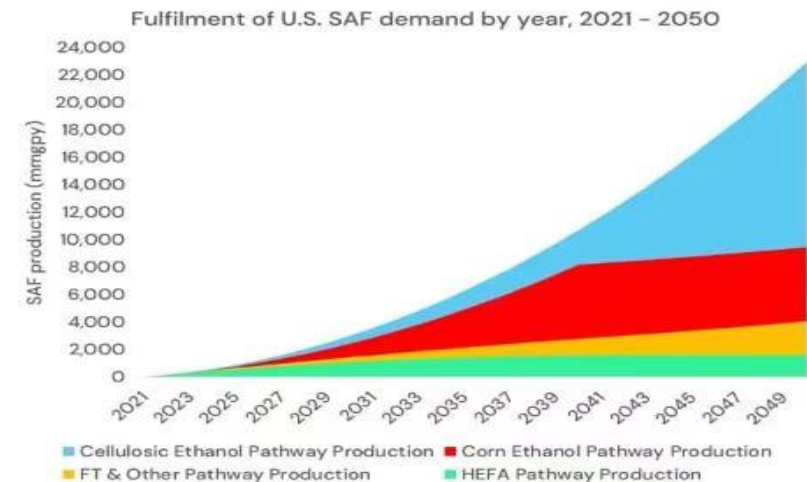
- ✓ Topsoe's Hydroflex™ technology
- ✓ Honeywell's Ecofining™ technology
- ✓ SINOPEC's Oil Hydrogenation technology

Is there enough McDonald's in the world?



Ethanol to Jet Fuel Technology

- ✓ Ethanol is a promising feedstock for SAF production, the US wants to use ethanol to produce SAF.
- ✓ Corn ethanol is not qualified as SAF feedstock. Climate-smart agricultural practices including no till, cover crops and enhanced efficiency fertilizers should be adopted for corn production to reduce.
- ✓ **TotalEnergies, Topsoe, Honeywell** have the needed EtJ technology to produce SAF with alcohol, and ethanol will take the lead as a top feedstock in SAF production



Biomass gasification & FT technology in testing

Biomass gasification & FT technology is designed to produce SAF from crop residues, wood waste or food scraps to tackle feedstock limitations. Technologies are available, i.e.

- ✓ Topsoe's G2L™ Biofuels
- ✓ Johnson Matthey's Fischer Tropsch (FT) CANS™
- ✓ Honeywell's Fischer-Tropsch (FT) Unicracking™



e-SAF is not commercialized now

- ✓ **Shell quits Swedish e-SAF project**
- ✓ **Vattenfall has cancelled Offshore Hydrogen production project**



Shell quits Swedish e-SAF project, and it and utility **Vattenfall** will not take up an €80.2mn (\$87mn) EU Innovation Fund grant.

<https://www.safinvestor.com/news/145415/e-saf-project/>



An electrolyser was never connected to an offshore wind turbine to produce hydrogen

Vattenfall drops offshore hydrogen production plans a year ahead of operations

<https://www.h2-view.com/story/vattenfall-drops-offshore-hydrogen-production-plans-a-year-ahead-of-operations/2107468.article/>

China and the EU can work together to tackle climate change

- ✓ EU mandated using SAF, 2% of aviation fuels in 2025, 6% in 2030.
- ✓ China expects to blend 5% SAF by 2030.
- ✓ China has rich bio-resources and solid petrochemical production system, which can meet SAF demands of both China and the EU.
- ✓ EU has the technologies but needs bio-resources.
- ✓ Taking advantages of Europe's advanced SAF technology and China's rich bio-resources and production capacity, jointly we can control climate change to achieve our common goal which is to realize net zero emission.

Thank you