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Trends and challenges in oleochemicals

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Sustainable Palm Oil Dialogue (SPOD), Brussels

Agenda

- Recent Trends and Developments
- Raw Materials
- Trends in Sustainability
- Developments in the Fatty Acid Industry
- Development in the Fatty Alcohol Industry
- Future Challenges

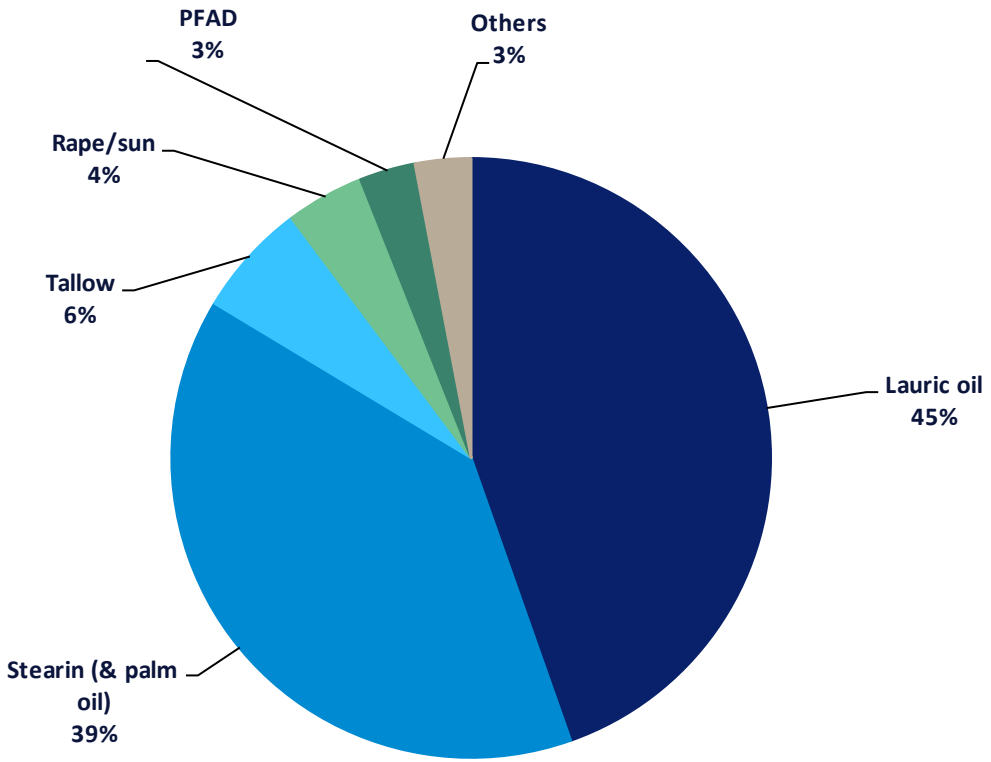
Recent Trends & Developments

- 2022: sales picked up, oil prices were high, and many oleo producers made good profits
- Tallow increasingly used in renewable fuels
- Increasing impact of tariffs (ADDs) and new legislation (EUDR)
- EUDR: how will the industry comply? Will there be a shift to other feedstocks like coconut?
- Lauric oils remain under pressure
- Several capacity expansion projects in both acids and alcohols proposed and under development
- 2023: economic outlook changed, oleo margins declined, and demand was weaker
- Capacity expansions still going ahead but some projects are delayed or postponed

Trends in raw materials

Oleochemicals consume 16-17 million tonnes of oils/fats annually

Oleochemical production by raw material use



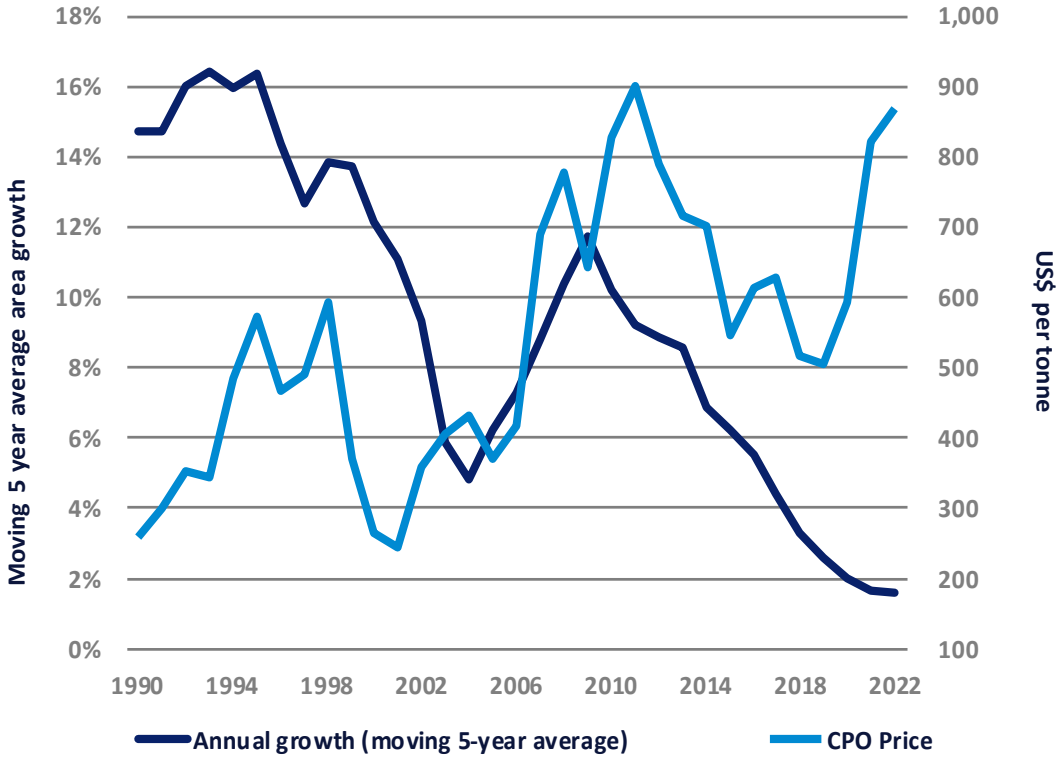
- Use of lauric oils for fatty acids/alcohols consumes circa 7.4 million tonnes. Stearin and some palm oil is bulk of remainder. Tallow and other veg oils are small.

Key trends:

- Palm oil production growth has slowed
- Tallow scarce for oleos
- Indonesian biodiesel policy keeps CPO prices high
- Indonesian export taxes advantage local processors
- Demand for PKO for fatty alcohols rising faster than growth in supply
- Output of coconut oil stagnant
- RSPO certified supplies limited
- Proliferation of certification schemes (MSPO/ISPO) Companies develop own schemes (NDPE etc)

Area growth is slowing, yields are stagnant

Growth in Indonesian palm oil areas vs the CPO price

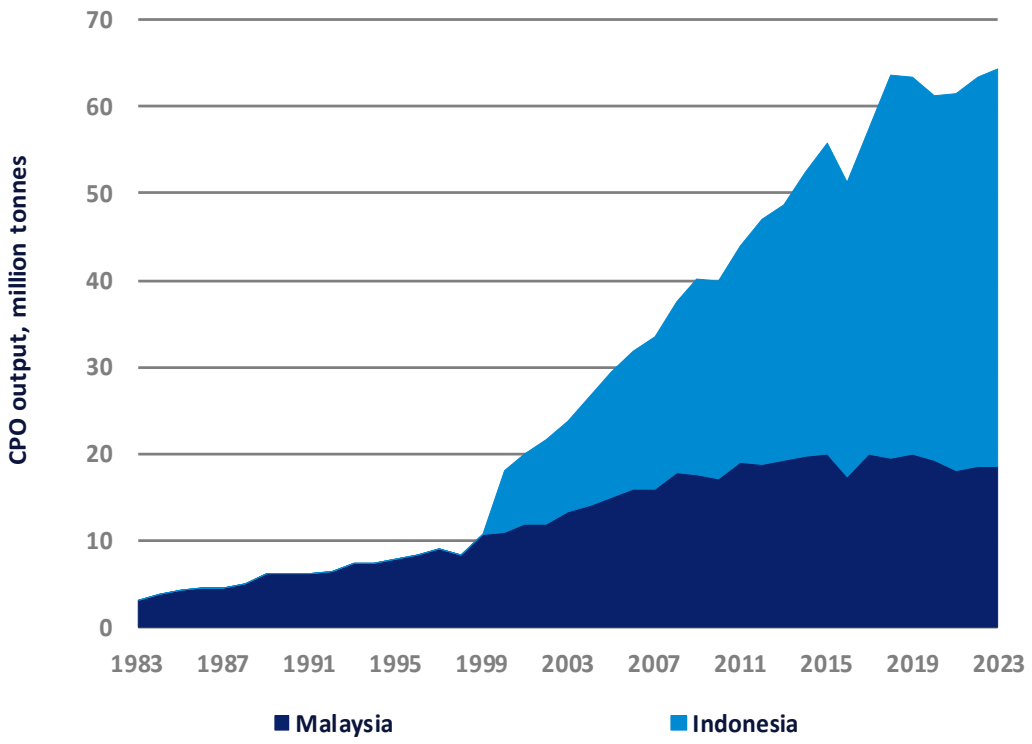


Average CPO yields in Indonesia and Malaysia

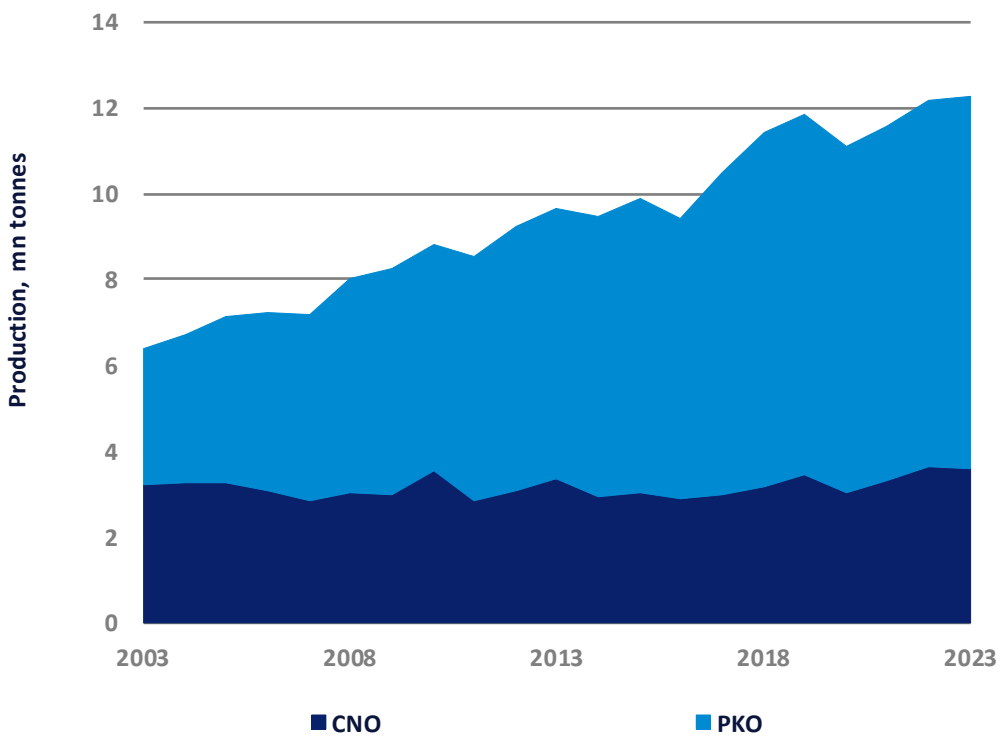
- High CPO prices stimulate area expansion, but the overall trend is declining area growth.
- Yields in Indonesia have not improved in 20 years. In Malaysia yields have declined.

Palm and lauric oil output has stagnated in recent years

Combined Indonesian and Malaysian palm oil output



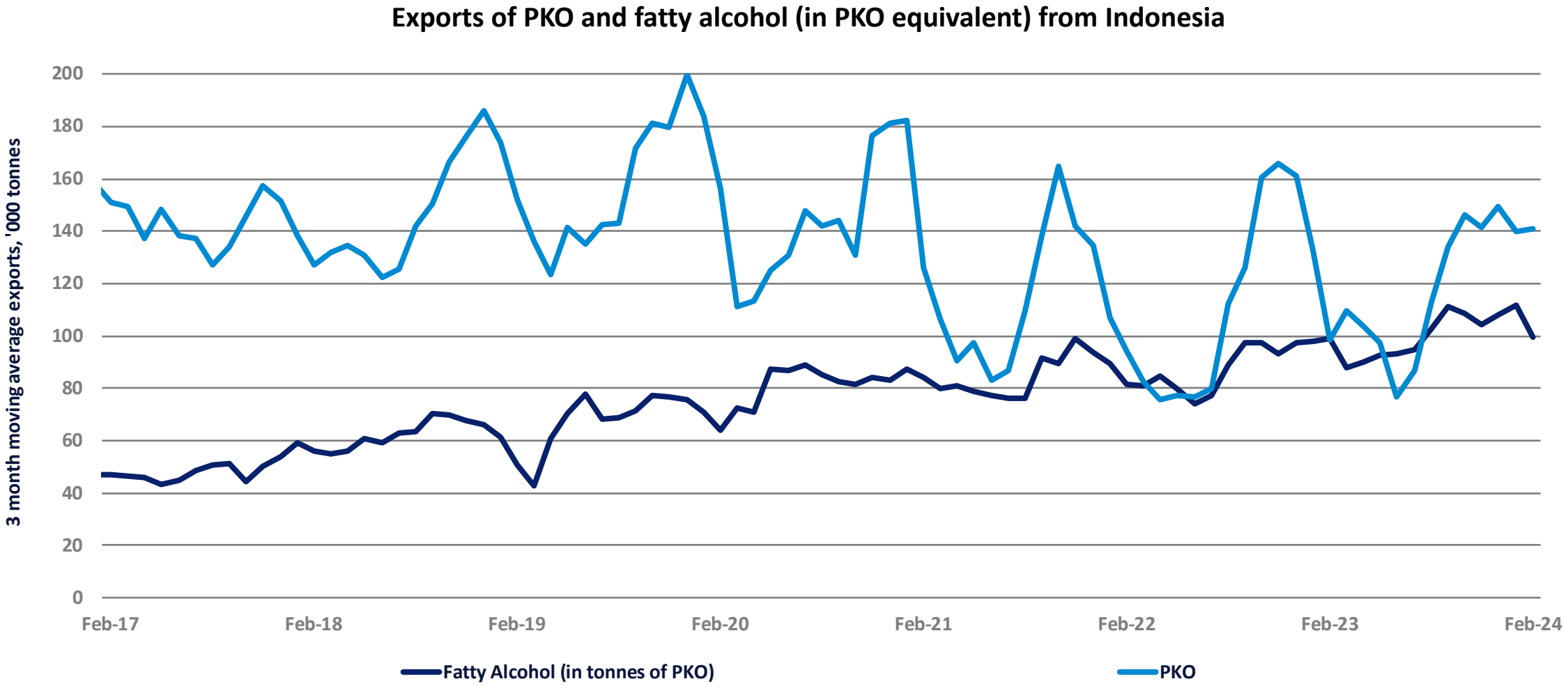
Global lauric oil output



- Indonesia has been the engine of growth in world palm oil production over the period 2020-2018
- Malaysian output peaked in 2017 while output in Indonesia has barely grown over the last 5 years

Indonesian export taxes encourage downstream processing

More internal PKO processing means rising exports of fatty alcohol at the expense of PKO



Oleos consume around two thirds of PKO supply; the rest goes into food

Stearin is plentiful thanks to the need to fractionate palm oil for food uses

Demand for palm oil/stearin in food, fuel and fatty acids (million tonnes)

	2000	2010	2015	2019	2020	2021	2022	2023
Food use	21.0	45.6	56.4	61.2	60.8	60.6	62.1	62.6
Fuel	0.1	2.5	6.2	12.9	14.1	14.5	15.2	16.5
Palm stearin for oleochemical demand								
Fatty Acid	1.6	2.9	4.5	6.3	6.1	6.7	6.8	6.5
Total	21.1	48.0	62.6	74.1	74.9	75.2	77.3	79.1

Fatty acid, fatty alcohol and food use lauric oil demand (million tonnes)

	2000	2010	2015	2019	2020	2021	2022	2023
Fatty Acid	1.0	1.9	2.6	3.3	3.2	3.4	3.5	3.3
Fatty Alcohol	1.6	2.7	3.4	3.8	3.6	4.1	4.1	4.1
Food Use	3.1	4.1	3.6	4.0	4.3	3.3	4.0	4.1
Total	5.7	8.6	9.6	11.1	11.0	10.9	11.7	11.5

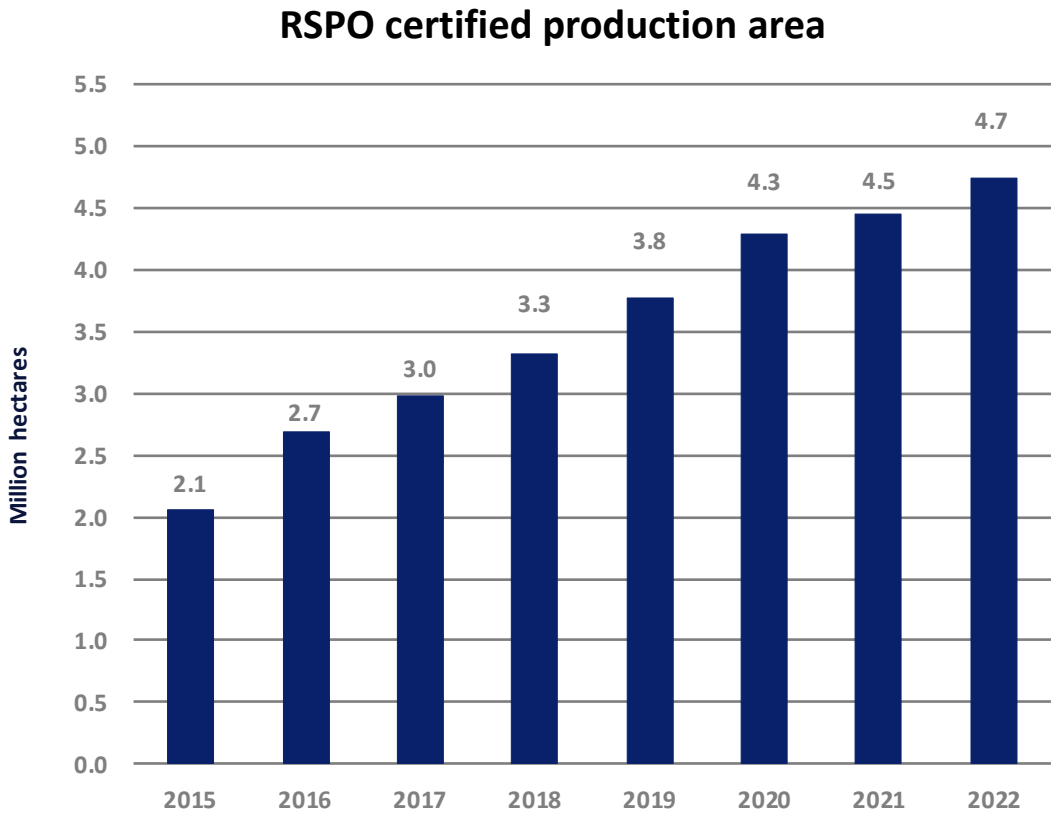
Sustainability in oleochemicals

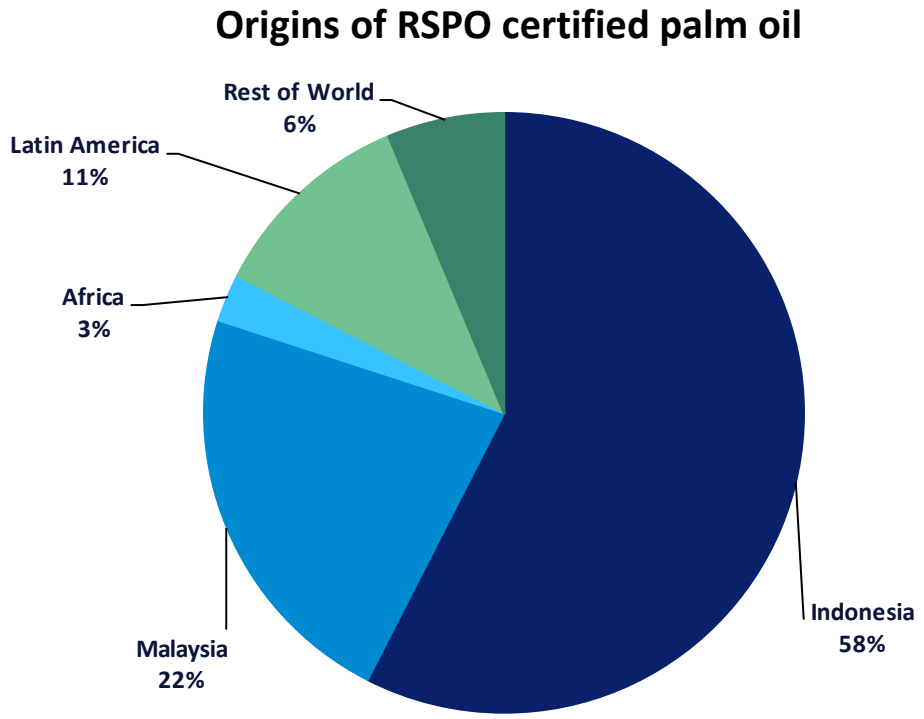
A complex and evolving landscape

- Sustainability is a key topic – concerns over rapid expansion of palm production in SE Asia and loss of natural habits and deforestation together with NGO campaigning put the spot-light on palm and its co-products
- Multinational companies, especially in Home & Personal Care adopted certification systems to protect their brands
- A Book & Claim system was quickly followed by RSPO Mass Balance
- National certification schemes such as ISPO and MSPO have been developed
- Some larger MNCs are looking at traceability of feedstocks i.e. Unilever's oil must be NDPE (no deforestation, peatland or exploitation
- RSPO palm oil is widely available with 15.4 million tonnes being produced in 2022
- Most is used in the food sector which has been able to transition more easily into sustainable materials than oleochemicals
- Oleochemicals use very little palm oil – the main feedstocks being stearin and PKO. The RSPO premium for stearin is typically several times above that of palm oil while premiums for certified PKO are even higher
- Slow down in palm oil output raises questions over future availability of certified materials
- Many companies have made commitments to 100% RSPO sourcing making switching to alternatives such as CNO impractical
- With the supply of MB palm oil exceeding market demands, there is little incentive for plantation owners to increase certified area solely to meet demand for PKO which is only around 10% of total oil output

RSPO certified area has increased

Certified palm oil output accounts for 20% of global output

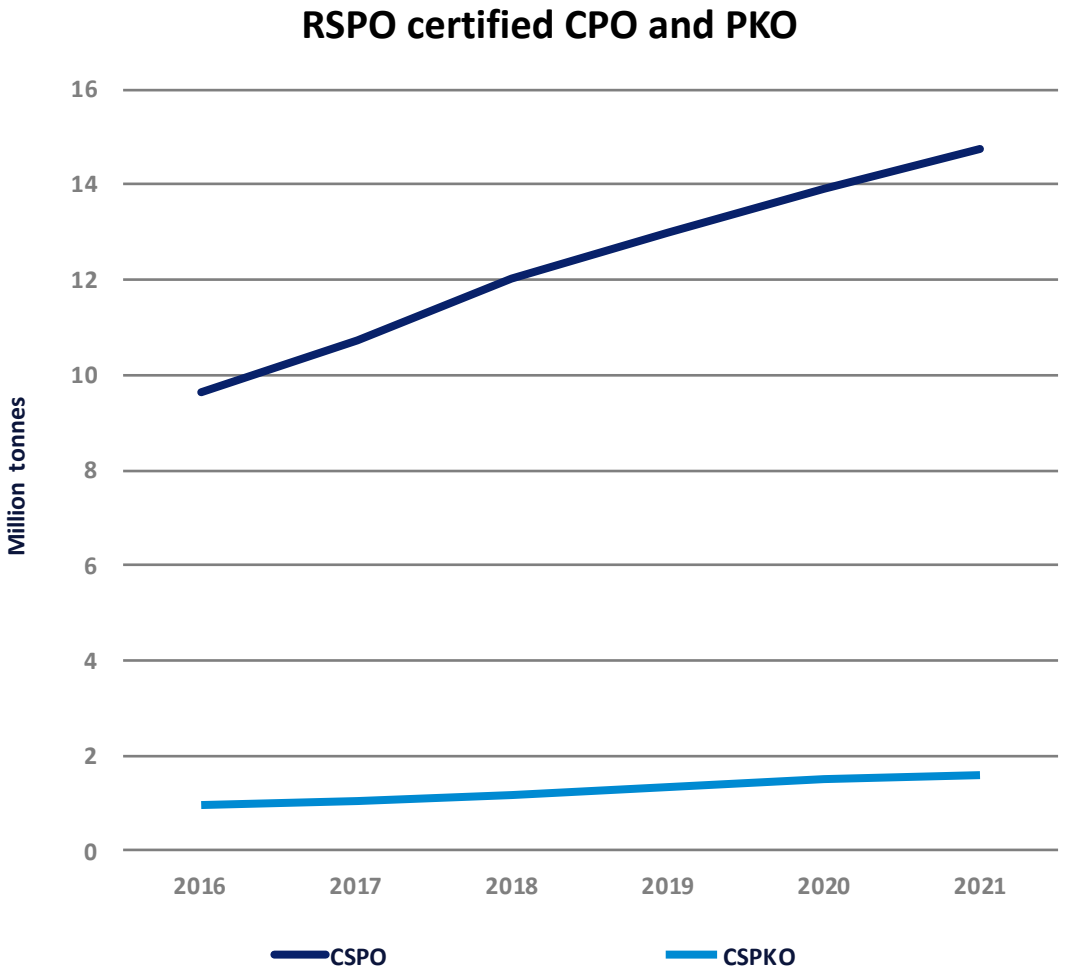




RSPO certified palm are has been growing year-on-year since 2015, although the rate of growth has slowed in recent years. Almost 60% of RSPO certified palm oil output is in Indonesia.

Further expansion in RSPO area is challenging

Including small holders is difficult and costly



Output of certified CPO has been rising at a CAGR of 6.9% per annum reaching 15.4 million tonnes in 2022.

The production of certified PKO reached 1.6 million tonnes in 2022. RSPO remains a minor share of palm oil output with only 20% of global production being certified.

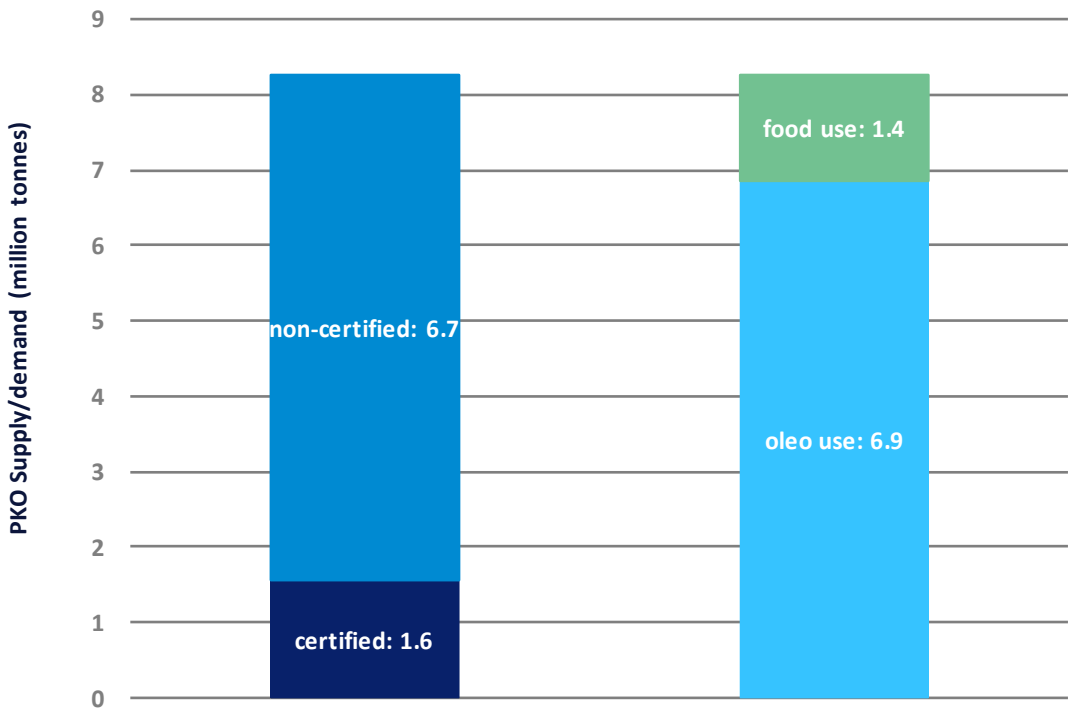
Expanding RSPO area is challenging due to:

- Expansion of national schemes
- Concerns over the rising cost of certification
- Difficulty in including small holders
- Concern that RSPO membership invites greater scrutiny from NGOs.

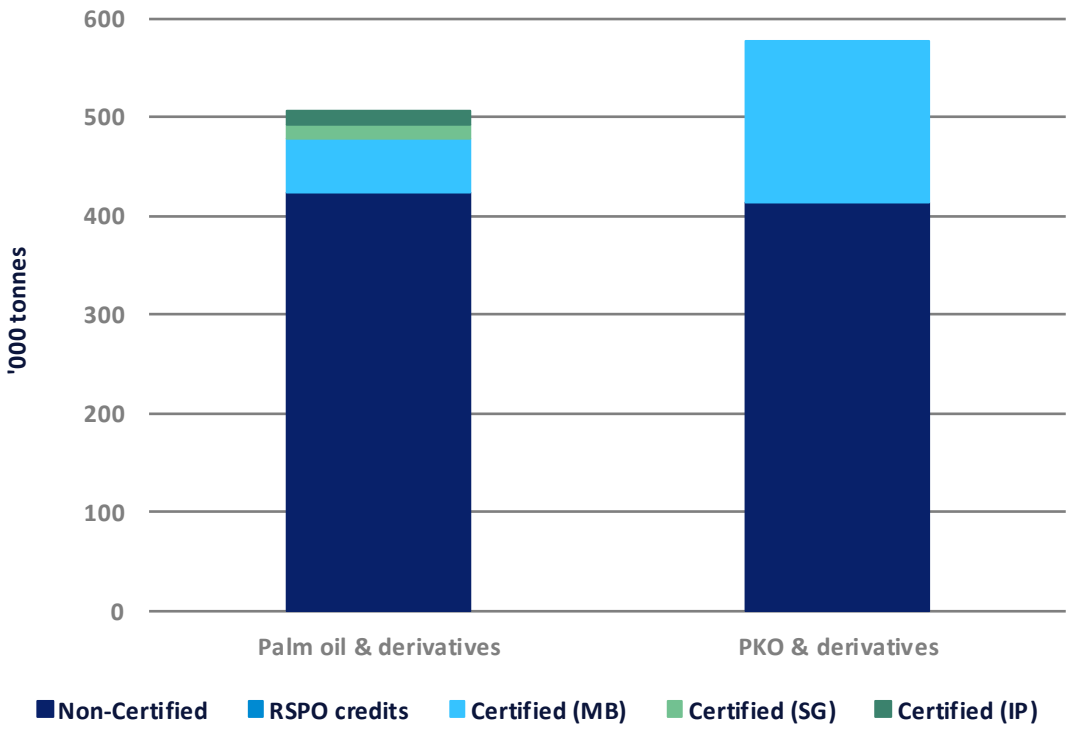
Certified PKO supply is insufficient for oleochemicals

Very little material is available as either segregated (SG) or identity preserved (IP)

PKO supply/demand in food & oleochemicals, 2023



RSPO palm oil & PKO use by a large SE Asian processor, 2022



Oleochemicals consume circa 6.9 million tonnes of PKO. If all certified PKO were used in oleochemicals, it would only account for circa 23% of PKO use. It is very difficult to assess the true level of certified material use in oleochemicals. ACOP Data on certified oil use includes all types of processing (oleochemicals, refining and biodiesel production). A sample of this data is given in the RH chart for a large SE Asian processor. This reveals that the bulk of certified material is bought as MB.

Issues relating to oleochemicals

Why is uptake of sustainable materials so low?

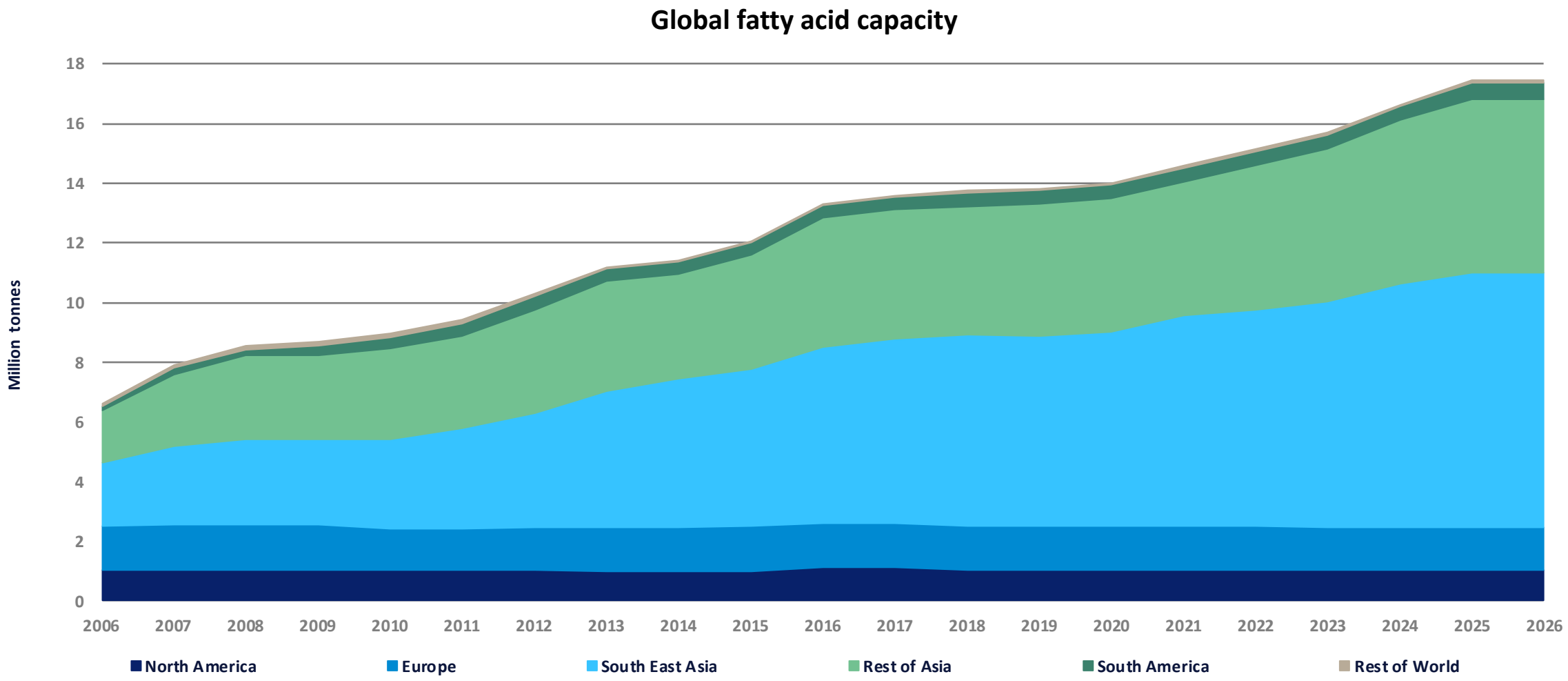
- Relatively low uptake of sustainable materials by oleochemical producers is due to:
  - Lack of demand in certain industry sectors
  - Difficulty in obtaining certified stearin and PKO
- Most of the oleo industry uses MB and uses the 1:1 rule (1 tonne of oil offsets 1 tonne of product) to deal with the complexity/difficulty in sourcing sustainable raw materials and varying product yields
- For Fatty alcohol plants running on PKO, it is almost impossible to obtain enough SG material in the right location to be able to run a plant on 100% SG PKO. Thus, producers use MB or a mix of MB or uncertified oil
- For fatty acid plants running on stearin, SG material is also short. It takes 5 tonnes of palm oil for 1 tonne of stearin thus most sustainable stearin bought by plants is MB.
- To use SG oil, an oleo producer must be able to pass the premium paid for the oil on to all of its products i.e., C12-14 alcohols, C16-18 alcohols (or acids) short chain fatty acids and glycerine
- While some end users in food, personal care and laundry may be willing to pay a premium for sustainable materials, most industrial users are not. Thus, most by-products of mid-cut alcohols will have to be sold without a premium.
- Similarly, fatty acids sold into food/personal care may reflect the certification premium but many fatty acids sold into industrial uses (animal feed, pharma, lubricants) have no requirement to be certified sustainable
- If oleo producers cannot rcoup the full cost of SG oil on their products they will face lower margins than their peers who are not using certified oil
- Margins in oleos are typically small and any slight disadvantage can make a major difference

Existing Fatty Acid Capacity

- The fatty acid market is fragmented - 4 majors account for just over a third of capacity
- Global capacity for fatty acids was 15.7 million tonnes in 2023 and is forecast to grow to 17.5 million tonnes by 2025
- Capacity is always ahead of demand
- Global demand would reach 17 million tonnes only by 2040
- 65% of demand is in Asia
- Capacity utilization fell from around 80% in 2022 to circa 72% in 2023
- Capacity in China is less well utilized than in SE Asia

A new wave of fatty acid capacity expansion is underway

New projects are concentrated in Indonesia and China.



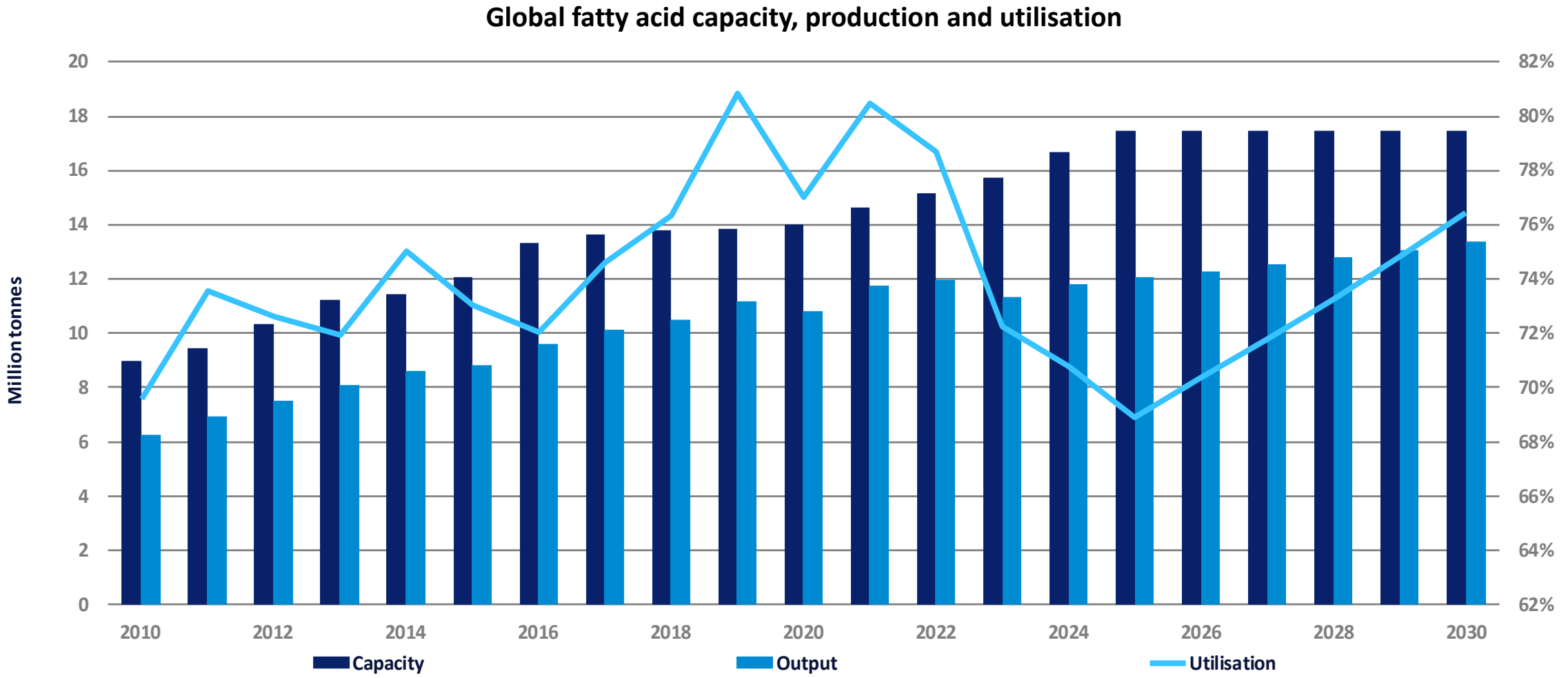
New Developments in Fatty Acid Capacity

If all projects go ahead, they will add almost 2 million tonnes of fatty acid capacity by 2025

- 2022
  - 200,000 tonnes/year unit in Indonesia
- 2023
  - 400,000 tonnes/year in China
  - 110,000 tonnes/year in Malaysia largely for captive use
- 2024/5
  - circa 400,000 tonnes/year capacity added in Indonesia
  - Large splitter commissioned in Indonesia running on stearine/palm oil: 330,000 tonnes/year for captive use
  - Malaysian producer building 500,000 tonnes/year fatty acid plant in Indonesia

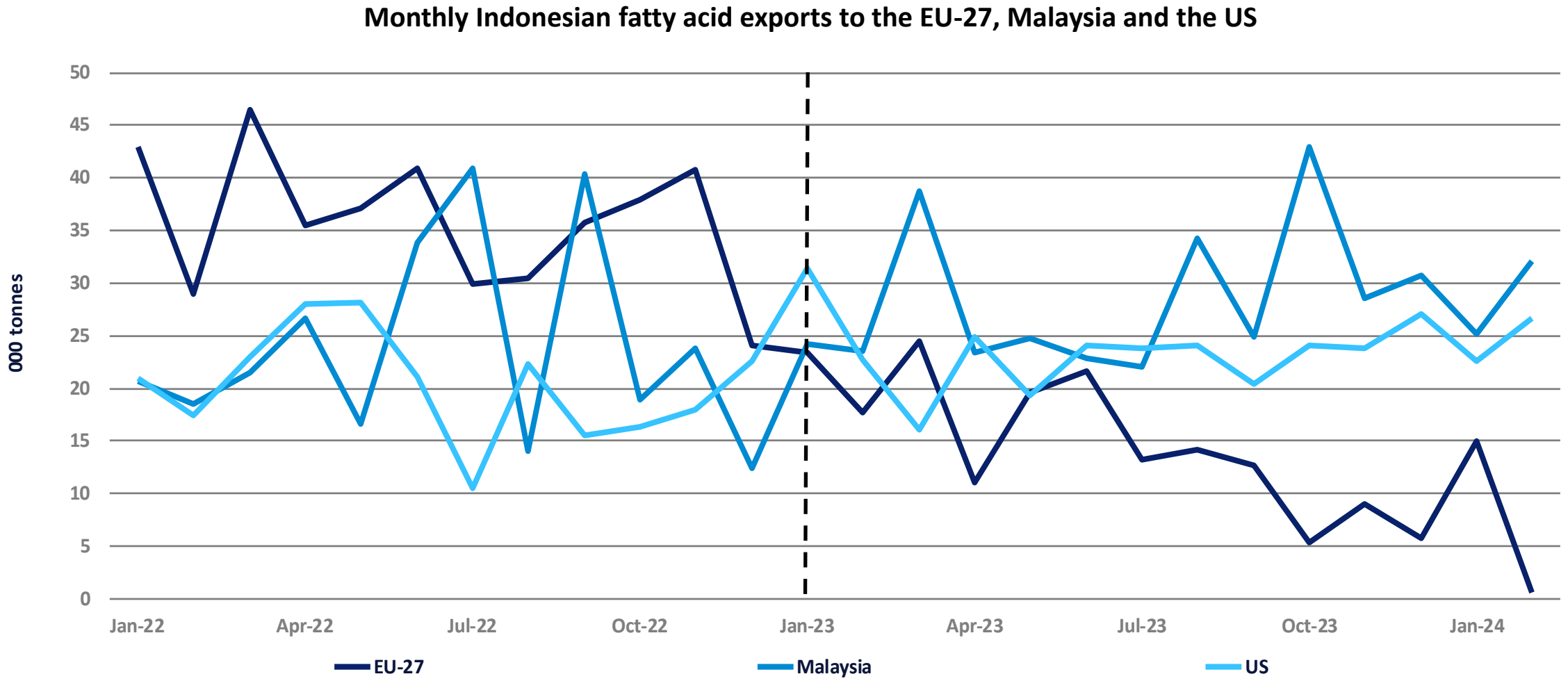
Operating rates in fatty acids are expected to fall as new capacity starts up

The global economic slowdown will also reduce utilisation rates this year and next. Capacity utilisation set to remain below 80% until 2030.



ADDs have reduced Indonesian fatty acid exports to the EU

Imposed in January-23, ADD duties range 15.2% to 46.4% depending on company

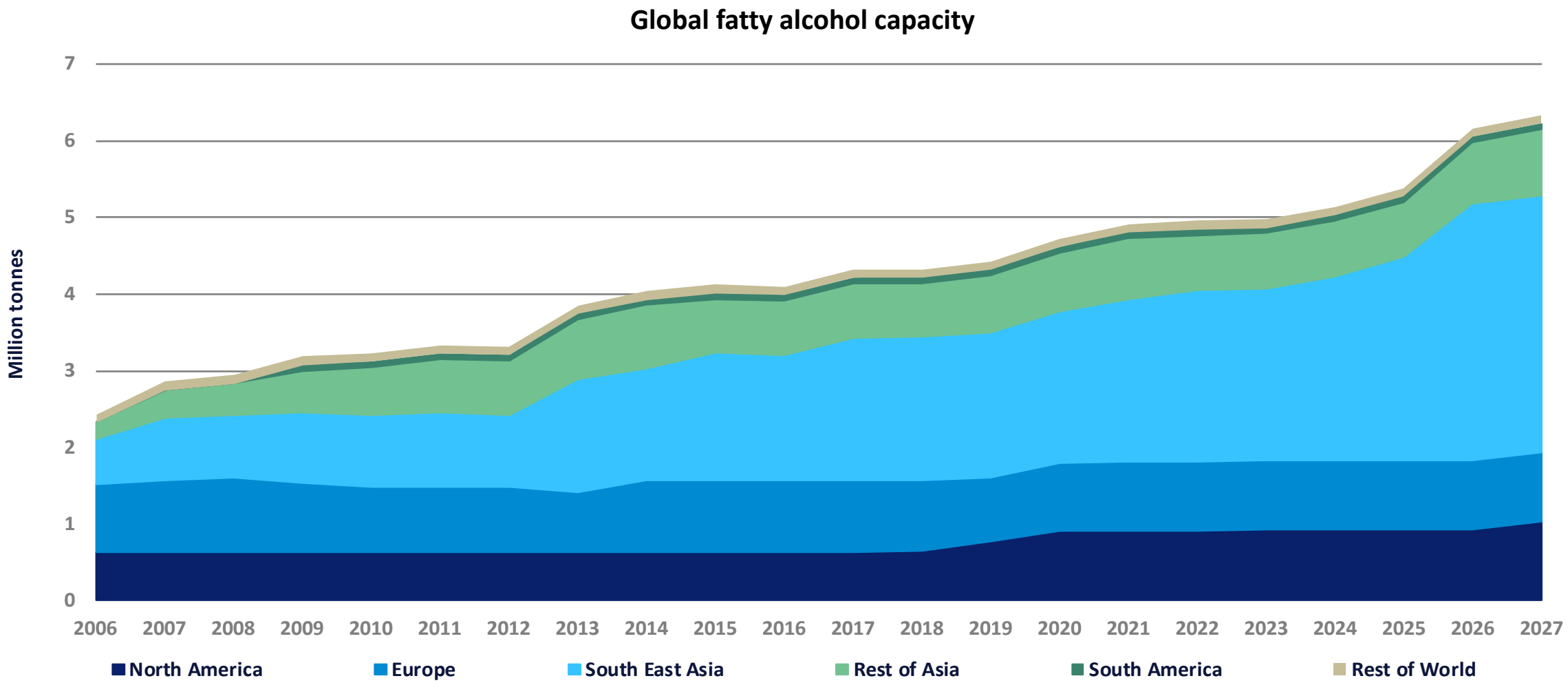


Existing Capacity Fatty Alcohols

- Fatty alcohol production is more concentrated than fatty acid - the top 5 producers account for half of industry capacity
- Global capacity in 2023 was 5.0 million tonnes including just over 1 million tonnes of synthetic mid cut
- Macro economic difficulties meant consumption fell by 2% in 2023 to 4.0 million tonnes: 1.0 million tonnes synthetic and 3.0 million tonnes natural alcohol
- Market growing 3% annually and capacity utilization reached 80% in 2022
- Expansions could add an additional 1 million tonnes per annum by 2026
- Sourcing PKO will be a challenge, especially to comply with EUDR, MB etc.
- The change agenda for surfactants is gaining momentum:
  - Push for sulphate free in USA
  - Move away from fossil fuel sources
  - 1,4 Dioxane regulations

Global fatty alcohol capacity expected to reach 6.1 million tonnes by 2027

Permata, Apical, Wilmar, Unilever and Zhejiang Jiahua all have significant new capacity in the pipeline



Fatty Alcohol Capacity: A New Wave of Expansion

- 2022
  - Capacity remained almost static: debottlenecking at majors small expansions offset by closure of 100,000 tonnes in the Middle East.
- 2023-2026 Firm Plans
  - Additional 150,000 tonnes in Malaysia
  - 200,000 tonnes expansion in Indonesia to start in 2024: long chain and mid cut
  - 120,000 tonnes unit in Indonesia but may be delayed until 2024
  - 150,000 tonnes expansion in China by end 2026: supply for surfactant manufacture
  - New 150,000 tonne plant in Indonesia mid-2025
  - New 150,000 tonne unit by Lurgi in Indonesia in 2026
  - Expansion by 120,000 tonnes in Indonesia also 2026

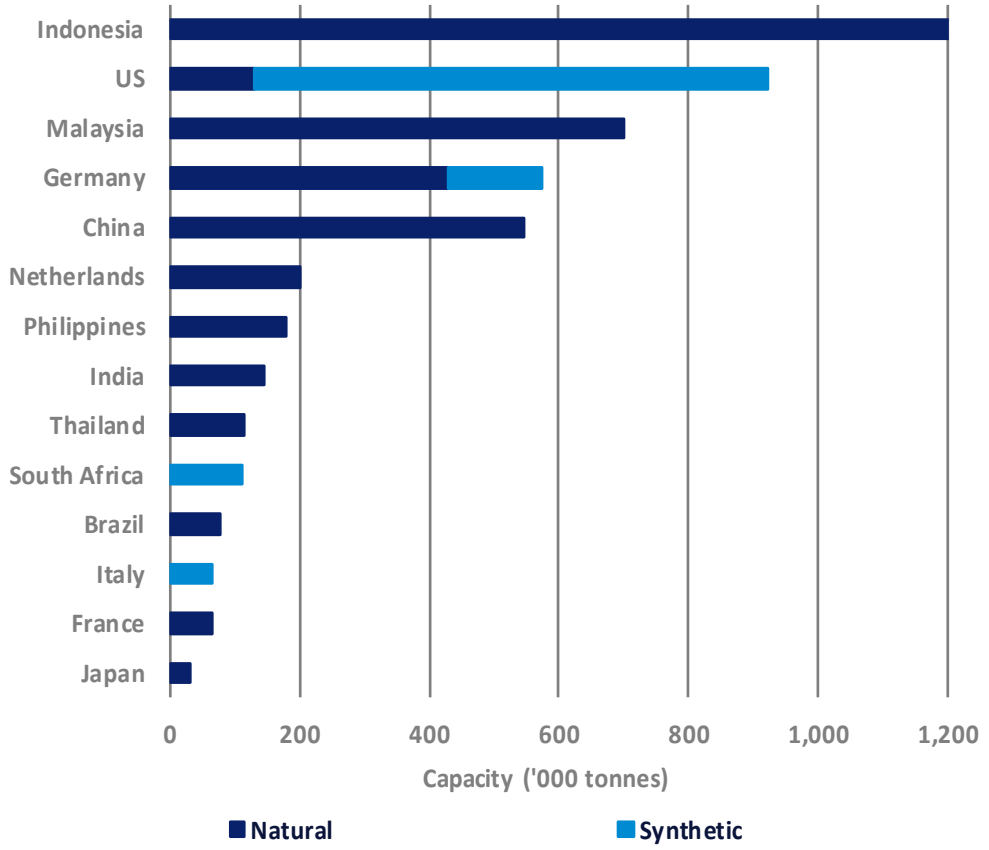
Raw material availability determines plant location

With most capacity gravitating towards Southeast Asia, the locus for PKO.

Export tax and levy support has favoured expansion in Indonesia, which has also seen most recent palm expansion.

US remains the centre for synthetic alcohol driven by cheap shale gas.

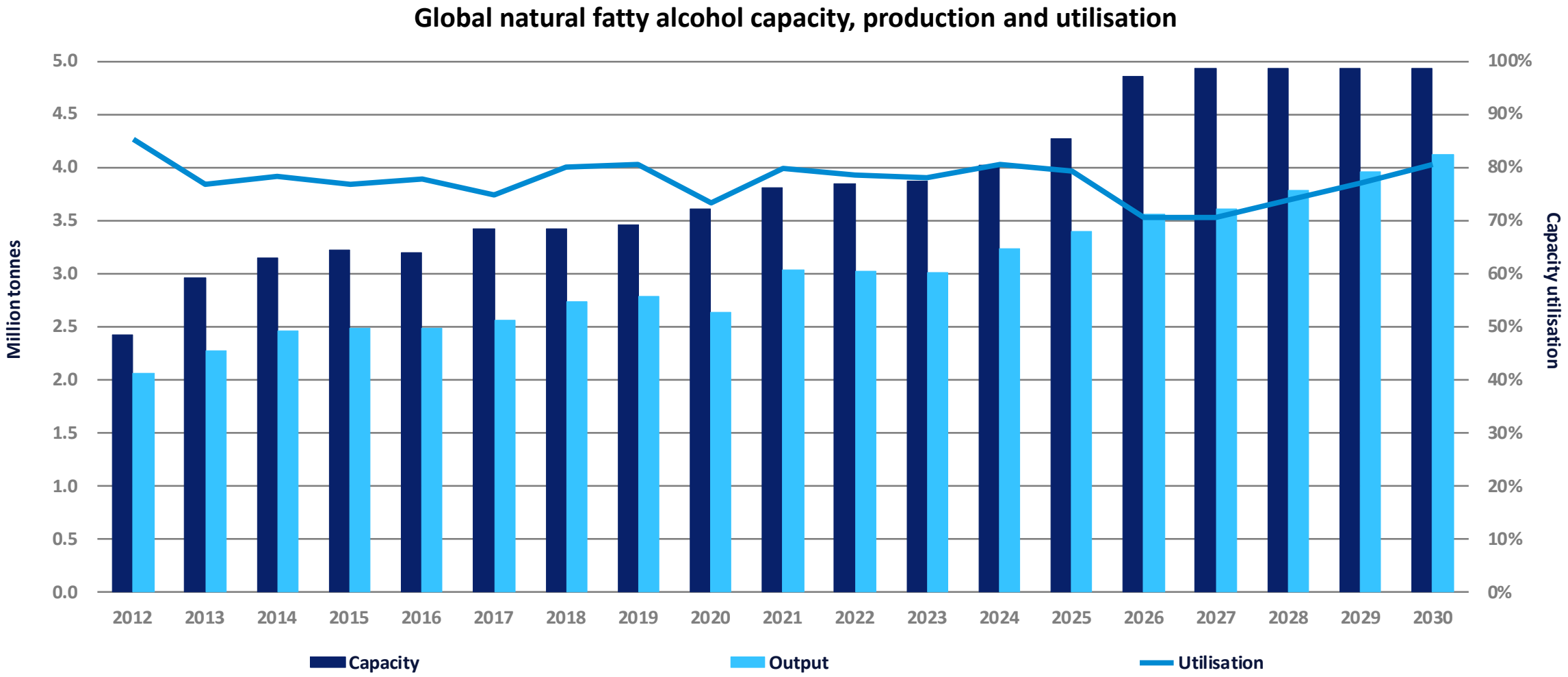
Natural and synthetic fatty alcohol capacity by country, 2023



same is also true for fatty acids

Fatty alcohol operating rates were healthy at 80% in 2022

But dipped in 2023 and will reach a nadir in 2026 as new capacity starts up



Future challenges

- Capacity continues to expand ahead of the demand curve
- Indonesia continues to maintain tax incentives
- Growth in integrated facilities: optimize supply chain costs
- Majors continue to move downstream
- Will Indonesian players hedge bets and build presence in Malaysia?
- Investment in EU remains unlikely unless a change to more stable economics
- ADDs have not improved prospects for EU producers
- Growing regulatory framework especially EUDR
- Feedstock limitations of PKO as palm oil growth falters

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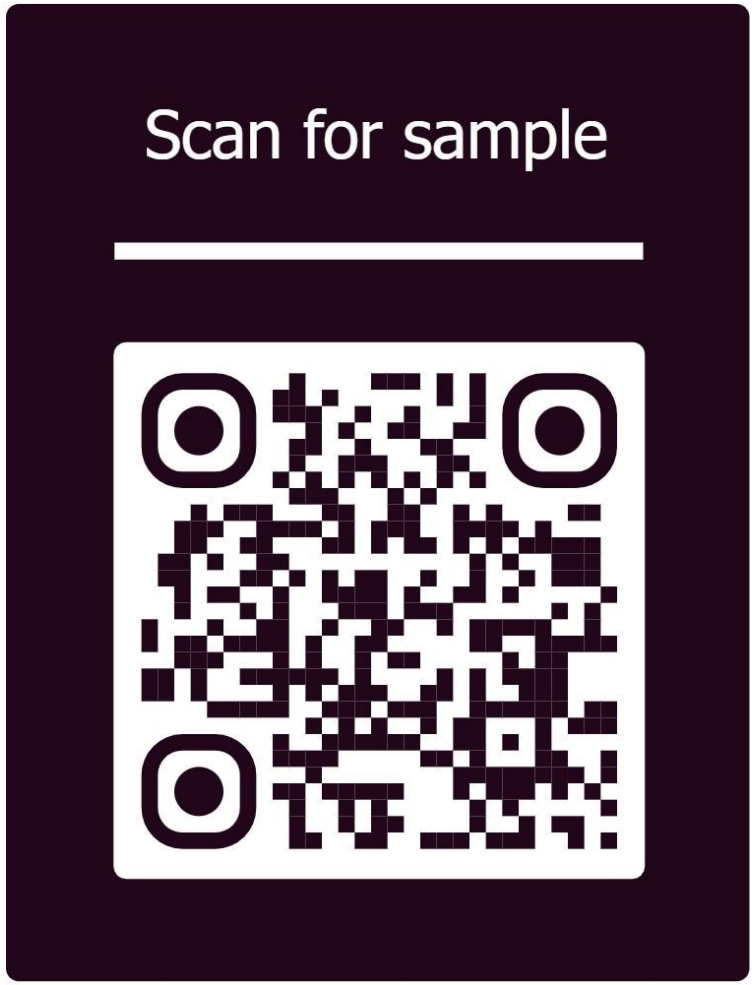

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