APAC sustainable aviation fuel demand set to trail behind supply

The APAC region has a fair amount of sustainable aviation fuel (SAF) projects in the pipeline that are set to start up by 2030. However, less is happening on the demand side with governments reluctant to commit to hard mandates, and this leaves APAC as a growing supplier of SAF to other regions

Denpasar International Airport, Indonesia

More needs to be done to boost SAF demand

Looking at the demand outlook for sustainable aviation fuels in Asia Pacific is more difficult than it is in Europe. The outlook is going to largely depend on policy and, unlike the EU, there is no uniform policy for the region; governments in Asia have or will have differing approaches when it comes to decarbonising the aviation sector.

APAC makes up almost 32% of global air traffic and the region makes up more than a third of global jet fuel demand. Therefore, reducing emissions from the industry in the region is crucial, particularly given that air travel in the region is expected to show the highest growth rates through to 2030.

From a demand perspective, Asia is lagging behind initiatives in Europe, where ReFuelEU will

mandate 6% SAF use by 2030. While more countries in Asia are setting SAF targets, there is a big difference from what we are seeing in Europe. Many governments are reluctant to put an SAF mandate in place. Instead, they have announced targets which are clearly a bit more flexible. Much will depend on SAF availability – and of course, cost. The region could benefit from a more coordinated approach when it comes to implementing mandates. In doing so, it would provide a more appealing environment for attracting the necessary investment on the supply side.

Looking at countries in the region that have announced mandates or targets – including China, which is expected to announce an SAF mandate imminently – SAF demand from these countries could total as much as 3-5.1m tonnes (1-1.7bn gallons) by 2030. This wide range is dependent on the target that China decides to go ahead with. However, this is a best-case scenario. In reality, actual SAF demand is likely to be lower for the region. BNEF forecasts APAC SAF demand to total around 2.3m tonnes (750m gallons) by 2030 under its ETS, while SkyNRG is assuming a demand number of around 2.5m tonnes (830m gallons) by 2030.

Looking at SAF offtake agreements in the region so far also suggests that demand will likely fall short of government targets. Volumes are still very modest and also generally short-term in nature. The only offtake agreement that stands out in the region is for 76m gallons at Kuala Lumpur International Airport in Malaysia starting in 2027.

APAC announced/planned SAF mandates or targets

Country	Annual jet fuel demand (m tonnes)	SAF target/ mandate	Explanation
China	37.2	No	Yet to announce a SAF mandate. However, it is widely expected to be announced soon with the expectation that it will range from 2-5% by 2030
Japan	11.1	Yes	Set a 10% blending mandate for SAF by 2030
Singapore	8.5	Yes	The government target is for 1% SAF from 2026, which will then increase to between 3-5% by 2030 depending on how the market develops and availability.
India	8.3	Yes	Targeting a SAF blend of 1% in 2027, 2% in 2028 and potentially 5% by 2030
Australia	7.5	No	There is no mandate in Australia. However, Qantas has set itself a 10% target by 2030, and is pushing for a SAF mandate.
South Korea	8.0	No	The government is expected to announce quality standards for SAF this year with the expectation that the government could introduce an SAF mandate in 2026.
Thailand	5.4	No	
Indonesia	3.9	No	The government wants to introduce a 5% SAF mandate from 2025.
Taiwan	3.3	Yes	The government has set an indicative target of 5% SAF use by 2030
Malaysia	3.2	Yes	Targeting a SAF blend of 1% by 2025.Longer-term the government is targeting a 47% mandate by 205.
Vietnam	2.1	No	
Philippines	2.0	No	
New Zealand	1.5	No	

Source: Press releases, EIA, ING Research

Note: 2019 jet fuel demand numbers used given demand is still recovering from Covid impact

Healthy but flexible pipeline of SAF projects

A big hurdle for much stronger SAF demand is adequate supply. This comes in the form of both production capacity and feedstock availability. However, Asia Pacific is seeing a large amount of investment in SAF capacity. Singapore is already home to the largest SAF facility in the world with the Neste plant, which has a capacity of 1.4m tonnes (460m gallons). It predominantly produces SAF, along with some smaller volumes of renewable diesel and bionaphtha.

By the end of 2024, the APAC region is estimated to have the ability to produce more than 1.8m tonnes (600m gallons) of SAF, equivalent to less than 1.5% of jet fuel consumption in the region. This capacity is expected to grow fairly quickly, with up to 1.8m tonnes (600m gallons) of additional capacity set to start up in 2025. Effectively, by 2030, the Asia region could have as much as 5.1m tonnes (1.7bn gallons) of SAF capacity if all projects go ahead – 4.2% of current jet fuel demand.

However, there is a large amount of flexibility in these numbers. Firstly, some of these projects could very well be cancelled. Shell, for instance, has already scrapped plans for a biofuel plant in

Singapore. More recently in Australia, Oceania Biofuels ditched plans for a plant.

Projects that do not have long-term offtake contracts in place might also be reluctant or struggle to get the necessary financing to progress, given that it leaves them more vulnerable to spot prices, which have come under pressure more recently.

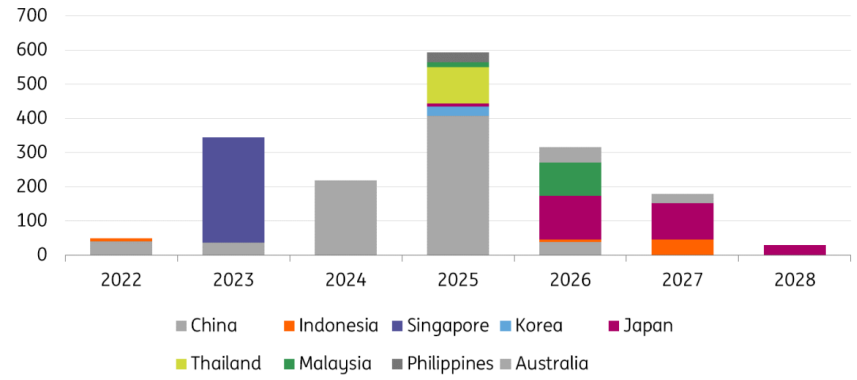
Secondly, given that SAF will not be the only product these plants produce, much will also depend on how dynamics in the renewable diesel market evolve.

Unsurprisingly, China has the largest amount of SAF capacity either under construction or planned, making up around 43% of total planned capacity in APAC by 2030. Singapore and Japan are a distant second and third, set to hold 18% and 16% of total regional capacity respectively.

Australia has only two projects in the pipeline that are estimated to be able to produce a little more than 200k tonnes (72m gallons) of SAF, although recently a third project was announced. These projects will use both Hydrotreated Esters and Fatty Acids (HEFA) and Alcohol-to-Jet (AtJ) technology. The estimated share of Australian capacity is fairly small, making up just 4% of expected APAC capacity. The lack of a mandate here is likely holding back further investment.

However, given that Australia is a large agricultural producer, there is potential for it to develop a SAF industry to take advantage of its feedstock supply. Otherwise, Australia could play a more important role as a supplier of feedstock to the region.

APAC SAF capacity in the pipeline (m gallons)



Source: BNEF, ING Research

SAF feedstock potential for the region

A key challenge for the market is feedstock availability, and this will obviously have ramifications on other sectors and/or regions as demand from the APAC SAF industry grows. Sectors and regions will have to compete more aggressively for feedstock.

The SAF technology being used and planned in the years ahead is largely HEFA. More than 70% of the planned capacity will use this technology. This points to a stronger demand for the likes of vegetable oil, animal fats and of course, used cooking oil (UCO). However, a recent joint study by the Roundtable on Sustainable Biomaterials and Boeing found that in Southeast Asia potentially other feedstocks are more abundant, such as rice husks. This suggests that in the longer term, the region will need to see investment in other SAF technologies, such as Fischer-Tropsch.

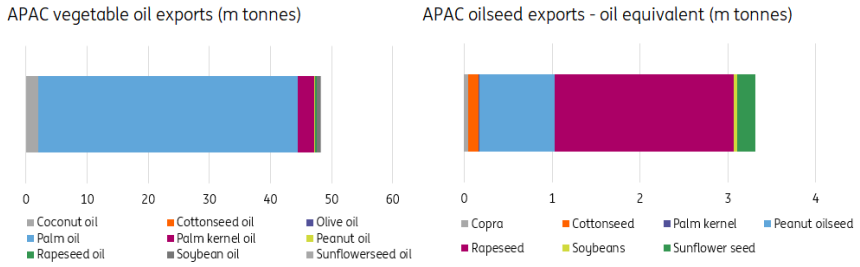
There is also potential for AtJ, with two of the three largest sugar producers in the world coming from Asia – India and Thailand – while China is also an important sugar producer.

For Asia, the HEFA production process makes sense for now given that there is already an abundance of vegetable oils in the region. The region is a dominant vegetable oil producer, largely driven by large volumes of palm oil from Indonesia and Malaysia. These two countries produce a combined 66m tonnes of palm oil, which is 85% of global supply. In addition, by-products such as palm oil mill effluent and palm oil residues can also be used as feedstock.

Australia is also a meaningful producer of rapeseed, which is relatively attractive when it comes to first-generation feedstocks given its oil content of around 40%, significantly higher than the 18-20% oil content of soybeans.

Australia makes up around 7% of global production but its exports make up more than a quarter of global export supply, leaving it the second largest exporter of rapeseed. Close to 80% of domestic rapeseed is exported, with a significant portion going to the EU. Over the past five years, the rapeseed crop has averaged around 5.6m tonnes, while exports have averaged around 4.4m tonnes. Clearly, the exportable surplus that Australia has could be diverted to a domestic biofuels industry if needed. Although, with Australia only having rapeseed crush capacity of around 1.2m tonnes, further investment in crush capacity would be needed.

APAC 2023/24 export supply of vegetable oil and oil seeds



Source: USDA, ING Research

Increase in collection rates and use of other feedstocks required to ramp up SAF production

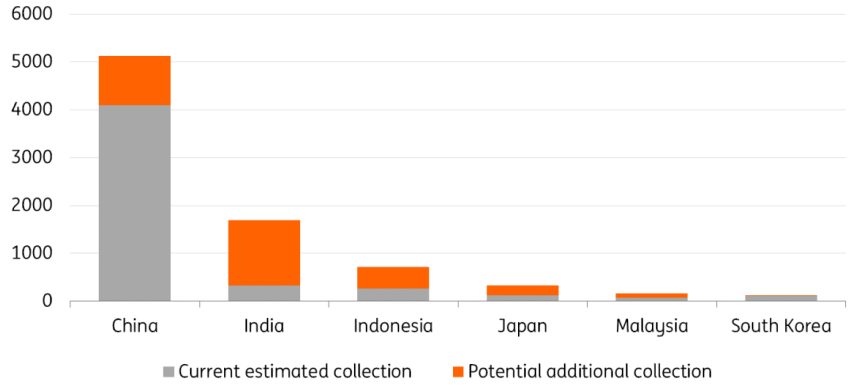
Looking at even more desirable feedstocks, the region is a large supplier of UCO, with China, Indonesia and Malaysia all amongst the top global exporters.

The bulk of planned SAF capacity in APAC will look to use UCO according to releases for the projects. The current and planned HEFA capacity in APAC is expected to be able to produce around 1.6bn gallons of SAF per year. This would require roughly 10m tonnes of feedstock. This is well above current collections of UCO in APAC, and so we would need to see an increase in collection rates along with the use of other feedstocks such as palm oil mill effluent, rapeseed oil and palm oil.

The International Council on Clean Transportation (ICCT) estimates that collection among the main UCO suppliers in Asia totals as much as 5m tonnes. An increase in collection rates could see this number grow to a little more than 8m tonnes, yielding potentially around 1.2bn gallons of SAF. This would mean that the need for SAF plants in Asia would also rely on palm oil and palm oil mill

effluent. Heavy usage of palm oil would, of course, raise questions over how sustainable the fuel is. It would also not meet sustainability standards in some regions, like Europe.

Used cooking oil collections from key Asian suppliers (000 tonnes)

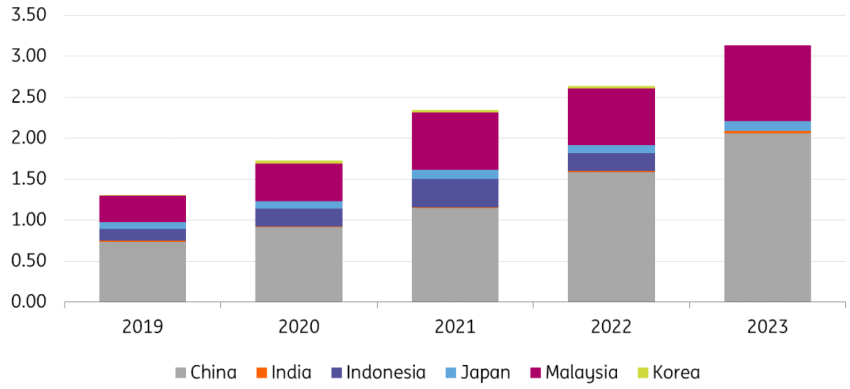


Source: ICCT, ING Research

Increasing SAF capacity will weigh on availability of feedstock for exports

Asia is already a key exporter of feedstock, with strong flows of UCO and rapeseed to Europe and the US. Naturally, as SAF capacity grows in the APAC region, this will weigh on the export availability of feedstocks unless we see a meaningful pick-up in collection rates of UCO and the use of alternative feedstocks in the region. This could create issues for SAF capacity in other regions when it comes to securing feedstock, given that Asia has been a growing supplier in recent years. In addition, given that APAC is expected to have a surplus of SAF capacity in the coming years, it also means that producers elsewhere will have to increasingly compete with SAF volumes from Asia.

Animal/vegetable fat and oil exports from key Asian suppliers (m tonnes)



Source: UN Comtrade, ING Research

Note: Used HS code 151800. 2023 trade data not available for Indonesia and Korea

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