Policy Recommendations for Developing Sustainable Aviation Fuel (SAF) into a Competitive Industry in China

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Executive Summary

Climate change is a global issue. President Xi Jinping's solemn goal of achieving carbon neutrality by 2060 demonstrates China's commitment to this issue. Premier Li Qiang stated in the 2025 government report that China will "accelerate the development of a green and low-carbon economy", "actively and steadily promote carbon peaking and carbon neutrality", and "coordinate efforts to reduce carbon emissions, pollution, and increase green growth, accelerating the comprehensive green transformation of economic and social development".

Swire Group, rooted in China for 159 years, is a highly diversified multinational conglomerate with five business divisions: Property, Beverages & Food Chain, Aviation, Marine Services and Trading & Industrial. Swire Group's business is concentrated in Hong Kong and Chinese Mainland. As a firm supporter and practitioner of sustainable development, Swire Group has formulated a clear group sustainability strategy, Swire THRIVE, to address important environmental issues such as climate change, carbon reduction, water resource protection, and waste reduction. The group has been committed to contributing to China's high-quality development. This document draws on Cathay Pacific's recent exploration experience in sustainable aviation fuel to deeply consider the development path of the sustainable aviation fuel industry and proposes suggestions for the development of China's sustainable aviation fuel industry based on international practises.

As one of the world's leading airlines, Cathay Pacific has taken various measures over the past few decades to mitigate its impact on climate change, including continuously improving fuel efficiency, introducing new aircraft, and exploring SAF. Cathay Pacific has now committed to achieving net-zero carbon emissions by the middle of this century. Given that the role of existing technologies in improving fuel efficiency has reached a bottleneck, the low-carbon development goals of the aviation industry largely depend on the large-scale application of SAF.

Although China is temporarily behind Europe and the United States in SAF policy, it has long mastered key technologies in the production field and has production

capacity facilities that are already in operation or under construction. In August 2024, the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Accelerating the Comprehensive Green Transformation of Economic and Social Development", which clearly requires "strengthening the research and application of sustainable aviation fuel". In September of the same year, SAF uplift pilots were launched at four airports and on twelve routes nationwide, but there are currently no production targets or long-term commitments to the use of sustainable aviation fuel.

The policy environment has a significant impact on the development and application of sustainable aviation fuel. Due to the high production cost of sustainable aviation fuel, it relies on policy support to narrow the price gap and compete with fossil fuels until production scale can be expanded and costs reduced to price parity.

To promote the development of SAF industry in China, we mainly have two recommended measures:

1. **At the central government level, include the development of the SAF industry in the national "15th Five-Year Plan", position it as a strategic emerging industry for support, and make corresponding arrangements in long-term industrial development planning, industrial policies, import and export trade measures, and R&D.**
2. **In the national strategy, further upgrade the status of Hong Kong International Aviation Hub to an international leading SAF hub and consider building the Guangdong-Hong Kong-Macao Greater Bay Area into an international leading SAF ecosystem, promoting the formation of a full-chain SAF ecosystem in the Greater Bay Area.**

Sustainable aviation fuel (SAF) refers to jet fuel produced from feedstock such as used cooking oil, agricultural and forestry waste, energy crops, and green hydrogen through refining processes. Compared with traditional fossil-based jet fuel, its feedstock are renewable and clean, and it can be blended with traditional jet fuel for use in airports and aircraft equipment. The ultimate effect is to reduce carbon emissions by about 80% over the entire lifecycle compared to traditional jet fuel.

After several years of development, Europe, the United States, and some countries Asian region have made significant progress in SAF. In contrast, China's sustainable aviation fuel industry is relatively lagging behind. Therefore, it is urgent to strengthen top-level design at the national level, consolidate consistent advantages in the new energy field, accelerate the promotion of the "dual carbon goals", and cultivate SAF as the next globally leading competitive industry after photovoltaic power generation and electric vehicles.

1. Current Status of International SAF Development

Currently, China's SAF industry is relatively lagging behind, as there is no policy roadmap or supporting measures for SAF development and application. Looking globally, apart from the European Union (through the Refuel EU Aviation legislation) and the United Kingdom (through the RTFO 2024) mandating the addition of 2% sustainable aviation fuel this year, other regions have the following clear SAF policy regulations:

- **United States Federal Government**: Unlike the common logic in Europe and Asia, the United States mainly stimulates the production and use of sustainable aviation fuel through subsidies. At the federal level, the "SAF Grand Challenge" was introduced in 2021, requiring the production of 3 billion gallons (about 9 million tons) of SAF in the United States by 2030 and 35 billion gallons (100 million tons) by 2050 to meet the needs of American airlines. Additionally, the Inflation Reduction Act (IRA) introduced during the Biden administration provides tax subsidies to SAF producers. Despite the Trump administration's withdrawal from many climate change issues, promoting domestic SAF production aligns with the Trump administration's direction of attracting manufacturing back to the United States.
- **Singapore**: Mandates the addition of 1% SAF to departing flights starting in 2026, with the proportion increasing to 3%-5% by 2030. To facilitate the use of SAF with premium by airlines, the Singapore government also imposes a surcharge on departing (non-transit) economy class passengers

(3 SGD for short haul, 6 SGD for medium haul and 16 SGD for long haul), with the funds specifically used to purchase SAF products locally.

- **South Korea**: Requires all international flights departing from the country to use 1% SAF mixture starting in 2027 to support the global aviation industry's carbon neutrality efforts.
- **India**: Aims to achieve a 1% SAF mixture ratio by 2027 and increase it to 2% by 2028 to gradually promote the use of SAF in international flights.
- **Indonesia**: As one of the world's largest biomass fuel producers, Indonesia introduced a 3% SAF mixture requirement in 2020, but implementation progress has been relatively slow. The latest plan is to mandate a 3% SAF mixture starting in 2026.
- **United States (State Level Governments)**: States such as California, Illinois, and Washington provide subsidies to SAF blending and using companies through local low-carbon standards and carbon markets. For example, California has become one of the regions with the lowest SAF refueling prices globally.
- **Hong Kong SAR, China**: The government has announced that it will set specific SAF usage targets in 2025 (expected to be announced before the October Policy Address) to stimulate local SAF uplift and support the aviation industry's low-carbon emission reduction efforts.

Additionally, the Asia-Pacific Airlines Association (AAPA) has publicly called for its 14 member airlines to achieve a 5% sustainable aviation fuel usage target by 2030. The OneWorld Alliance has also proposed a goal of using approximately 10% of total fuel consumption as SAF by 2030. These signals indicate that countries around the world are actively deploying SAF to avoid falling behind or being passive in this green competition. Considering China's inherent advantages in industrialization and excellent economic efficiency, timely participation in this industry competition will still allow China to seize the initiative and lead the global SAF industry development.

2. Feasibility of Developing SAF: "Why China Can"

Sustainable aviation fuel (SAF) is the only effective path for the aviation industry, especially the medium and long-haul civil aviation industry, to achieve carbon reduction in the foreseeable future. However, its disadvantage is that its price is about 2-5 times that of traditional jet fuel, and its availability and affordability are temporarily not ideal globally. In the early stages of SAF development in Europe and the United States, the capability to reduce costs and increase efficiency still needs improvement. In contrast, China has a series of advantages in biomass fuel

and renewable energy development, such as abundant natural resources, strong refining foundation, and complete industrial chain, making it fully feasible to develop SAF on a large scale and capable of actually improving SAF's availability and affordability. The specific analysis is as follows:

- **Abundant Feedstock Reserves for SAF**: Traditional jet fuel raw feedstock is fossil fuels, while SAF feedstock mainly include waste cooking oil, agricultural and forestry waste, and green hydrogen. China has abundant reserves in these areas (e.g., 10 million tons of waste oil annually, 700-1,000 million tons of straw, and a large amount of relatively cheap green hydrogen resources). Other countries' SAF production is usually limited by the reserves of waste cooking oil and agricultural and forestry waste, but China has a natural advantage in this regard.
- **Strong R&D Brings More New Technologies and New Feedstock**: China is a major country in the chemical industry, with mature refining foundations and catalyst technologies. In the SAF field, more and more new feedstock types and new conversion technologies are emerging. Potential energy crops (such as reed bamboo and castor) can be converted into sustainable aviation fuel and can be grown on a large scale in saline-alkali land without affecting national food security. Additionally, the SAF team at the Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, has developed technology for producing sustainable aviation fuel from lignocellulose through aqueous phase catalysis.
- **Significant Cost Advantages in Certain Advanced Pathways**: For example, wind and photovoltaic power as precursor "feedstock" can be used in the "Power-to-Liquid" pathway to produce SAF. This technology pathway is expensive in Europe and other Asian countries mainly due to the inability to achieve lower electricity prices locally, which restricts the large-scale preparation of green hydrogen. However, China's "Three North" region has abundant wind and solar resources, continuous progress in electrolyzed technology, and favorable conditions for reducing electricity costs, even below thermal power levels, which is conducive to off-grid production of green hydrogen and high-value-added products such as SAF.

3. Significance of Developing SAF: "Why China Should"

3.1 Positive Effects of the SAF Industry on China and Its Export Potential

In 2024, Cathay Pacific, in cooperation with a SAF production company in Henan Province, China Aviation Oil Europe, and PetroChina International, transported

SAF produced in China to Amsterdam, the Netherlands, for blending and uplift, promoting the expansion of China's SAF industry to overseas. In February 2025, Sinopec exported approximately 500 tons of SAF produced by its Zhenhai Refining & Chemical Company to Hong Kong International Airport for uplift by various airlines, achieving the first export sales to Hong Kong by the plant. This demonstrates that actively developing the SAF industry will bring multiple positive effects to the country. Firstly, by developing the domestic SAF industry, China can mitigate the impact of international market fluctuations on energy supply and ensure its economic stability. Secondly, the development of the SAF industry will promote technological progress and the improvement of the industrial chain, driving the coordinated development of upstream and downstream enterprises, creating numerous job opportunities, and increasing "new quality productivity". Additionally, in terms of exports, as global demand for green energy increases, SAF products will become competitive export commodities. For example, Finland's Neste company generates billions of euros in revenue annually by promoting sustainable aviation fuel. China can also learn from its successful case and expand international markets. Under the "Belt and Road" initiative, China can enhance trade cooperation with other countries by exporting SAF products, jointly promoting the global green energy transition. In the process of developing the SAF industry and improving SAF production efficiency through scientific research, China can leverage its strong manufacturing capabilities and technological level to become an important link in the global SAF supply chain, further enhancing its international influence and competitiveness.

3.2 Improving National Energy Security by Using SAF as a Substitute for Fossil Fuels

Developing the SAF industry can also reduce dependence on overseas crude oil resources, lower the risk of energy supply disruptions due to geopolitical risks, and enhance the autonomy and security of the national energy strategy. As global environmental requirements become increasingly stringent, the promotion of SAF is expected to help the country occupy a more favorable position in the international energy market. Through policy guidance and market incentives, China can gradually establish a comprehensive SAF production, blending, transportation, and refueling system, achieving a certain degree of energy security and autonomy.

3.3 SAF Industry Supports Decarbonization Efforts in the Transportation Sector

The transportation sector is one of the main sources of global carbon emissions, and the development of the SAF industry provides important support for the

decarbonization efforts of this sector. SAF can reduce carbon emissions by about 80% over its entire lifecycle compared to traditional jet fuel, making it an important means for the aviation industry to achieve carbon neutrality. The International Air Transport Association (IATA) points out that if the aviation industry is to achieve carbon neutrality by 2050, the contribution of SAF to emission reductions will exceed 65%.

3.4 Leveraging R&D Advantages to Master Core SAF Technologies and Gain International Discourse and Standard-Setting Power

More and more Chinese companies' scientific R&D are leading globally, such as photovoltaic power generation, wind power, water electrolysis, new energy vehicles, and lithium batteries. In the SAF field, China has no exception. China has strong technological capabilities in the SAF industry chain, including feedstock (such as energy crops and green hydrogen), new conversion technologies, and efficiency improvements of existing technologies. China should further leverage these advantages, master core technologies, and help the country gain international discourse and standard-setting power, thereby achieving more sustainable diplomatic and social benefits.

3.5 SAF is a Requirement for the High-Quality Development of the Renewable Energy Industry

As the proportion of the renewable energy industry in the energy mix continues to increase, how to achieve sustainable and high-quality development has attracted industry attention. Wind and photovoltaic power have intermittent and unstable characteristics in the power generation field, and some regions are prone to grid absorption capacity limitations and widespread low-price competition, even encountering frequent "negative electricity prices" in some areas. These issues are difficult to solve in the short to medium term. However, if the low-cost electricity from wind and photovoltaic power can be converted into energy storage media such as green hydrogen on-site, and these media can be further refined into SAF, green ammonia, or green methanol, it would provide a high-quality, high-value-added solution for the renewable energy industry, bringing new energy opportunities to grid absorption bottleneck areas and even off-grid areas. For example, Denmark has successfully achieved on-site energy conversion by developing wind and photovoltaic industries on a large scale, providing sufficient green hydrogen as feedstock for SAF production.

3.6 Helping C919 "Go Global" and achieve the "China Manufacturing" Overseas Strategy

The advantage of SAF is that it can be directly used in existing aircraft frame and engines. However, current equipment is limited by a 50% blending ratio and cannot achieve the ultimate goal of using 100% SAF fuel in aircraft. Therefore, the two major original equipment manufacturers (Airbus and Boeing) have announced the development of aircraft equipment that can adapt to 100% neat SAF. With the rise of China's aviation manufacturing industry, the internationalization of domestic aircraft (such as the C919) is gradually accelerating. In this context, COMAC has also recognized the role and significance of SAF and has actively participated in the safety certification and sustainability certification of SAF during its development. Therefore, around the "China Manufacturing" overseas strategy, enhancing the ability of domestic aircraft to use blended SAF or neat SAF indirectly improves the international market position and product popularity, thereby winning more orders and cooperation opportunities in the future, achieving both economic and environmental benefits.

4. Specific Policy Recommendations for SAF Development

In view of this, to promote the development of the SAF industry, China can consider taking the following measures at the central government level:

- **Include the development of the SAF industry in the national "15th Five-Year Plan" and position it as a strategic emerging industry for support.**
- **Formulate and publish China's sustainable aviation fuel industry development plan (2026-2035), set specific SAF production capacity or consumption targets, and formulate supporting measures for the SAF industry that are suitable for China's national conditions, such as land cost reduction policies, value-added tax reductions, direct subsidies to the consumption or production end, etc.**
- **To facilitate the international import and export trade of SAF, optimize relevant policy measures, such as setting separate customs codes for both neat SAF and blended SAF, lifting export quota restrictions on both products, and increasing export tax rebate ratios for both products.**
- **Further increase investment in SAF R&D, establish special subsidy funds, and support research and development and breakthroughs in SAF feedstock, technology pathways, or production efficiency improvements.**

In the process of developing SAF at the national level, the advantages of the

Guangdong-Hong Kong-Macao Greater Bay Area in SAF demand, scientific research, import and export trade, etc., can be further leveraged to play an industrial demonstration role. Specific recommended measures include:

- **In the national strategy, further upgrade the status of Hong Kong International Aviation Hub to an international leading SAF hub and consider establishing the Guangdong-Hong Kong-Macao Greater Bay Area into an international leading SAF ecosystem, promoting the formation of a full-chain SAF ecosystem in the Greater Bay Area.**
- **Appropriately relax the import and export of SAF-related feedstock or finished products within the Guangdong-Hong Kong-Macao Greater Bay Area, or provide tax reduction policies for feedstock or products, promoting some airports in the region to become a leading SAF hub in Asia and even globally.**

5. Conclusion

Globally, the sustainable aviation fuel (SAF) industry is booming. The proportion of SAF production to total traditional jet fuel has increased from less than 0.01% before the pandemic to 0.3% in 2024. Developing SAF will be an effective measure for China to achieve its carbon neutrality goals and promote global low-carbon green development. It is a new quality productivity during the “15th Five-Year Plan” period. China is fully capable of cultivating SAF into the next globally leading competitive industry, gaining a strategic advantage in the aviation industry and low-carbon technology development.