How will low carbon methanol take shape in Asia

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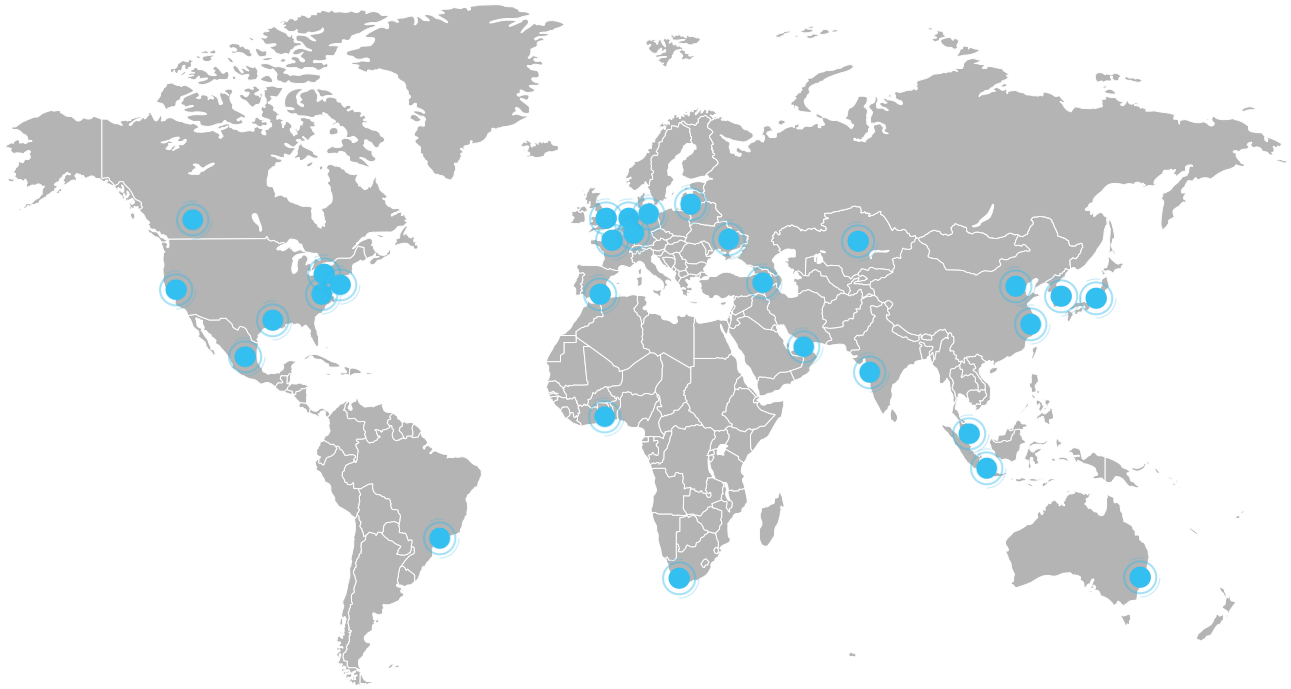


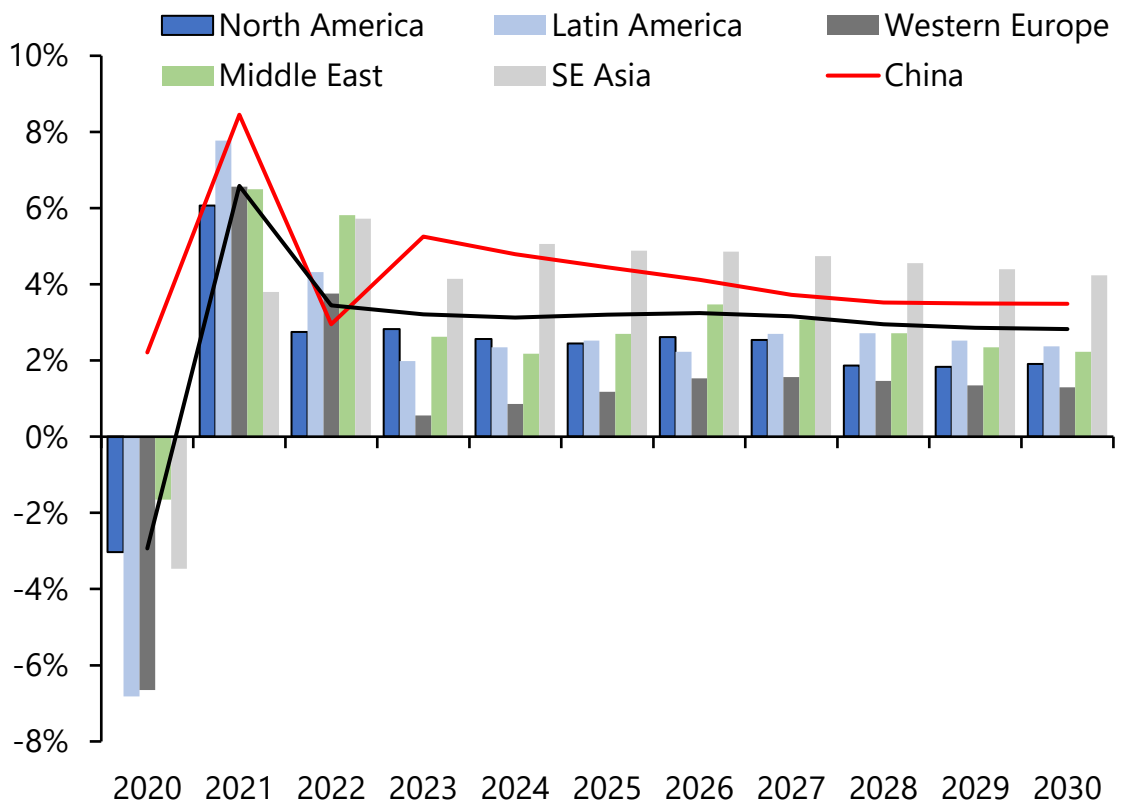
Agenda

- Global market overview
- A focus on Asia and China
- Methanol as a shipping fuel alternative

Global methanol market overview

Global Economy: Global economies readjusted to a new norm, with China GDP growth falling towards 3.5%. Awaiting tariff impacts???

Major regions/country GDP

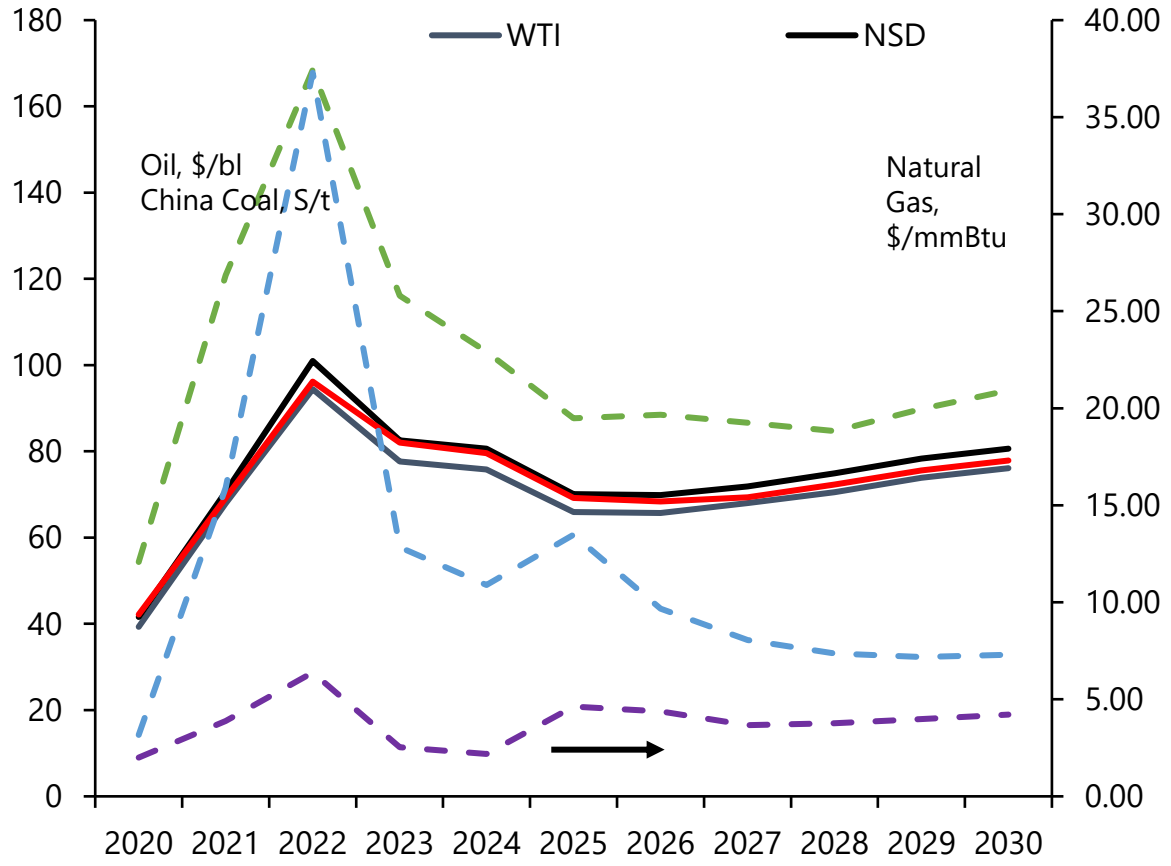


— Argus Consulting Services, Oxford Economics

- World GDP growth was forecast at 3.1%c for 2024, a fraction below the 2023 outturn. World growth is expected to continue at a similar pace in the next few years before dipping below 3% in the late 2020s.
- The world long-term forecast is currently supported (pre-tariff) by a significant upgrade to the US GDP forecast, now expected to rise by 2.3%c per year in the 2023-2030 period, up from 1.8% per year previously.
- The key drivers behind this upgrade are stronger forecasts for capital stock and total factor productivity growth. These in turn reflects a surge in new business creation and accelerated spending on software and R&D in the post-COVID period, plus productivity gains from the AI boom—which the US is particularly well-placed to benefit from.
- Outside the US, downside risks to growth remain prominent in Asia—and have arguably increased after the US Presidential election result. Japan's long-term forecast has been downgraded slightly and, despite some short-term stimulus, China's growth is expected to slow from over 6pc per year in 2013-2022, to 4% per year in 2023-2032. The negative effects of the unwinding property bubble, souring US-China relations and (potentially) technological decoupling are unlikely to be overcome by China's forays into new sectors
- Troubling impact of tariffs????

Global Energy: Energy pricing expectations "settle down" after pre-2023 volatility. Mostly flat oulooks the next 5 years

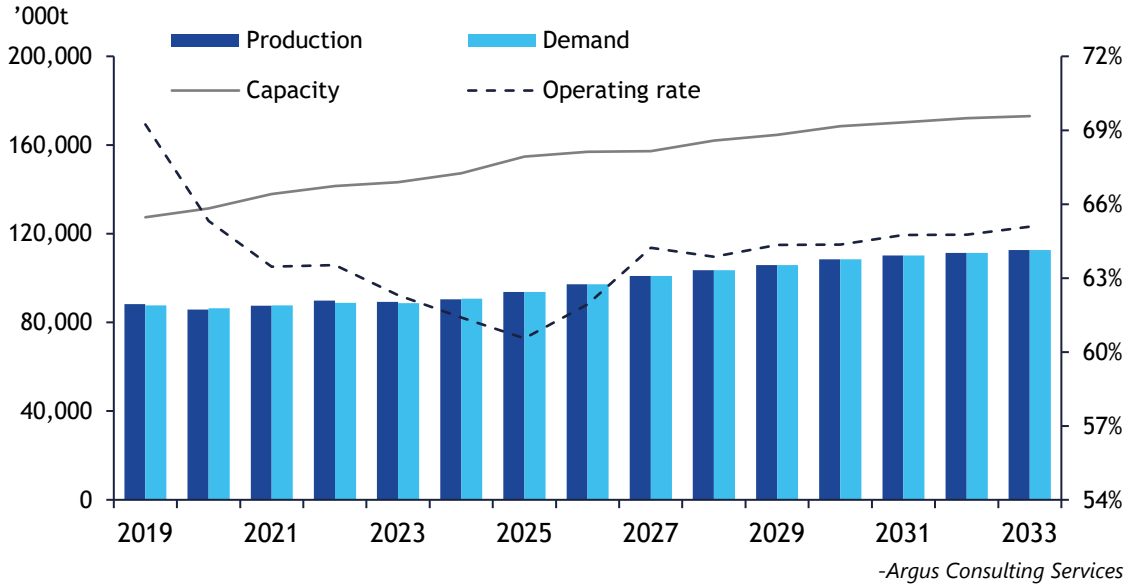
Crude Oil, Natural Gas, China Coal

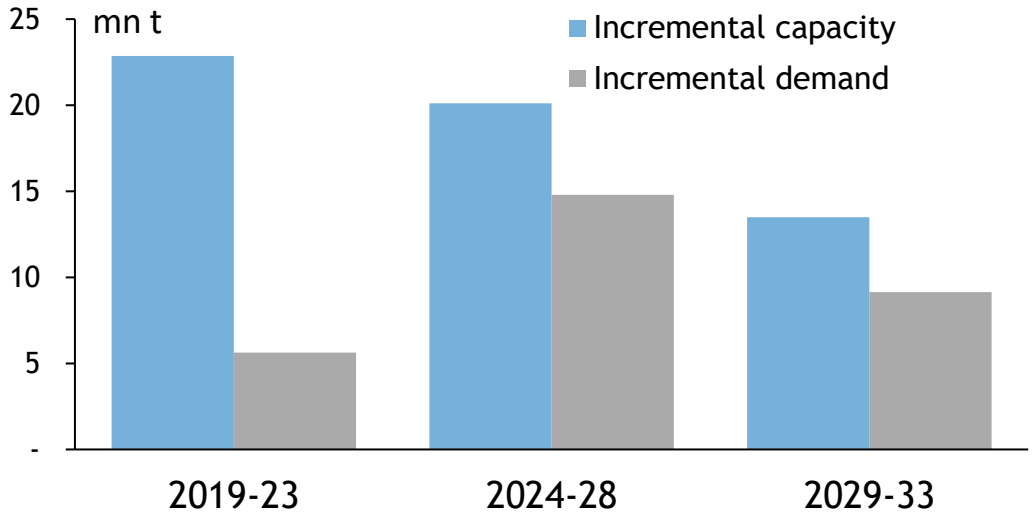


- After a roller coaster 2020-2023, main energy prices have dropped and are poised to remain flat through the forecast period.
- These bode well for stabilizing derivative prices, but at levels unlikely to "boost" methanol values.
- $70/bl oil is an energy equivalence of about $280/t methanol.
- China forward coal prices equate to a coal-based methanol cash cost of about $250/t.
- Europe's TTF benchmark natural gas prices provide little economic incentive to produce methanol via natural gas.
- *Expected higher US natural gas—at $4-5/mmBtu—will be irritating to methanol producers. New capacity—low carbon—will be further challenged.*

Global methanol supply trend: Capacity dominates demand, but demand will outgrow capacity additions in the forecast

Global methanol supply and demand, less CTO

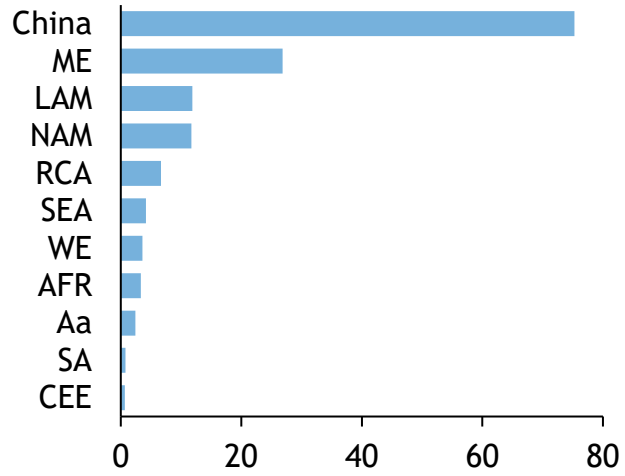




- Supply severely exceeded demand over 2019-23 with 23mn capacity additions vs 6mn demand growth, causing a steady fall of operating rates from 69pc to 61pc
- Slowed expansion plans and the expected demand recovery will return the industry a better balance in 2024-28
- While industry overcapacity is still envisioned through the forecast period, operating rates are likely to return to around 65% as imbalance eases

Global methanol supply trend: Capacity additions slow down in 2026-27, allowing the industry to rebalance

Capacity to Produce Methanol, 2024 mn *t*



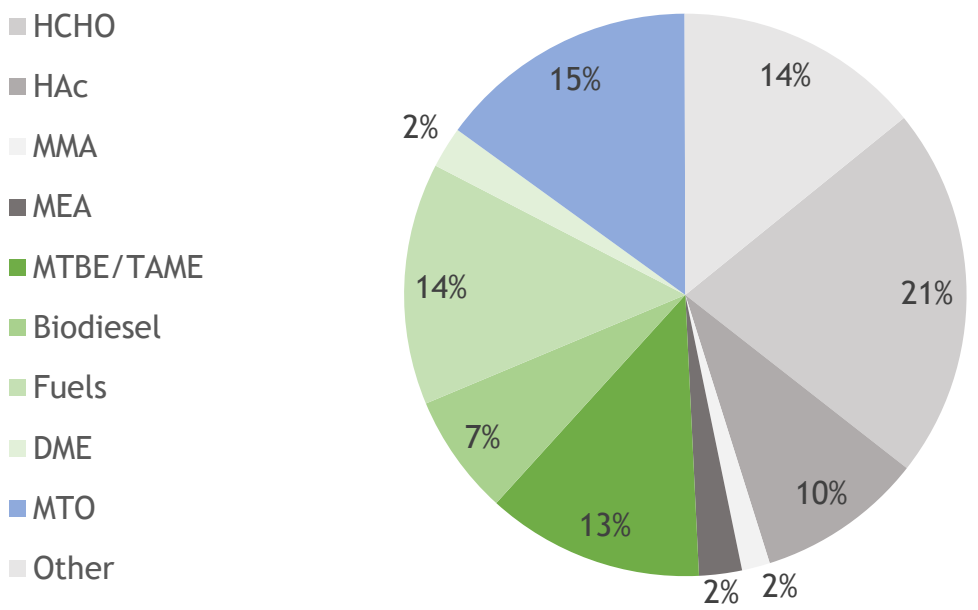
- Global methanol capacity in 2024 totaled 147mn t (excluding CTO/CTP), with China accounting for 51pc (72mn t), the Middle East accounting for 18pc (27mn t), Latin America and Caribbean accounting for 8pc (12mn t)
- New capacity is expected through the forecast period:
  - 2026-27, Russia, Nakhodka Fertilizer 1.8mn t/yr unit in east coast Vladivostok
  - Mar 2025, Iran, Persian Gulf Apadana 1.65mn t/yr unit in Assaluyeh
  - 2026-28, Iran, two more?
  - 2028-29, UAE, Taziz, 1.8mn t/yr unit in Abu Dhabi
  - 2028-30, under planning, US Sandpiper and Lake Charles, Indonesia Pertamina, Mexico Transition Industries

Global capacity changes (excluding CTO/CTP) *'000t*

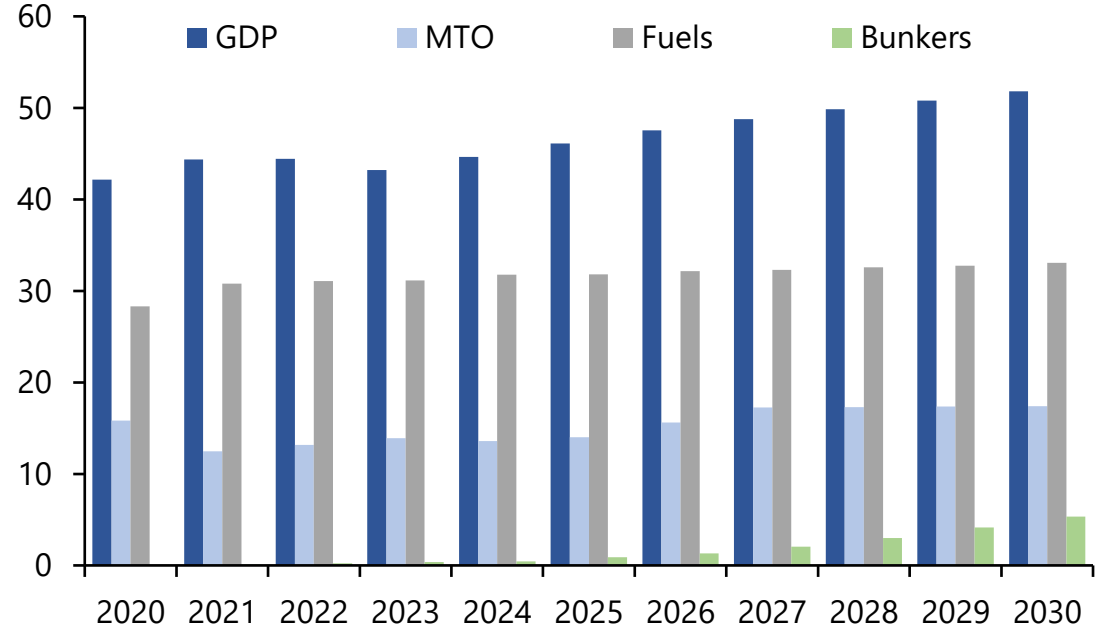
Region	2019	2020	2021	2022	2023	*2024*	*2025*	*2026*	*2027*	*2028*	*2029*	*2030*	*2031*	*2032*	*2033*
North America	1,120	140	1,040	1,000	115	750	1,450	200	-	3,365	2,600	500	-	1,000	-
Latin America	590	160	510	390	-	-	-	-	-	-	-	-	-	-	-
Western Europe	-	156	-	60	-	-	(200)	(200)	-	-	-	-	-	-	-
Russia and C Asia	480	150	220	400	100	-	50	300	1,800	-	-	800	1,600	-	-
Middle East	2,600	1,750	1,050	1,450	400	1,250	800	850	-	1,400	900	800	1,650	850	-
Southeast Asia	-	-	-	-	-	-	*1,650*	-	-	-	-	*400*	*400*	-	-
China (ex CTO/CTP)	3,868	730	2,875	340	1,097	*1,983*	*1,730*	*1,660*	*200*	*1,000*	-	*1,000*	-	-	*1,000*
Rest of world	-	-	-	-	67	75	-	-	-	-	-	-	-	-	-
Total	**8,658**	**3,086**	**5,695**	**3,640**	**1,779**	**4,058**	**5,480**	**2,810**	**2,000**	**5,765**	**3,500**	**3,500**	**3,650**	**1,850**	**1,000**

Global methanol demand: Demand is now forecast to see average growth of 2.4mn t/yr from 2024, up to 2033

Industry Derivative Demand less CTO, Fall 2024 = 90.6mn t



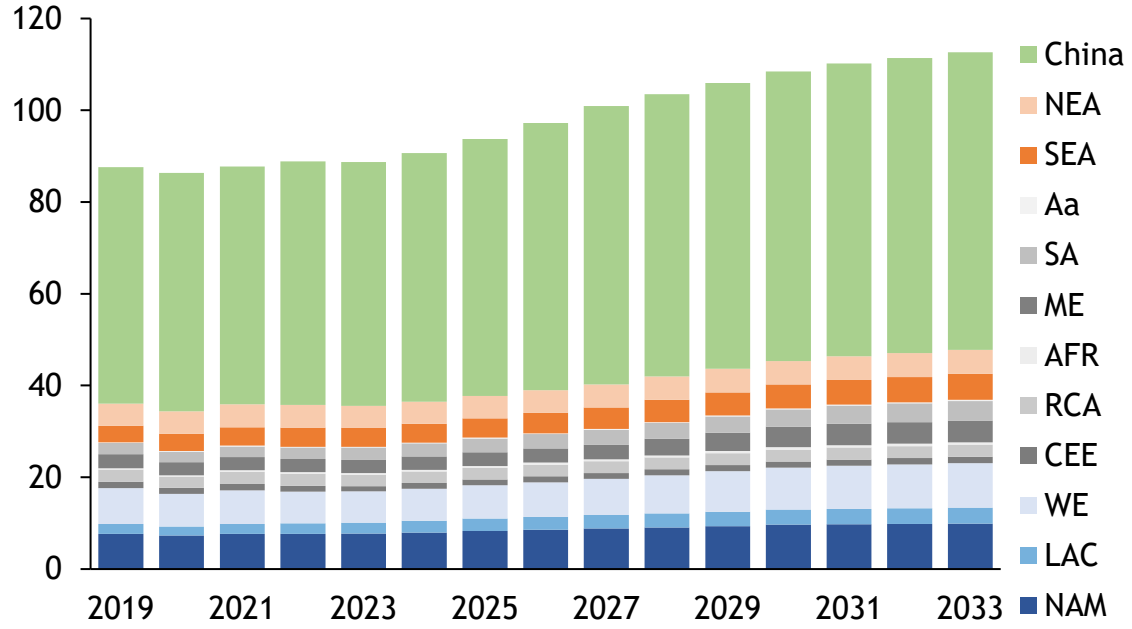
Derivative Growth mn t



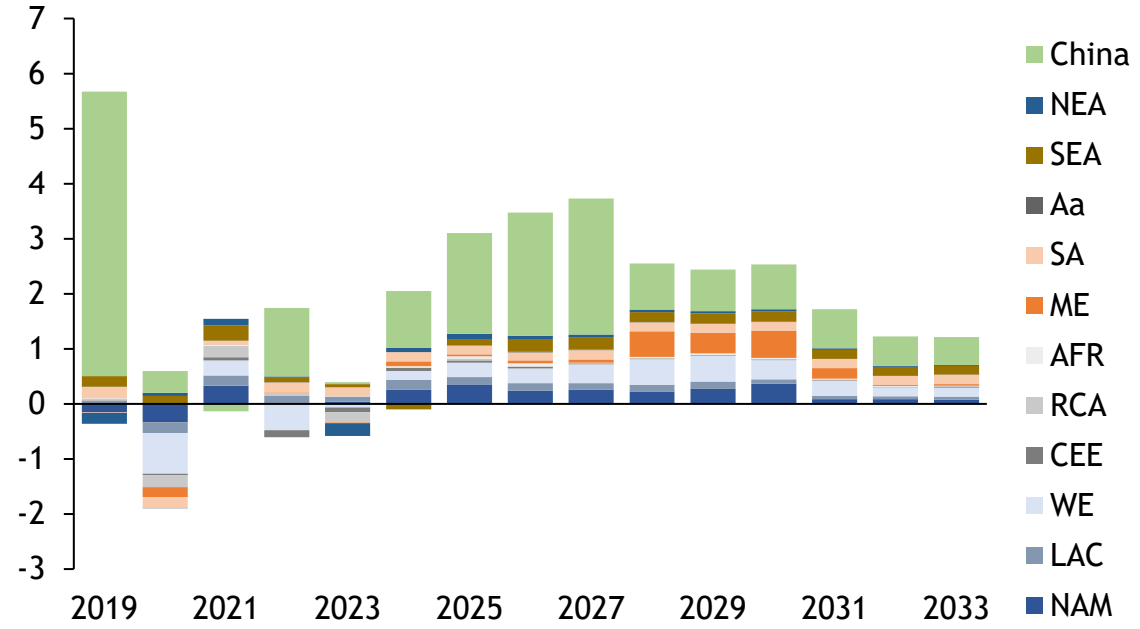
- Methanol related to oil (naphtha)/fuel substitutes accounts for 36pc of total demand, suggesting a link between methanoland energy prices. Traditional products (formaldehyde, acetic acid, methyl methacrylate, solvents, etc.) represent 49% of demand, and are tied to housing, automotive, paints/coatings and appliance industries and thus more driven by GDP
- Forward demand growth will be more underpinned by growth in GDP-driven products (housing, automotive, consumer producer) and fuels. Again, however, the fear of Trump Tariff Wars looms heavily in the next couple of year.
- The largest MTO demand is plateauing (15pc of demand), as large cracker capacity additions in China will threaten MTO production growth. Bunker demand will remain limited as proving fuel and/or back-up to green/blue methanol.

Global methanol demand: China demand growth slows with lowered economic outlooks and MTO sector peaking in 2027

Regional Methanol Demand less CTO, mn *t*



Regional Demand, yr-on-yr (less CTO) mn *t*

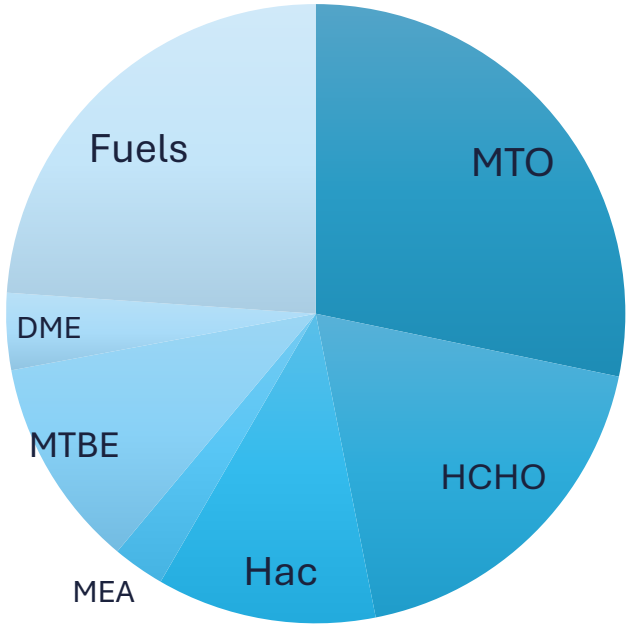


- China continues to be the largest methanol consuming country in the world, accounting for around 50pc of total world demand
- China, the US and West Europe combine to account for just over 75pc of world methanol consumption
- Through the 2019-2023 period, global methanol demand saw CAGR of just 0.3pc, hurt by the loss of demand in 2020-2023
- Global demand growth to speed up to 3.4pc CAGR over 2024-28 before a slowdown to 1.5pc in 2029-33. Industry growth drivers will see a change from reliance on the large MTO sector, to fuels and the core GDP-driven products
- China demand, although slowing, will continue to dominate industry demand. Rest of world must step-up

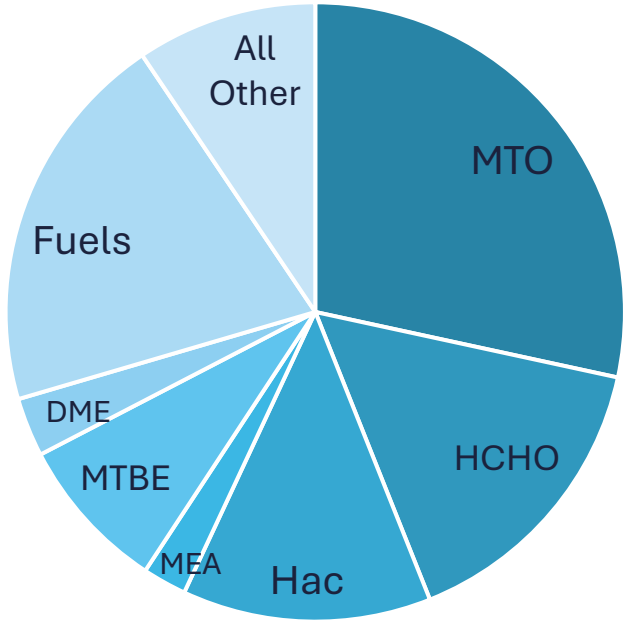
A focus on Asia and China

China's demand structure: MTO remains the largest demand sector and will expand further in 2026-27

2024 Demand less CTO = 55mn t



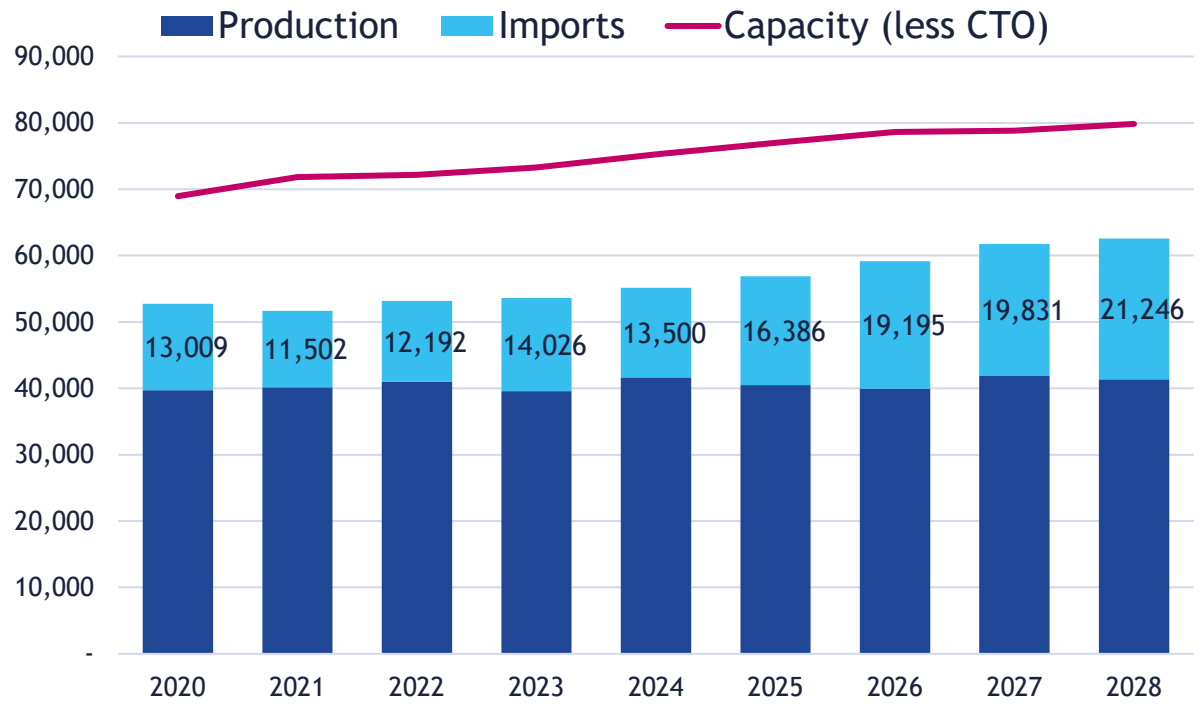
2028 Demand less CTO = 62mn t



- MTO demand for methanol is around 15mn t in 2024, accounting for 27% of China's total methanol consumption at around 55mn t in 2024. Among the 15mn t demand, ~9mn or 60pc of which are met by imports
- Other major demand sectors are fuels (24%), formaldehyde (19%), acetic acid (11%) and MTBE (11%)
- Demand structure will largely maintain in the future. MTO and acetic acid will expand their shares, squeezing shares of other sectors such as formaldehyde, MTBE and fuels.

China's demand outlook: Expansions in MTO, acetic acid and MTBE enhance China's appetite for imports in 2025-27

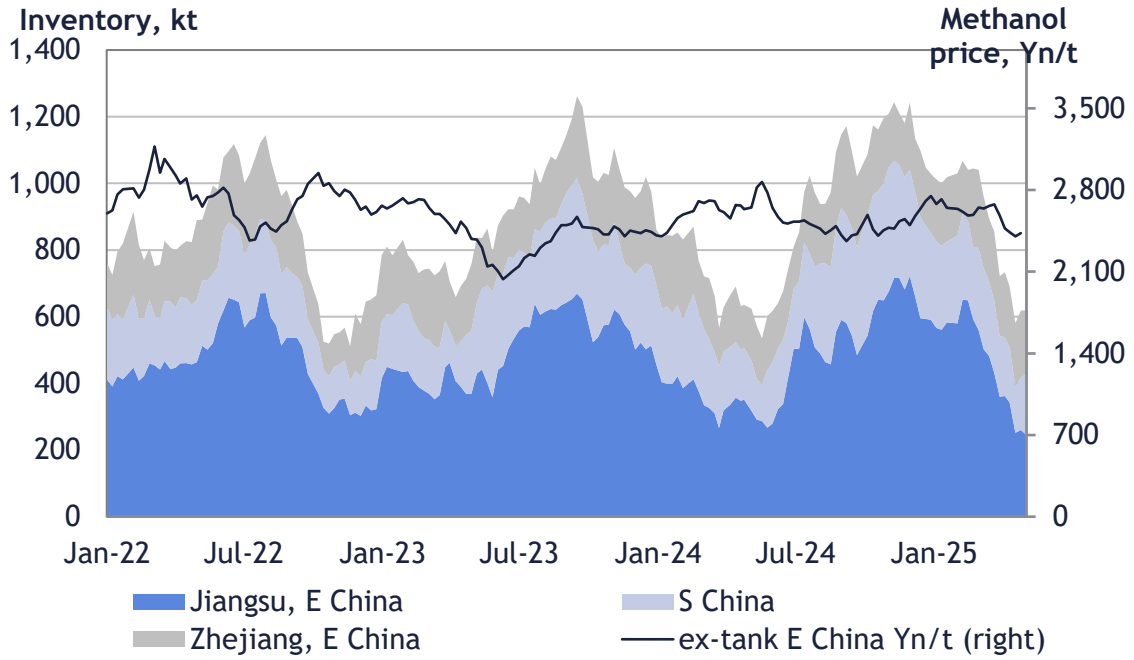
China's mercahnt methanol supply growth



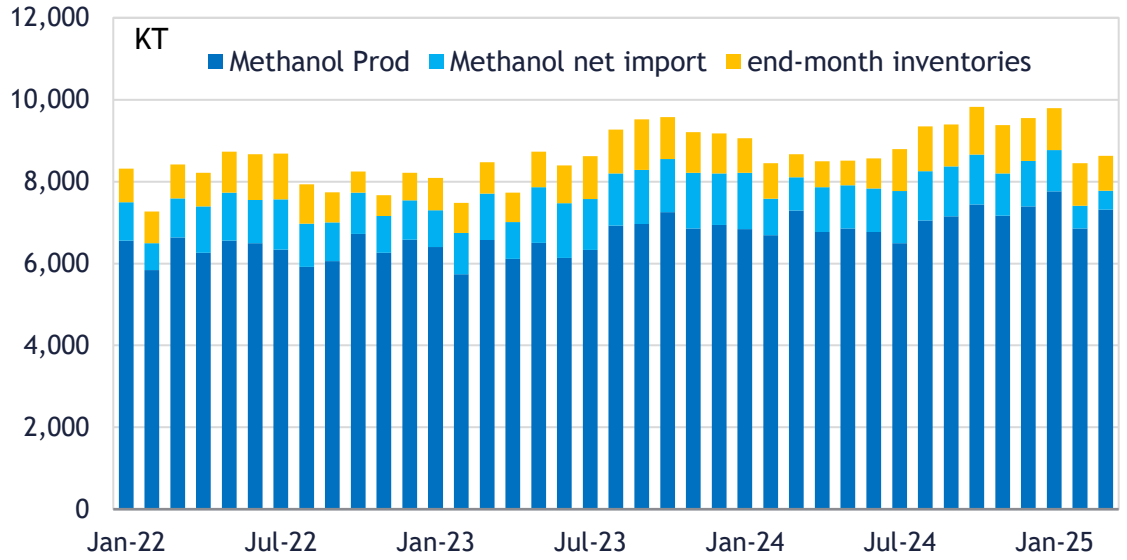
- China's merchant methanol capacity reached 75mn t in 2024, up by 2mn t/yr from 2023 and will grow by another 1.7mn in 2025
- Merchant methanol production will hit 42mn t in 2024, also a rise of 2mn t from 2023. But upcoming new projects are limited
- Domestic plants run slightly higher around 64pc (coal-based capacities) from 63pc in 2023 amid slower domestic expansions
- Import demand is estimated to rise to 16mn t in 2025 and 19mn t in 2026 to meet growing demand

Market balance: China port inventories are the best indication of global (now mainly Asia) balance

China's methanol port inventories vs. Methanol prices



China's methanol apparent demand, monthly



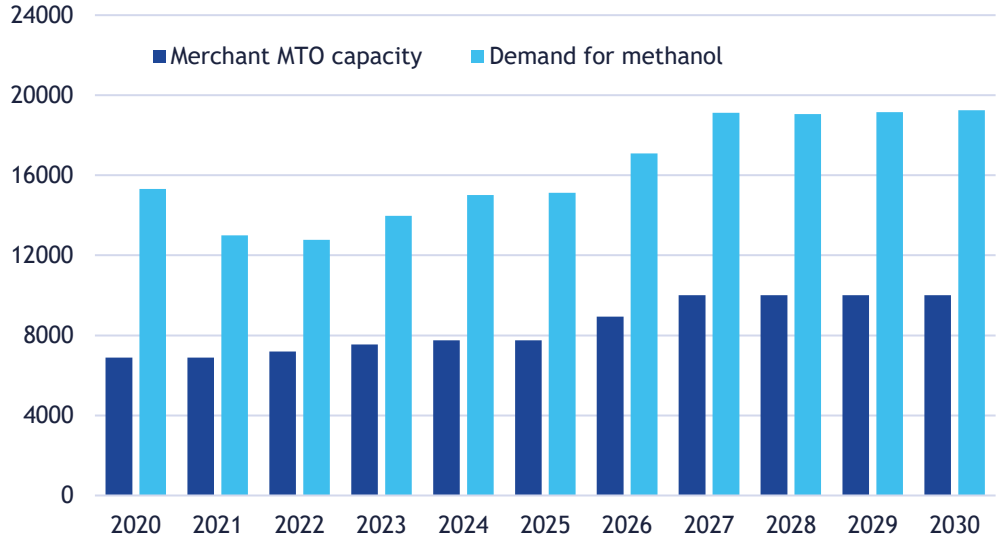
- China's port inventories are well below a healthy level around 900kt now, the highest 1.2mn t+, the lowest 510kt, and the average around 880kt over 2022-25
- China's methanol apparent demand (domestic production + net import + end-month inventories) hit a multi-year high of 8.8mn t in Jan 2025 before a sharp fall to a 22-month low of 7.4mn t in Jan 2025

MTO outlook: New MTO projects on the way, creating new demand in 2026, but lower operation will discount demand

China's new MTO projects

Company, Location	MTO Capacity, kta	Required Methanol, kta	Startup
Guangxi Huayi	1,000	2,800	Q2 2026
Shandong Lianhong	460	1,300	end 2025
Inner Mongolia Rongxin	800	2,300	early 2027

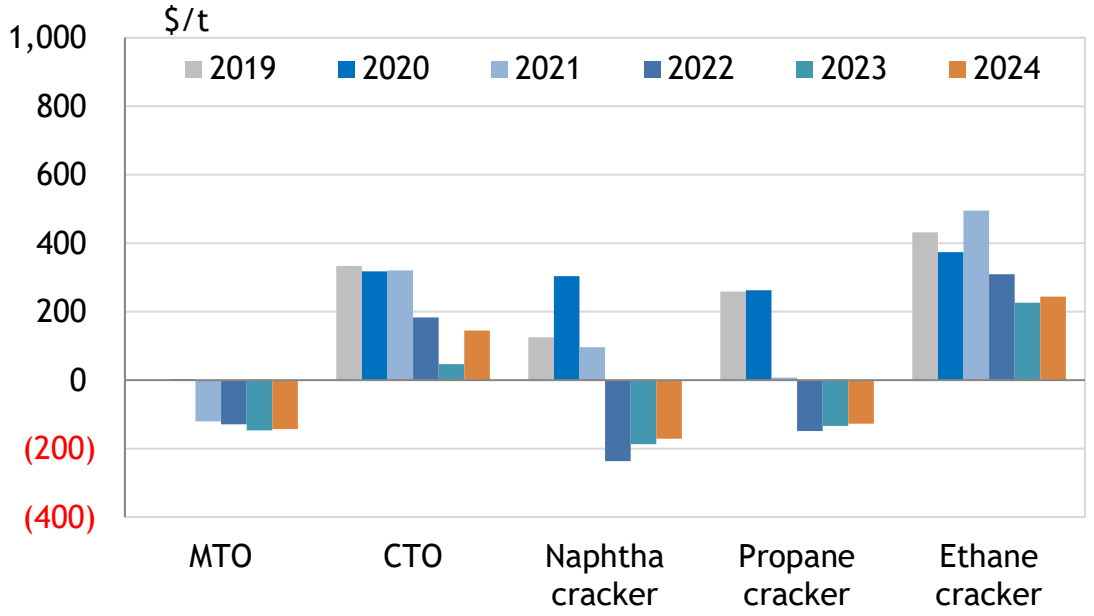
MTO capacity and demand for methanol, kt



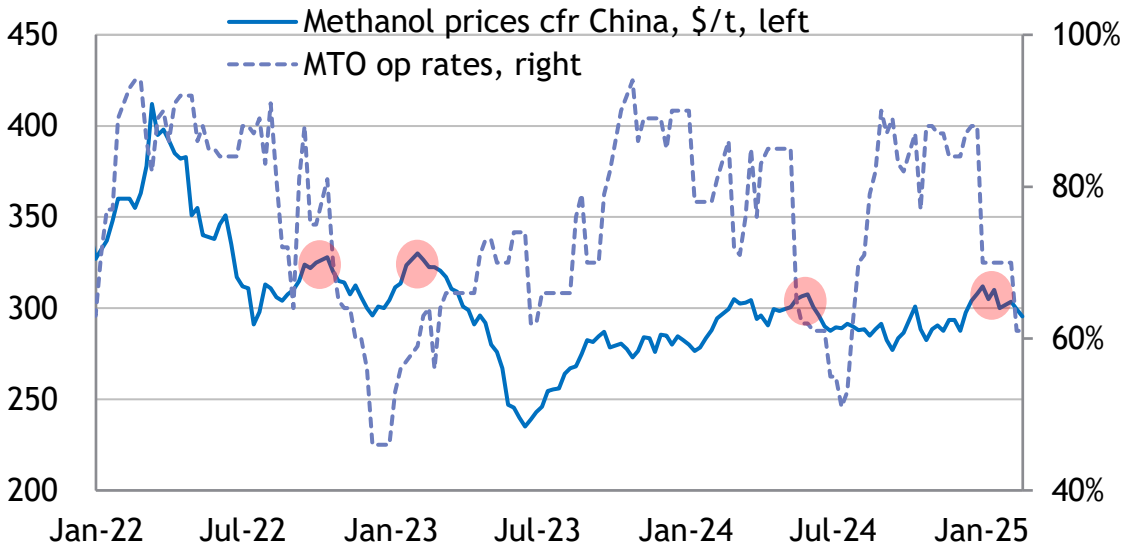
- China will add three new standalone MTO projects, creating a total of 6.4mn t of methanol demand. Two of them will need merchant methanol purchases and one will consume its existing production
- Massive new cracker projects in China in 2025-27 will cause a further overcapacity in olefin and olefin derivative industries, weighing down overall olefin unit run rates from current 81pc to 75pc in 2027-28.
- MTOs are less competitive with its smaller scales, limited product variety. Expectations of an overall lower MTO run rate around 60-65pc from current 70-80pc will discount overall MTO demand for methanol.

Ceiling of cfr China: Negative MTO margins cap MTO's affordability to methanol and methanol's (import) prices

MTO margins vs Other olefin production technologies

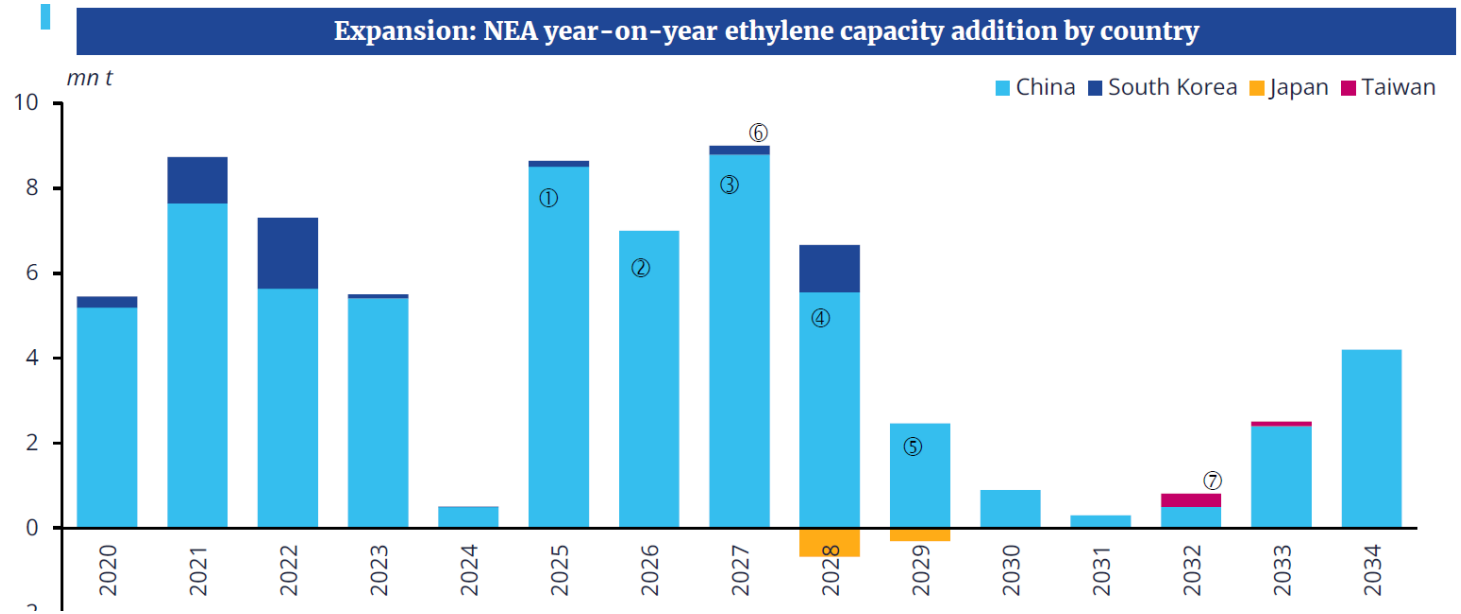


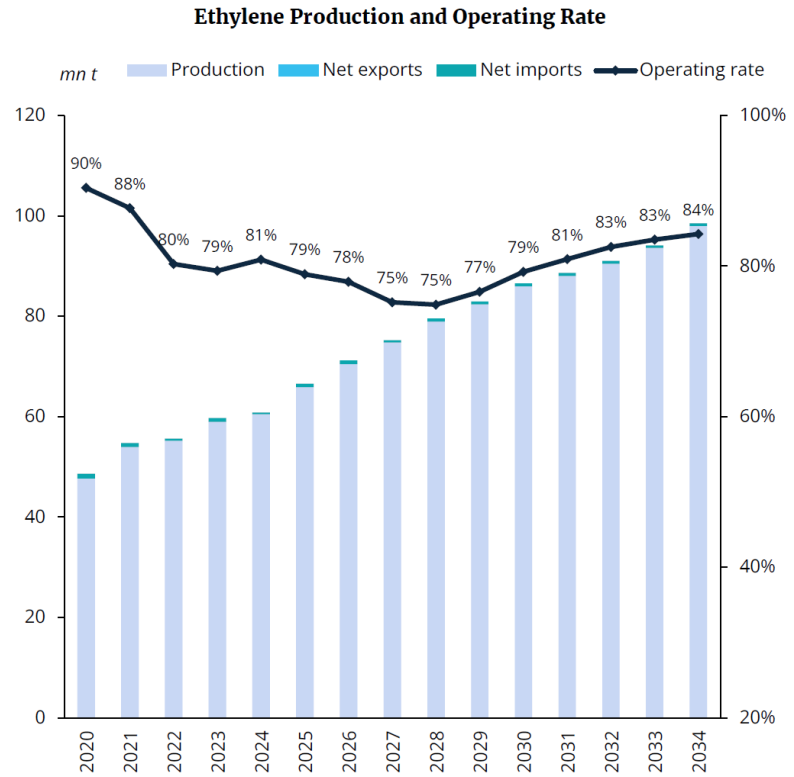
MTO operations vs Methanol prices



- MTO margins were negative over 2020-24; But MTO margins still marked a premium of around $30-100/t against naphtha cracker margins in 2022-2024, and this has supported MTO operations over the period
- Chinese MTO plants adjust operations mainly according to margins, ethylene prices and feedstock supply
- Why keep running? Integrated complex, contract fulfillments, cash flow, lack of olefin supply etc. are factored

Asia olefin supply outlook: Asia is embracing for a peak olefin expansion period, weighing down operating rates

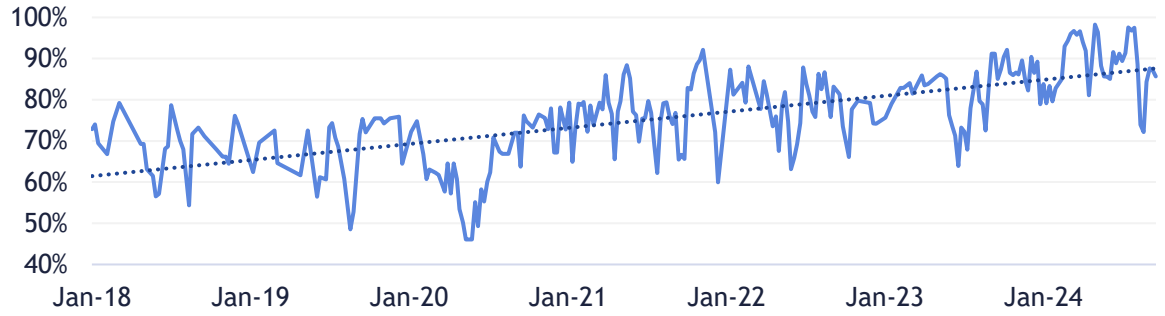




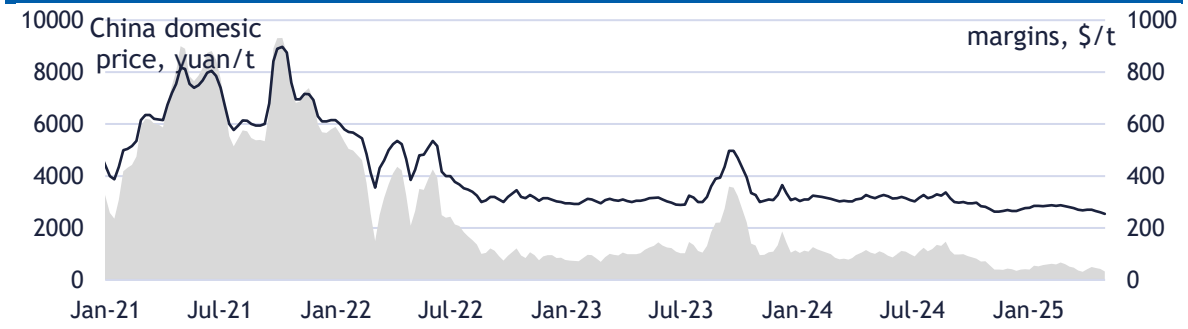
- Supply growth will be led by massive new crackers in China in 2025-29. The capacity CAGR is at 7.5pc over 2024-29 but will slow down to 1.6pc in 2029-33. Operating rates are expected to bottom out in 2027-28
- We expect a total of 4.9mn t of closure from older, smaller, and non-integrated crackers by 2033
- Increased investment in ethane and flexible gas crackers in China will provide better economics and reduce its reliance on imported downstream products.

Acetic acid outlook: Acetic acid expansions support methanol demand, but expected overcapacity will discount demand

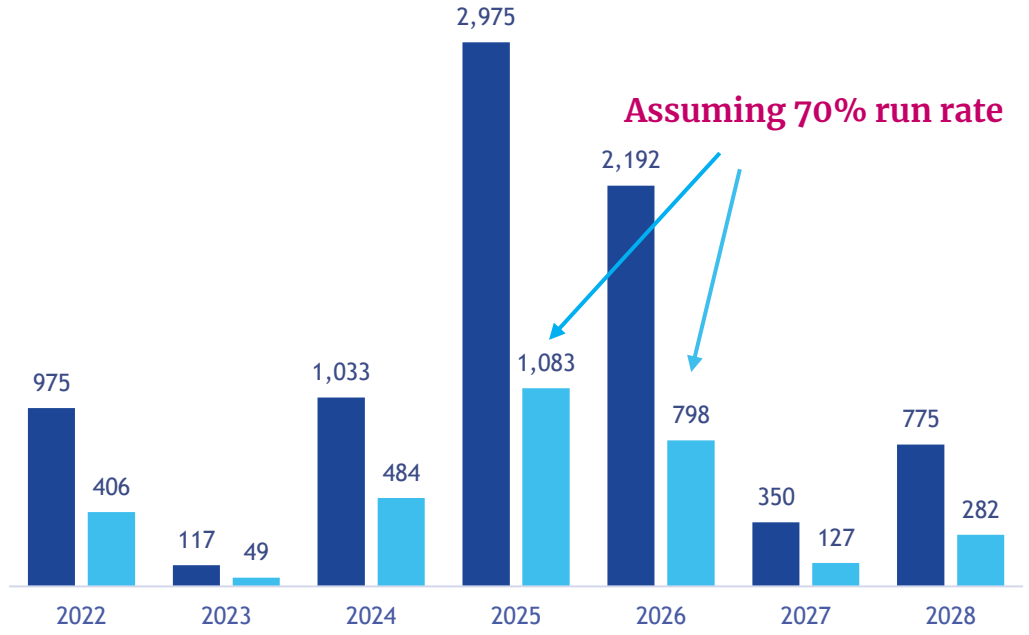
China acetic acid run rates



China acetic acid prices and margins



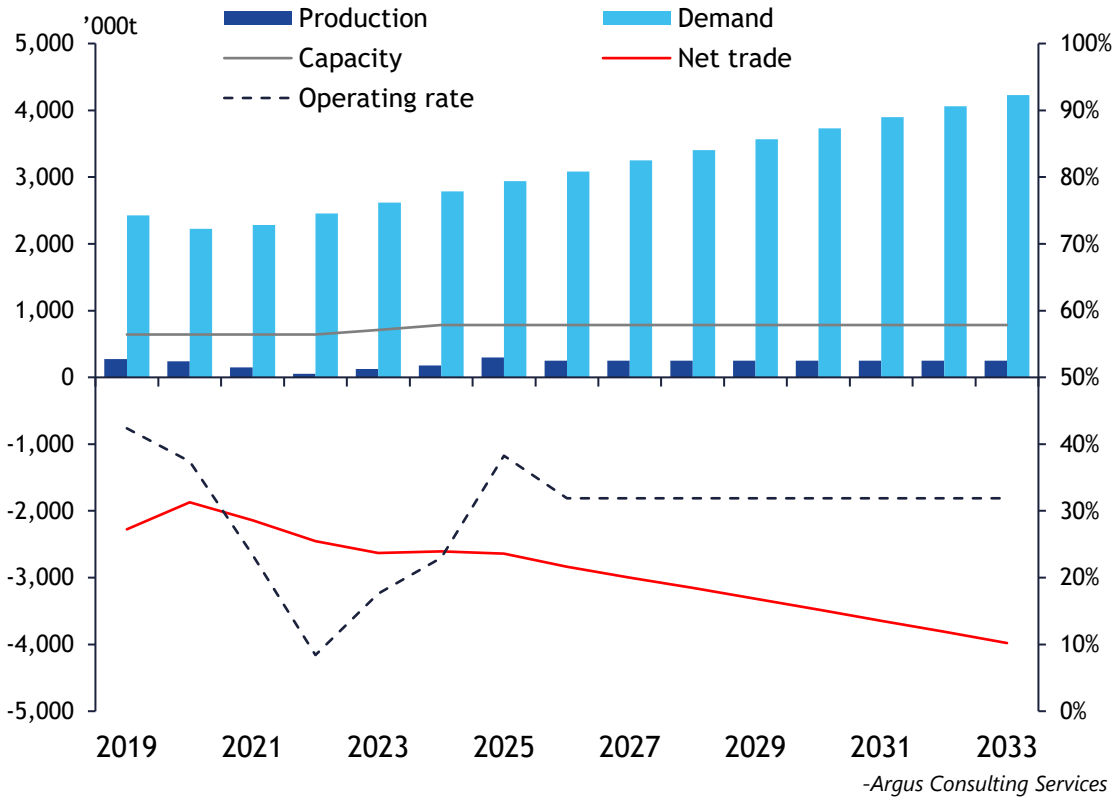
Capacity additions (effective) vs Demand for methanol



- China's acetic acid capacity will reach 12.6mn t/yr in 2024 and will grow rapidly by around 3mn t in 2025 and another 2.2mn t in 2026. Huge expansions in downstream PTA and VAM sectors supported demand
- Operating rates may fall back to 70-80pc in 2025-27 from current 90pc amid increasing overcapacity

India's price premiums: India relies heavily on Middle Eastern methanol

India's methanol supply and demand



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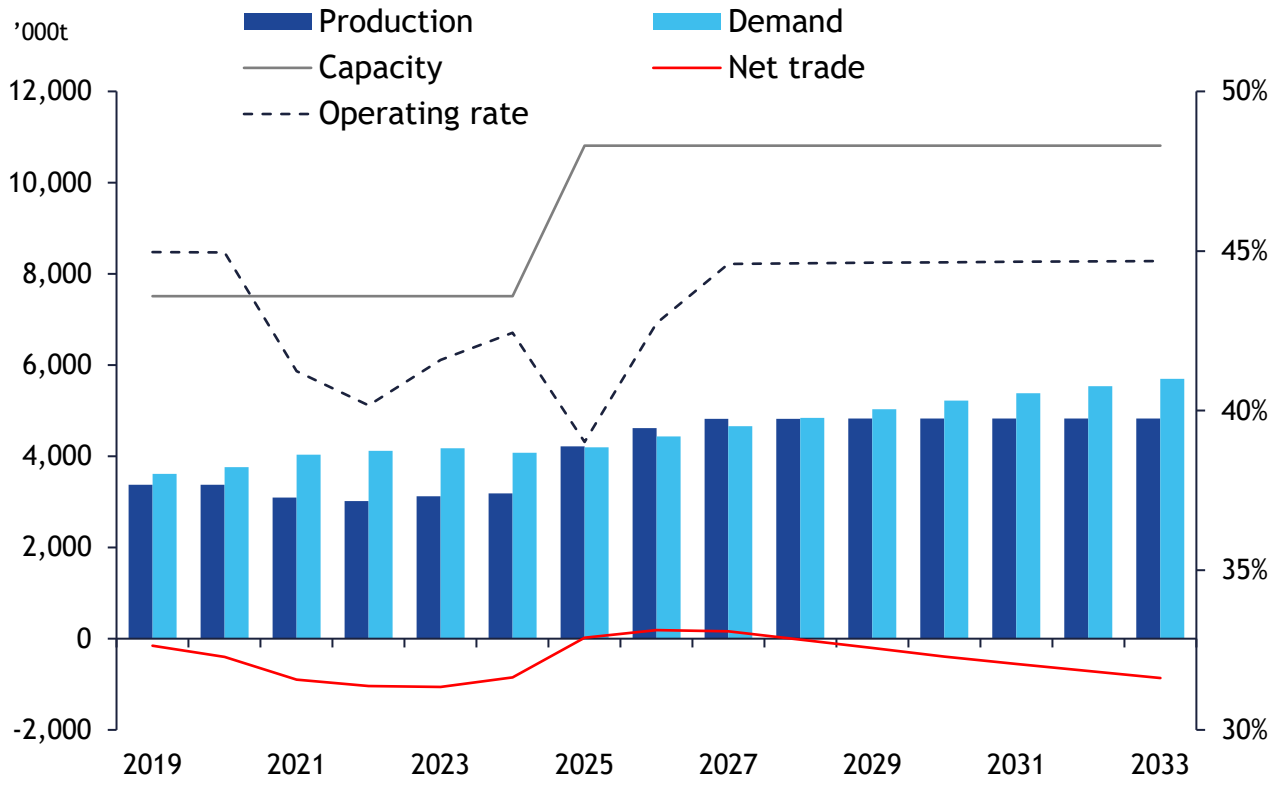
Import origins	Import volumes, kt	%
World	**2,729**	**100%**
Oman	1,307	48%
Saudi Arabia	617	23%
Qatar	376	14%
Iran	203	7%
Bahrain	99	4%
Venezuela	53	2%
Algeria	51	2%
UAE	15	1%

- India's domestic methanol production is small, relying heavily on imports
- The Middle East is the dominant exporter to India, with occasional parcels from Africa, Venezuela, and at times from the US
- India's demand reached ~3mn t/yr in 2024, and is expected to grow at CAGR 5.1pc in 2024-28 (compared with 2pc in 2019-23)
- Formaldehyde is the single largest methanol derivative in India, taking nearly half of methanol consumption, followed by MTBE

Southeast Asia's price premiums: Southeast Asia plant upsets keep the region much shorter than expected

Southeast Asia methanol supply and demand



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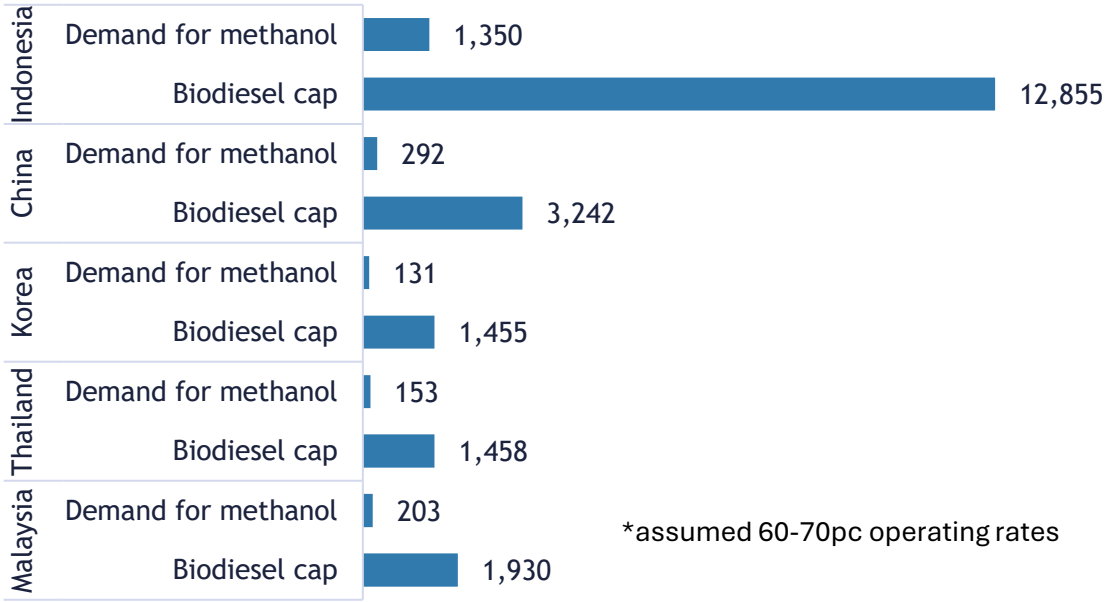
- Southeast Asia capacity grows to 10.8mn t from previous 7.5mn t after the launch of Sarawak
- The region's total methanol demand was about 4.1mn t in 2024 and will grow to 4.8mn t by 2028, with CAGR 4.4pc in 2024-28 (compared with 3.7pc in 2019-23)
- The region will become more self sufficient in 2025-27 with net trade turning to 0-200kt from negative 850kt-1mn t in 2023-24
- Malaysia's average run rate was only 38pc (1.9mn t production) in 2024; we expect production to rise to 2.9mn t in 2025 (35pc rate)
- Biodiesel has led methanol demand growth the last five years and will continue to dominate regional demand (45pc of total demand in 2024).

Key demand driver in southeast Asia: Biodiesel mandates in road transport continue to drive regional methanol demand

Asia biodiesel capacity and demand for methanol in 2024, kt



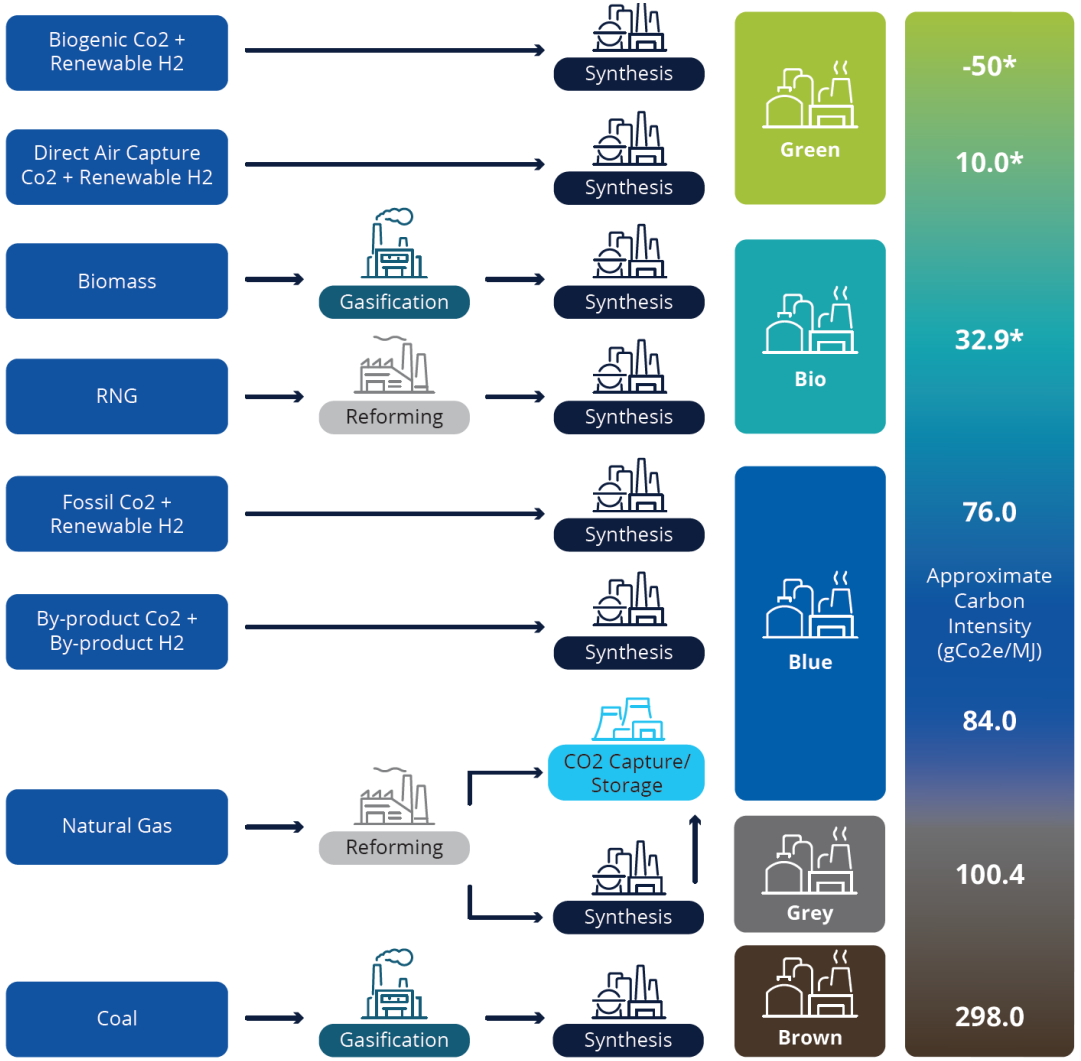
Biodiesel blending mandates in Asia (Vol.%)

	2025	2030
Indonesia	40%	50%
Malaysia	20%	20%, 30% for heavy load truck
Thailand	10%	10%
Philippines	3%	5%
Korea	5%	8%

- In Asia, led by Indonesia, five countries have imposed biodiesel blending mandates in road fuel. Mandates increases are expected in Indonesia, Philippines and South Korea till 2030
- A 5% increase in mandates creates 200kta of methanol demand
- Demand in marine fuel (B24 – 24pc Ucome and 76pc VLSFO) rises sharply
  - Singapore's B24 consumption reached 780kt in 2024, up by 51pc from 518kt in 2023
  - Biodiesel is RED compliant, import origin is mainly from China
  - China's own B24 bunkering demand remains restricted by policy huddles

Methanol as a shipping fuel alternative

Green methanol definitions: Methanol production pathways



Path-ways	CO2 emissions, tCO2 e/t				
	Feedstock	Well-to-Tank	Tank-to-Wake	Full-life-cycle	Convert to gCO2e/MJ
E-methanol	-1.38	0.56 (max*)	1.375	0.56	28
Biomethanol	-1.38	0.66 (max*)	1.375	0.65	33
Coal-methanol	2.50	1.78	1.375	5.66	283
NG-methanol	-0.27	0.92	1.375	2.03	102
CCU-methanol	-1.35	1.09	1.375	1.12	56

Note: Methanol's calorific value is 19.95 MJ/kg

- GHG savings are based on VLFSO 94gCO2 equivalent/MJ
- Biomethanol: minimum 65pc GHG savings
- E-methanol: minimum 70pc GHG savings

Green methanol as a marine fuel alternative – Policy: GHG emission legislations by EU, FuelEU Maritime and IMO drive green fuel demand

Emissions Trading Scheme (ETS)

- In 2023, RED III was finalized to apply to **all transport sectors including marine and aviation**
- In 2025, **40%** of the CO2 emissions from voyages and at berth stays in 2024 will be subject to the ETS, rising to **70%** in 2026 and **100%** in 2027
- 2024 only count CO2, 2026 **expand to CH4/N2O/Slip**, qualified biofuels is considered zero CO2 emission

FuelEU Maritime Regulation

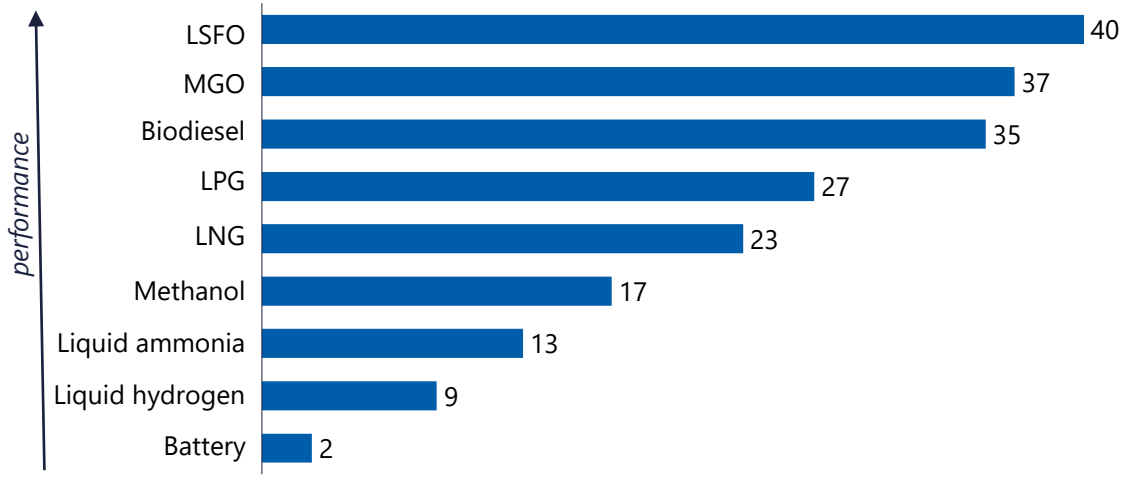
- The regulation sets targets for reducing the yearly average GHG intensity of the energy used by a ship.
- The required GHG intensity reduction **starts at 2% in 2025** (2020 baseline), reaching 6% in 2030 and 14.5% in 2035, **through to 80% by 2050**.
- A penalty or reward is then calculated based on the extent of under- or over-performance

International Maritime Organization (IMO)

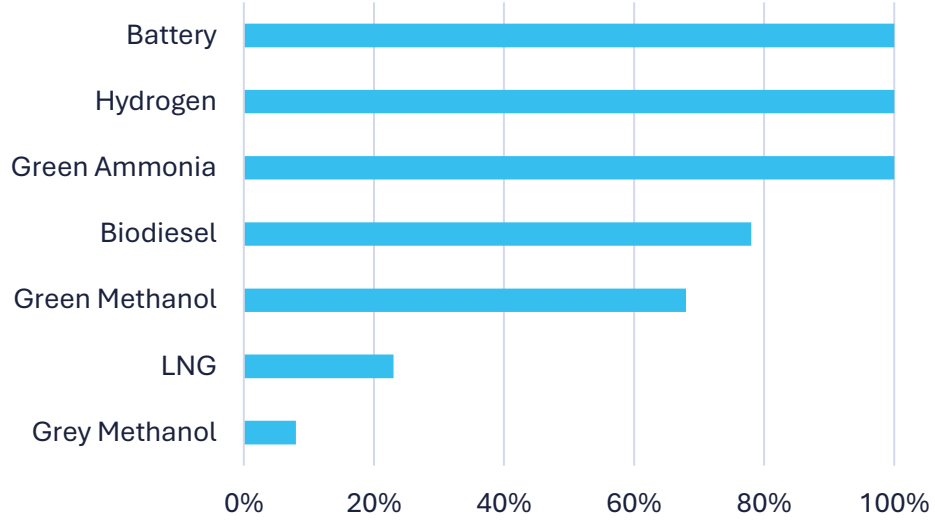
- **By 2030,** to **reduce carbon intensity of 20%** striving for 30%, take low/zero carbon fuels of at least 5%, striving for 10%; By 2040, to reducing carbon intensity of 70% striving for 80%; **By 2050**, to **achieve net-zero** CO2 emissions
- MEPC's 83rd session proposed **two-tier pricing mechanism**. Other details will be released **in the fall of 2025 through to 2027** with **implementation from 2028**
- IMO's guidelines are more feedstock agnostic with a simpler approach to decarbonization

Green methanol as a marine fuel alternative – Product property: Green methanol are ideal options in terms of GHG savings, technology/facility readiness and lower logistic costs

Volumetric energy density of different fuels (MJ/l)



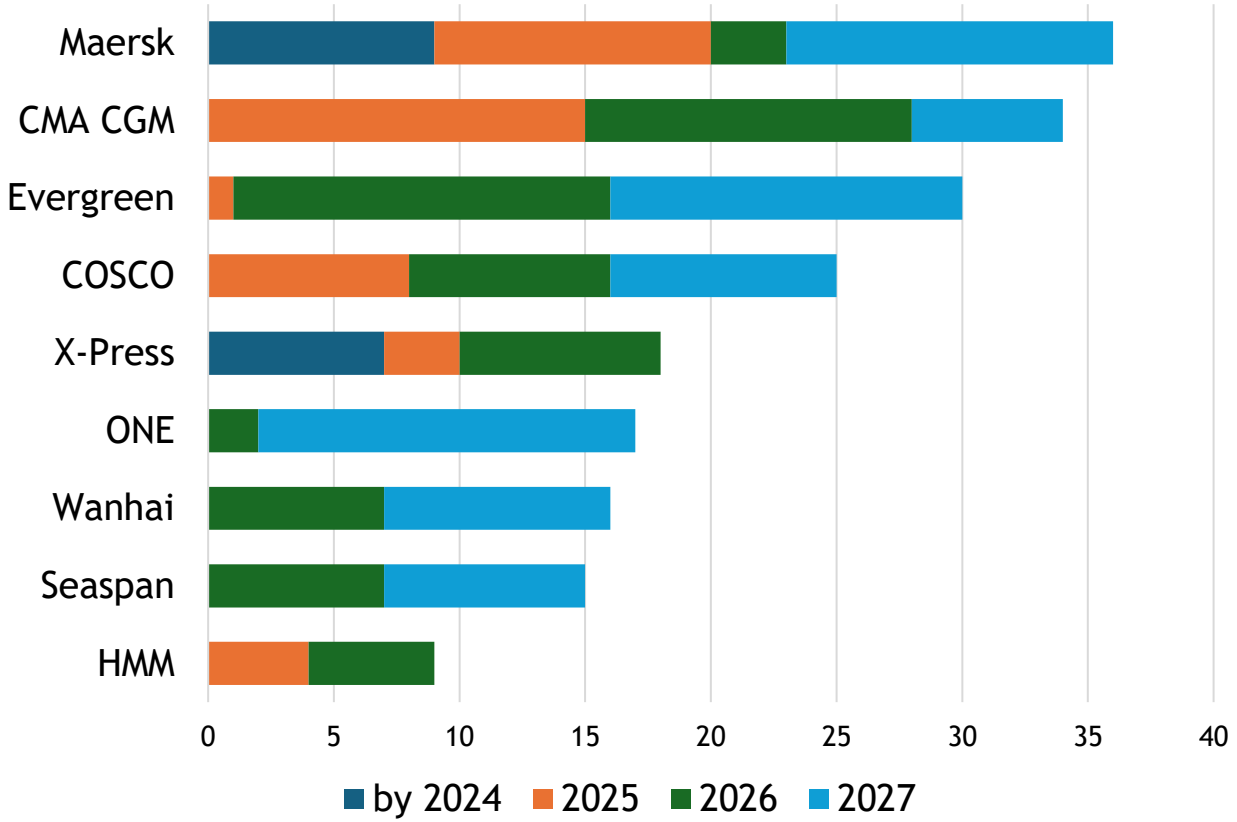
Well to Wake GHG savings %



- GHG savings and volumetric energy density are key factors for choosing alternative low carbon marine fuels
- LNG and LPG are attractive with high volumetric energy density, but their decarbonisation potential is not enough
- Biodiesel, green methanol, ammonia & hydrogen have a great decarbonisation potential,
  - But biodiesel's feedstock is limited and faces competition from aviation and road,
  - Green methanol, ammonia and hydrogen have relatively low volumetric energy density
  - But green methanol has higher technology/facility readiness and lower logistic cost compared with ammonia and hydrogen

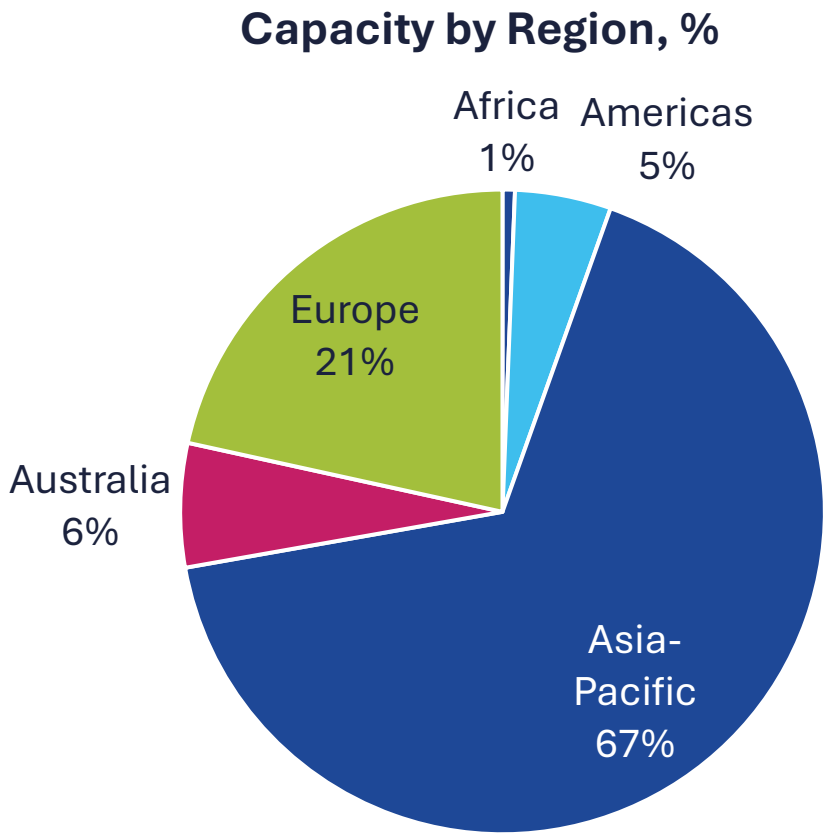
Demand is on the rise: Increasing buying enquiries for green methanol, even just in small quantities, trial basis and for branding

The expected delivery of methanol capable vessels



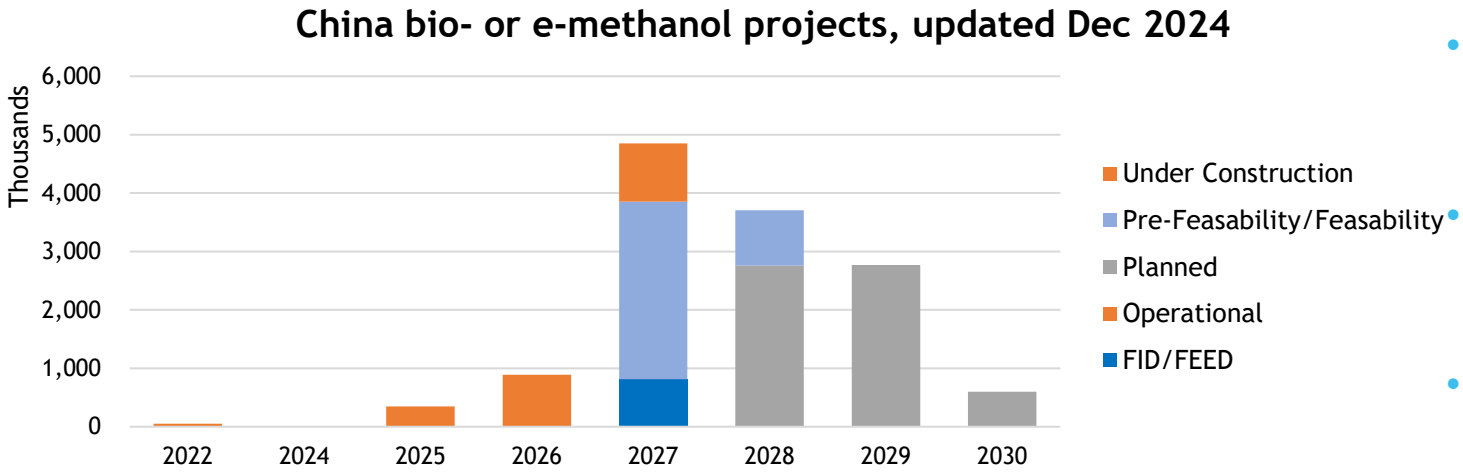
- Commercial bunkering activities kick off at Shanghai port
- More methanol capable vessels are to be delivered in 2025-27
- More buying enquiries surfaced, particularly for end 2025 delivery
- Top ones: Maersk, CMA, Evergreen, COSCO, X-Press, HMM and Hapag Lloyd are also active
- Initial demand is conservative due to cost concerns, and mostly on a trial basis, but demand is real, even just for building corporate image

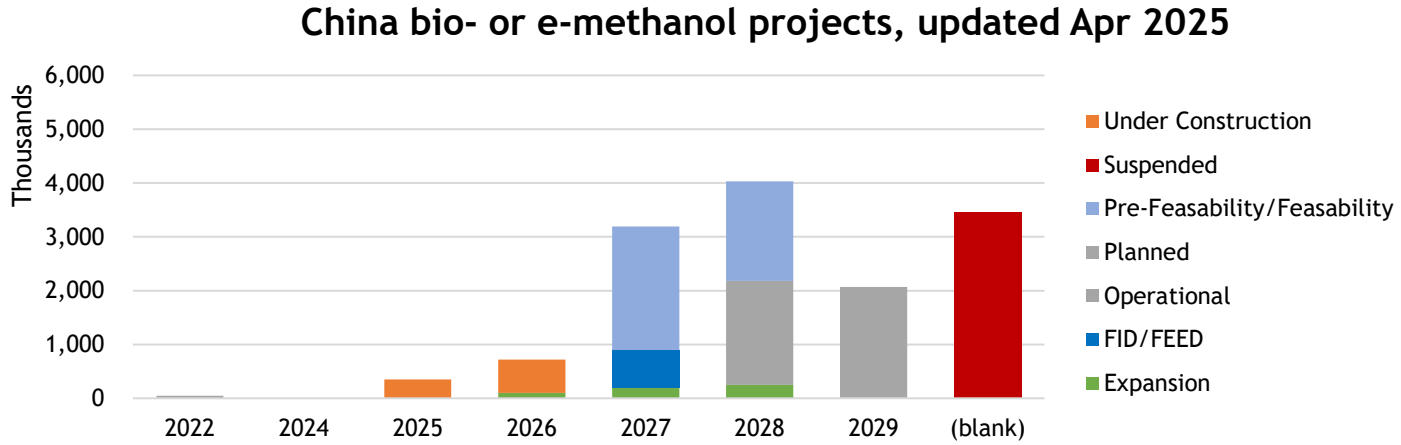
Why China: China has large availability of both low-cost renewable electricity and agriculture wastes



- Asia Pacific (mainly China) is the leading region in biomethanol capacity with 67pc share, followed by Europe 21pc and Australia 6%
- America's total capacity is close to 1mn t/yr, but most is carried by grey methanol producers that have obtained bio natural gas (biomethane) supply contracts, but function mostly in a made-to-order scale due to demand and economics concerns.
- China has several advantages allowing them to be at the forefront of biomethanol projects:
  - Availability of low-cost renewable energy
  - Overall cost competitiveness with low capex
  - Large availability of agriculture and municipal waste residues

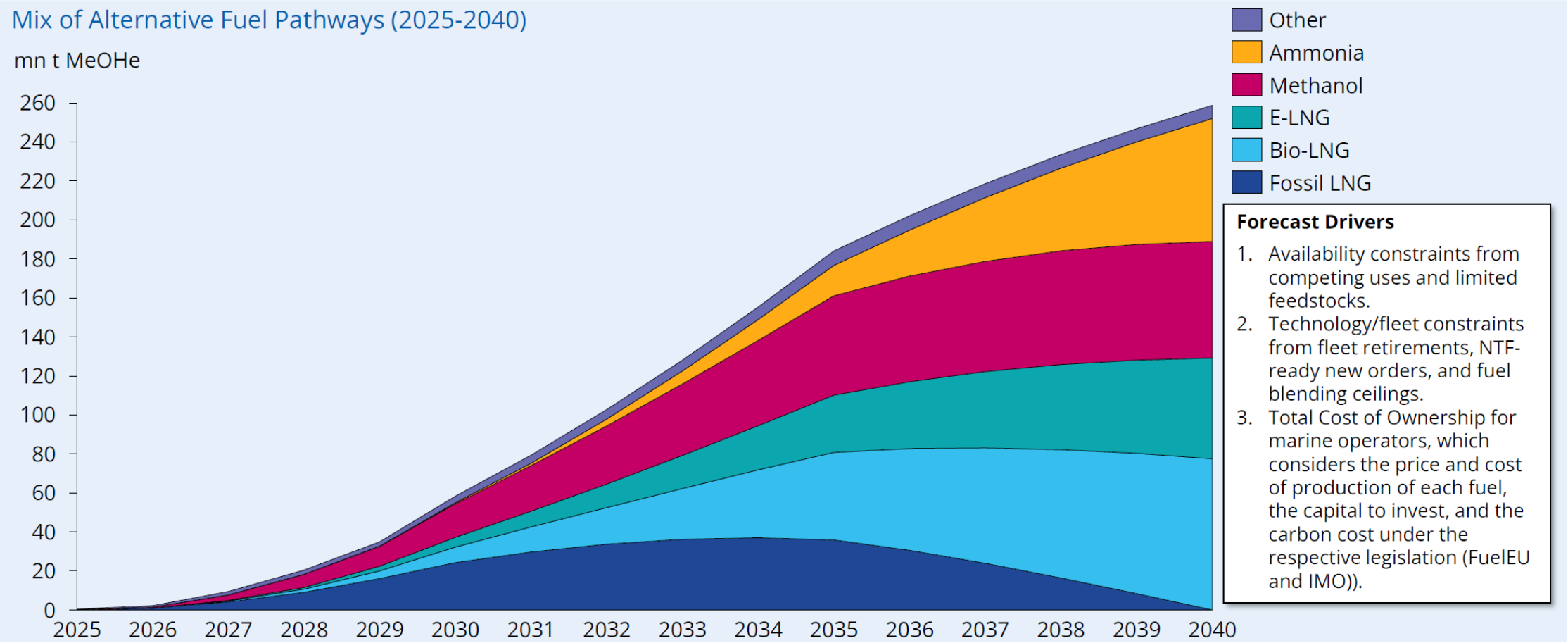
Green methanol supply: China becomes more cautious in green methanol investment





- *Argus* has noted that 11 projects, or more than 3mn t/yr of capacity, have been put on hold.
- A handful of projects that were officially announced to have started construction did not begin.
- Some projects have completed feasibility studies but failed to achieve FID.
- Reasons behind: high entry barriers for new industries, risks in technology, ROI, demand and policy uncertainties
- The whole industry is watching closely the first three demonstration projects: Shanghai Electric, CIMC, and GoldWind

Mix of marine fuel pathways (excludes biodiesel), 2025-2040: Argus expects methanol to gain significant shares by 2035



Argus new biomethanol assessments: Argus will launch its first Asia-based biomethanol pricing on 23 May

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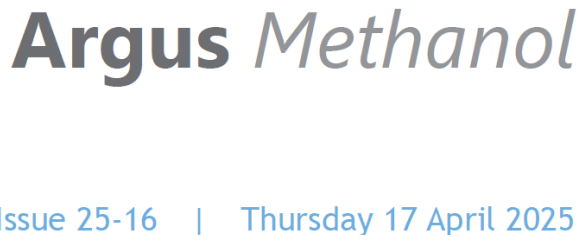

The new assessments will be shown in three publications

For more details on pricing methodology and product specifications, please consult becky.zhang@argusmedia.com

Conclusions

Key takeaways

- Global methanol demand growth returned in 2024, but slowed
- Supply continues to outpace demand growth through to 2033, with new capacities from the US, Russia, UAE, Iran and China, but the imbalance is reducing
- Industry growth drivers will see a change from reliance on the large MTO sector, to fuels and the core GDP-driven products
- *Argus* is expecting near term supply pressures as demand waned more than production losses amid trade uncertainties and geographic unrest. Supply from Iran fully restored and with a new startup
- China is seeking more import supplies in 2025 with new derivative expansions, mainly acetic acid (slightly delayed due to margins concerns), MTBE and MTO (end 2025 to 2026), helping the industry move towards a better balance in 2026-27
- Marine decarbonisation requests more green fuel alternatives towards the next decades. Green methanol (mainly biomethanol) trade emerged in Asia this spring and is expected to gradually take shape along with more demand and supply availabiity.

Further information

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Thank you