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Global Methanol Markets: Adjusting Once Again

2024 MMSA Houston Briefing

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INDEPENDENT. OBJECTIVE. GLOBAL METHANOL ADVISORS

About MMSA

- Founded in Singapore – 2004
- Global Representation
- Employee owned, independent advisors
- Over 172 years of methanol industry experience:
Singapore, Shanghai, Tokyo, UK, Houston, Seattle

Multi-Client Services



MMSA Weekly Methanol Analysis

Global market analysis and price assessment every Friday Singapore time – limited to 8 pages

Methanol & Derivatives Analysis

Methanol, Formaldehyde, Acetic Acid, MTBE, MMA, Energy Use globally– 700+ pages; updated quarterly

China Monthly Methanol Analysis (CMMA)

Quantitative analysis of world's largest methanol market – Feedstocks, Costs, Affordability, MTO, S/D, Pricing

Methanol Vessel Tracking Analysis MVTA

Daily monitoring of 765+ methanol carrying vessels (and growing)

MTO Business Analysis

Monthly assessment of profitability of 24+ CTO and MTO facilities in China

Methanol Notes™

One-page topics of relevance, weekly since 2005

Today's Talking Points



From a bottom in 2022 and an underwhelming 2023, demand growth slowly repairing in 1H 2024 as supply falters globally

Methanol moves through yet another cycle
Demand grows from traditional derivatives led by economic recovery
Supply to recover 2H 2024



Reinvestment in more efficient conventional methanol production required to support demand growth

Project finance / build cycles longer in North America
New plants must be more efficient
Current assets must lower their carbon intensity
Industry depends on China – risking its sustainability unless feedstocks radically change



Improved supply and methanol affordability will keep a lid on prices through 2025, with cash margins varying regionally

New 1.8 mtpa additions in USGC, Malaysia end 2024.
China coal-based supply for inland demand / backward integration hit in 2023.
China and Europe biggest holes to fill; years not months
Recovery in economies, olefins, then methanol pricing
China coal prices must be monitored



“Low carbon” methanol markets remain nascent with opportunities across global fuels, chemicals markets

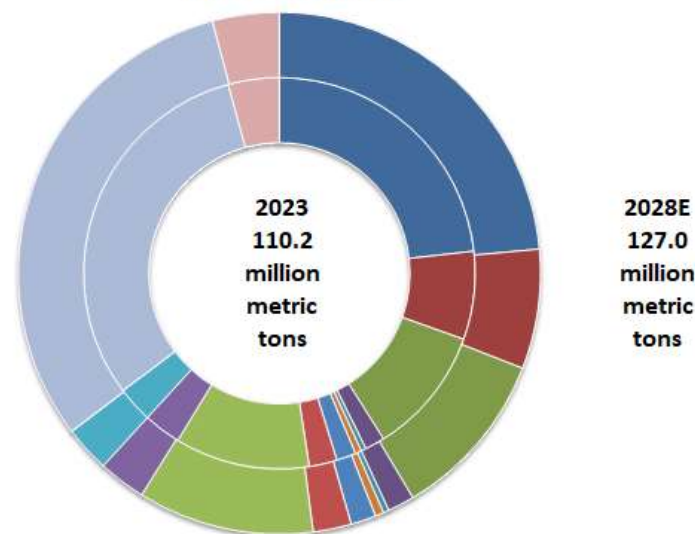
Methanol-capable ships create 10+ M mt of consumption potential
Highly-likely low carbon methanol supply limited for now
Sustainable Aviation Fuel (SAF) offers (very) long-term option for methanol
Road transport fuels demand in Europe and US more resilient due to slower phase-in of new energy vehicles
Chemical applications can bury CO2 and avoid use of hard to decarbonize materials

Traditional methanol demand outpacing new supply additions; industry stretched long term



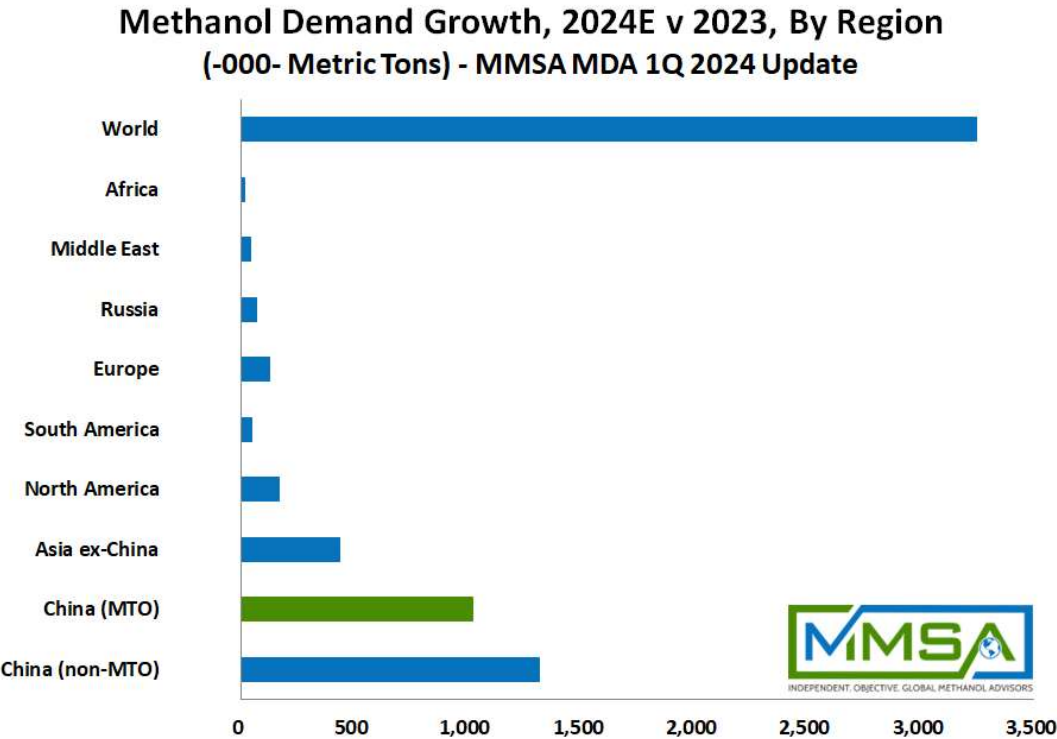
- Chemical intermediates demand continues to expand; MTO mature
- Low carbon methanol demand not included
- Growth of 60 million tons by 2040, approximately 2.5% pa.
- By 2040, 60 million tons of demand growth
 - 32 world-scale plants needed beyond those likely to move forward

**Methanol Use - World
By Derivative**



■ Formaldehyde	■ Acetic Acid	■ Methyl tert-Butyl Ether (MTBE)
■ Methyl Methacrylate	■ Dimethyl terephthalate (DMT)	■ Methanethiol (Methyl Mercaptan)
■ Methylamines	■ Methyl Chloride (Chloromethane)	■ Gasoline Blending & Combustion
■ Biodiesel	■ DME	■ Fuel Cells
■ Methanol-to-Olefins	■ Others	

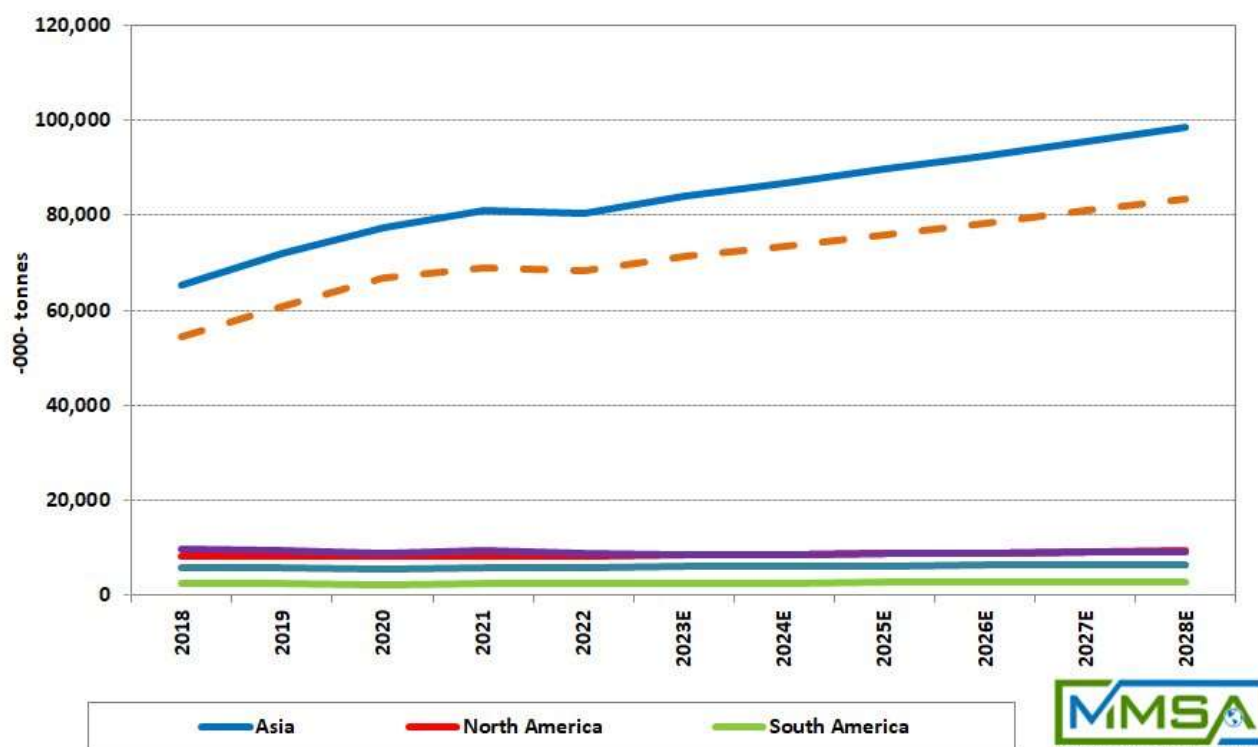
Methanol demand returns to growth trajectory in '24, with China, MTO recovering



All-important China demand stabilizes in 2023, return to expansion expected



**Demand for Methanol
2018 - 2028E**

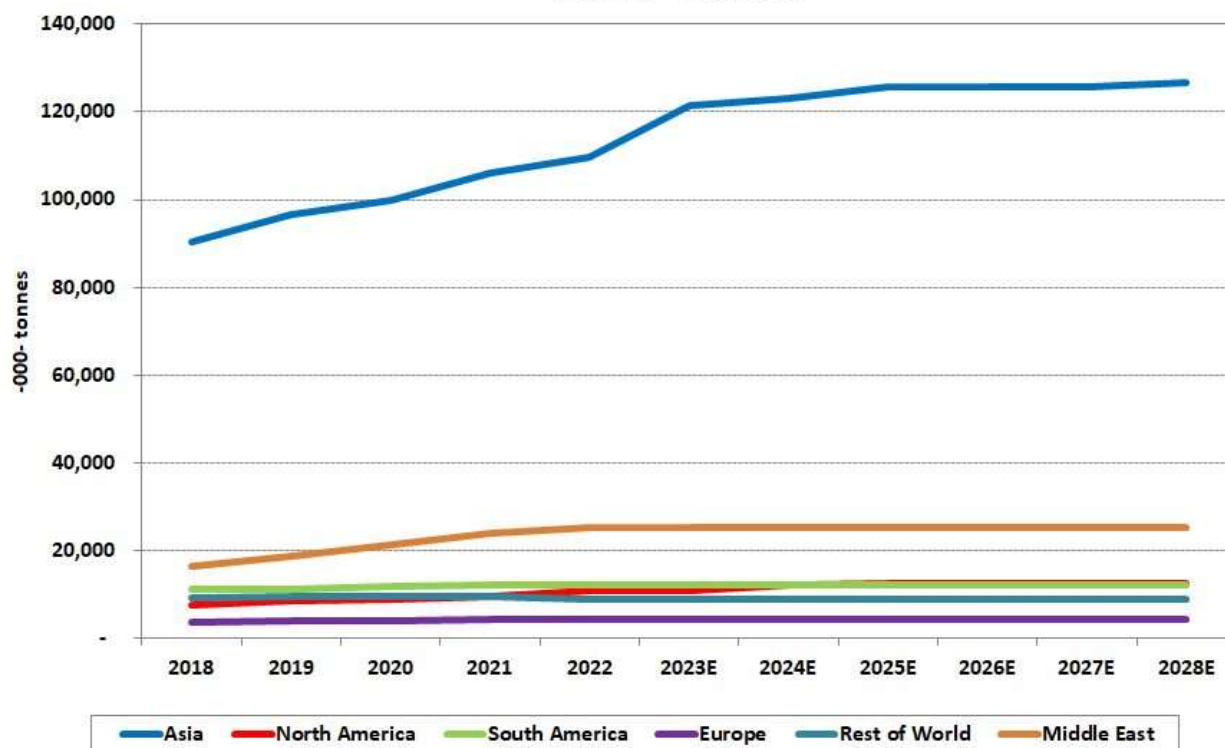


- GDP-type growth rate adds 2-3 million tons of demand each year on average.
- China being the largest market adds most of the new demand.
- India influence increases in forecast
- Chemical intermediates (including olefins) the main demand driver.
- Fuels provide upside, substitution demand when methanol is affordable

Global methanol capacity additions surge in '23-24, followed by dearth post '25



**Supply Capacity for Methanol by Region
2018 - 2028E**



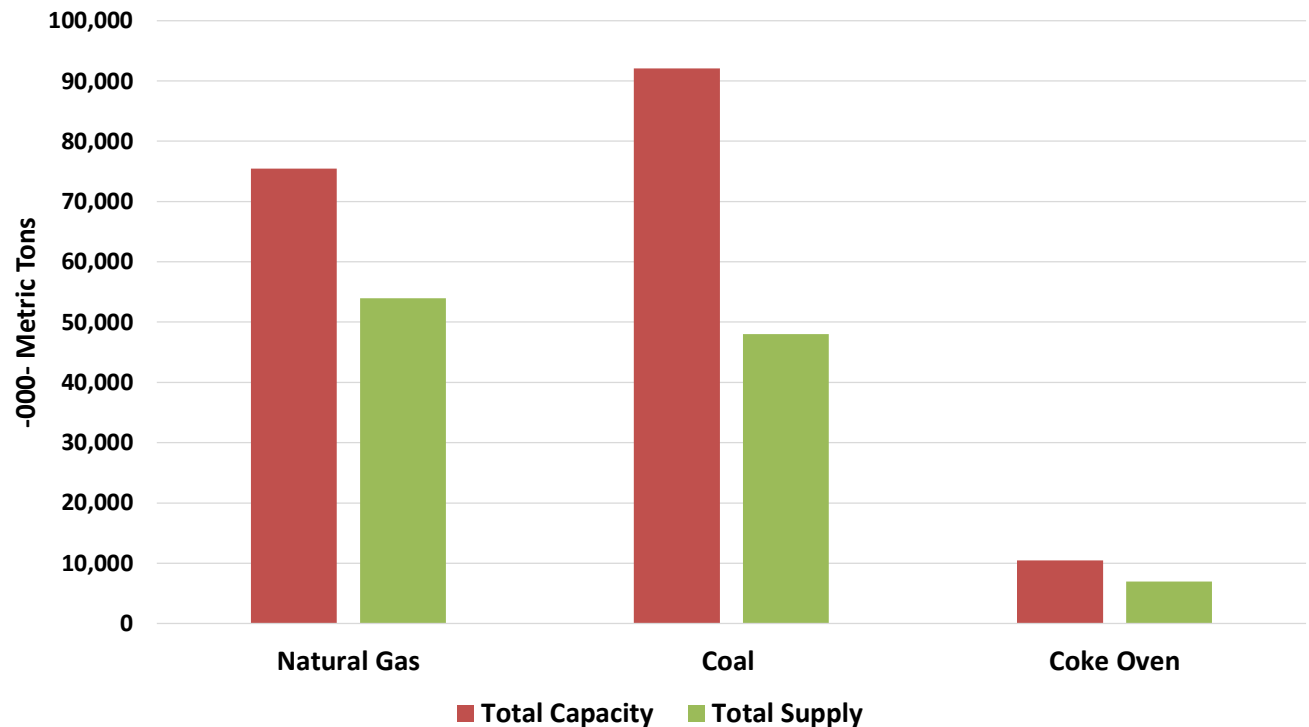
- Geismar 3, USA and Sarawak, Malaysia (2 x 1.8 MMT) added in 2H 2024.
- China adding 14 million tons between 2023-28, mostly in '23 and '24
- At risk capacity in New Zealand, Trinidad, Chile, Russia, Iran, Germany.
- Competition for gas from LNG hampering existing plants and new projects.

Methanol's “900 lb gorilla” – coal feed



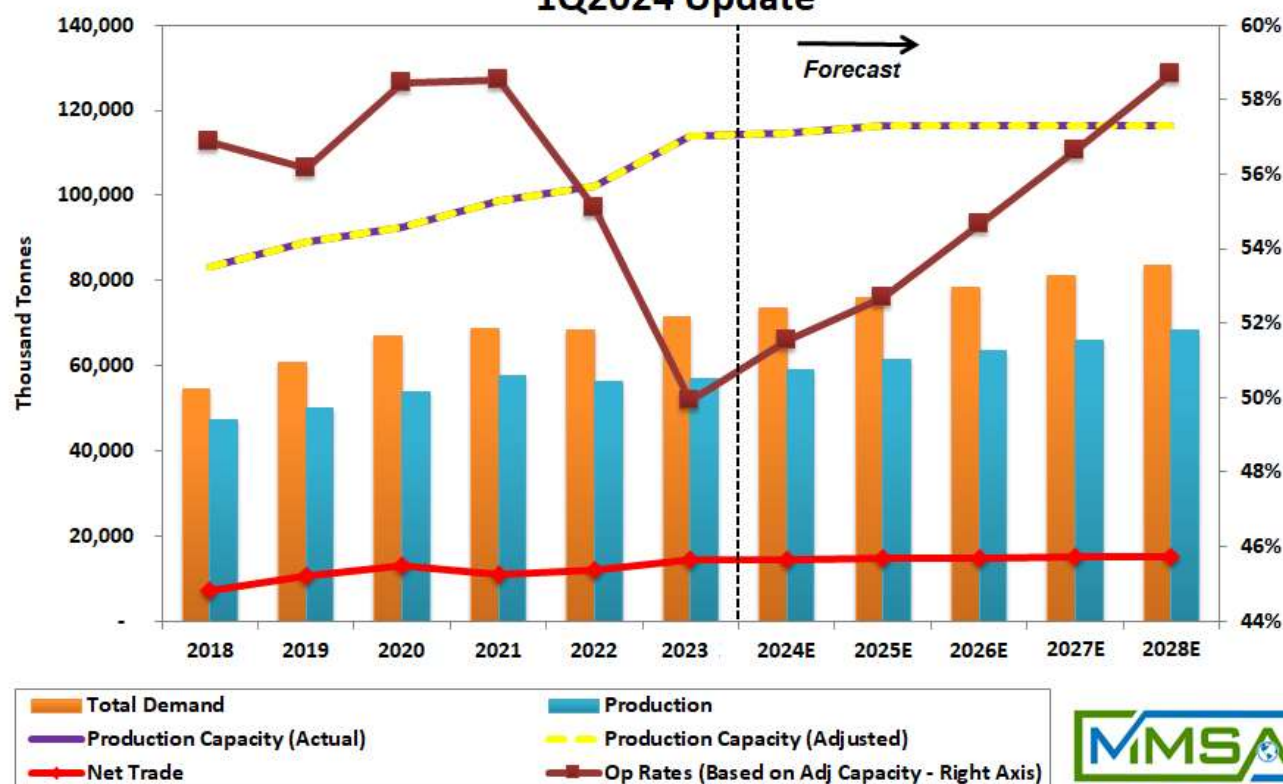
- Over half the world's methanol originates from coal.
- China continues to add significant coal-based methanol capacity to meet its own growing methanol requirements
- Incremental demand for new applications causes further high cost, high carbon intensity coal-based production to operate.
- China working hard to utilize H₂ in processes to lower CI; lots of challenges to that approach

**Available Production Capacity and Supply
by Feedstock Type 2023**



China returns to growth; imports, production to rise

Methanol Supply and Demand - China
1Q2024 Update

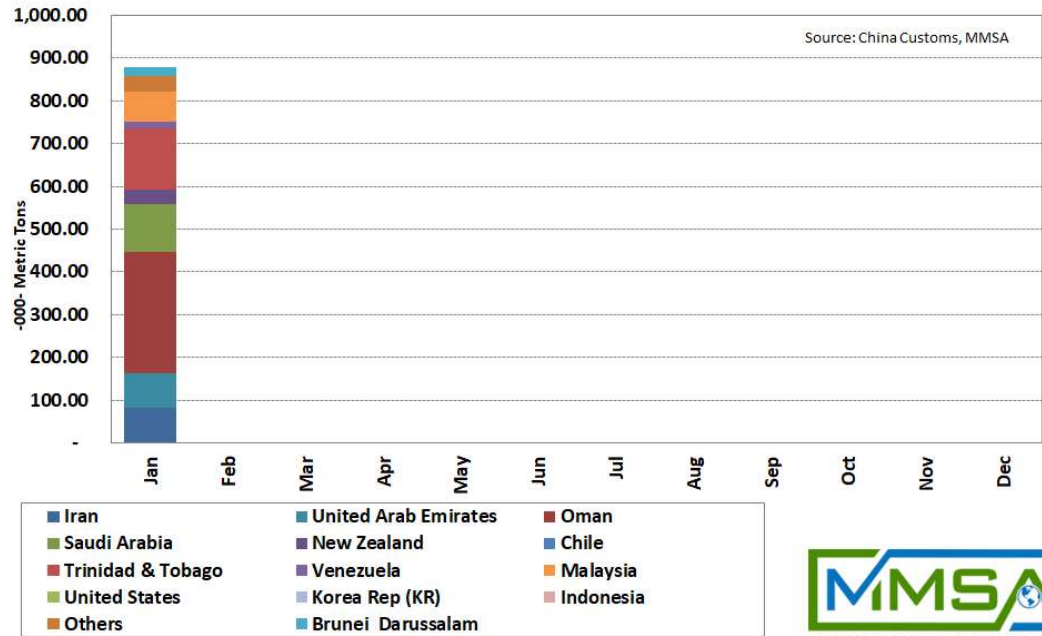


- Massive new capacity additions, lockdowns, real estate crisis, war, coal prices factor in flat '21 – 23 performance
- Environmental pressure and market realities will limit investment in new coal-based methanol operations
- China very motivated to lower Carbon Intensity with a long road ahead

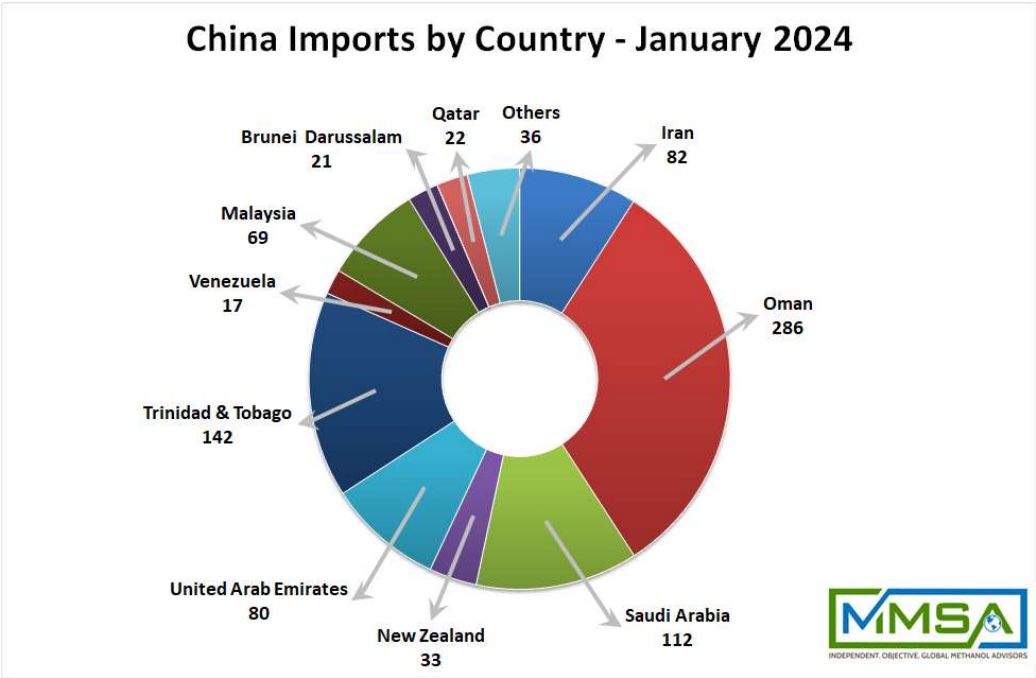
China imports record volume of 14.5 million tons in 2023, absorbing global surpluses



2024 China Methanol Imports



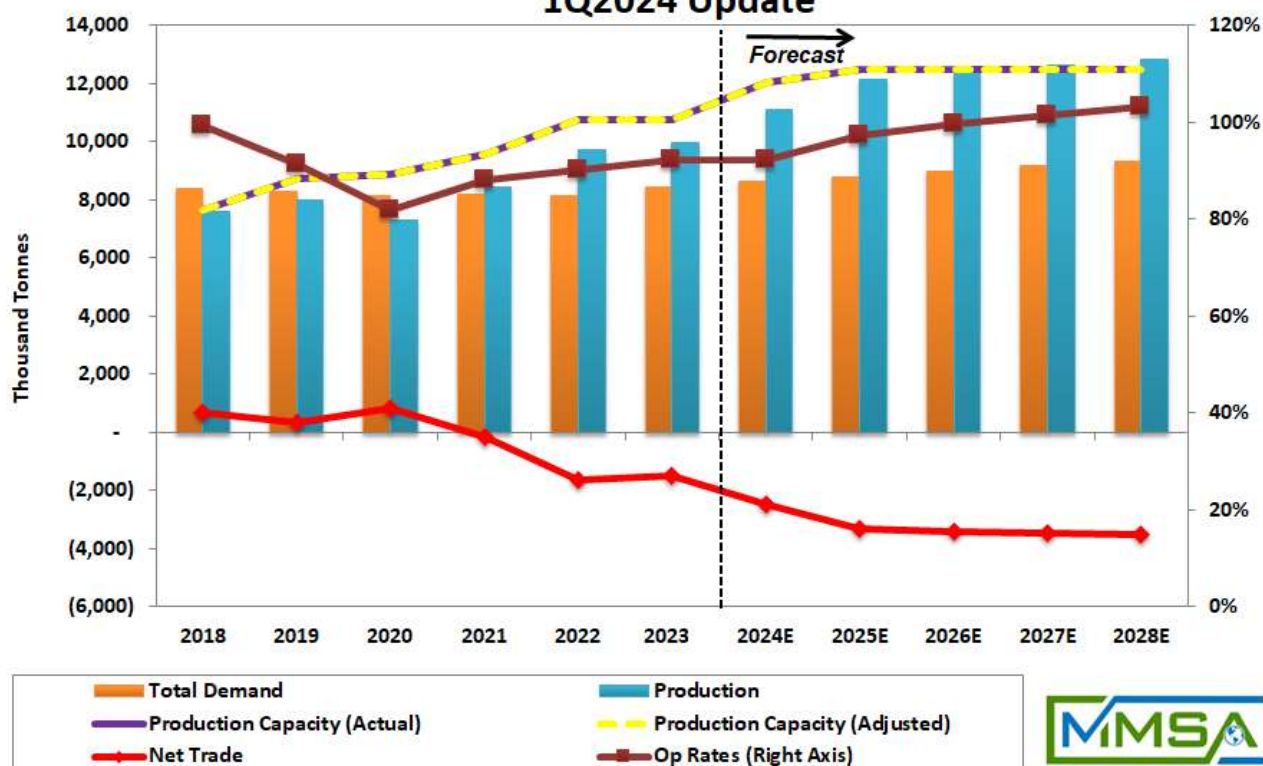
China Imports by Country - January 2024



North America rates can improve further, Trinidad gas cost a factor for supply, demand set to improve on investment downstream



Methanol Supply and Demand - North America
1Q2024 Update



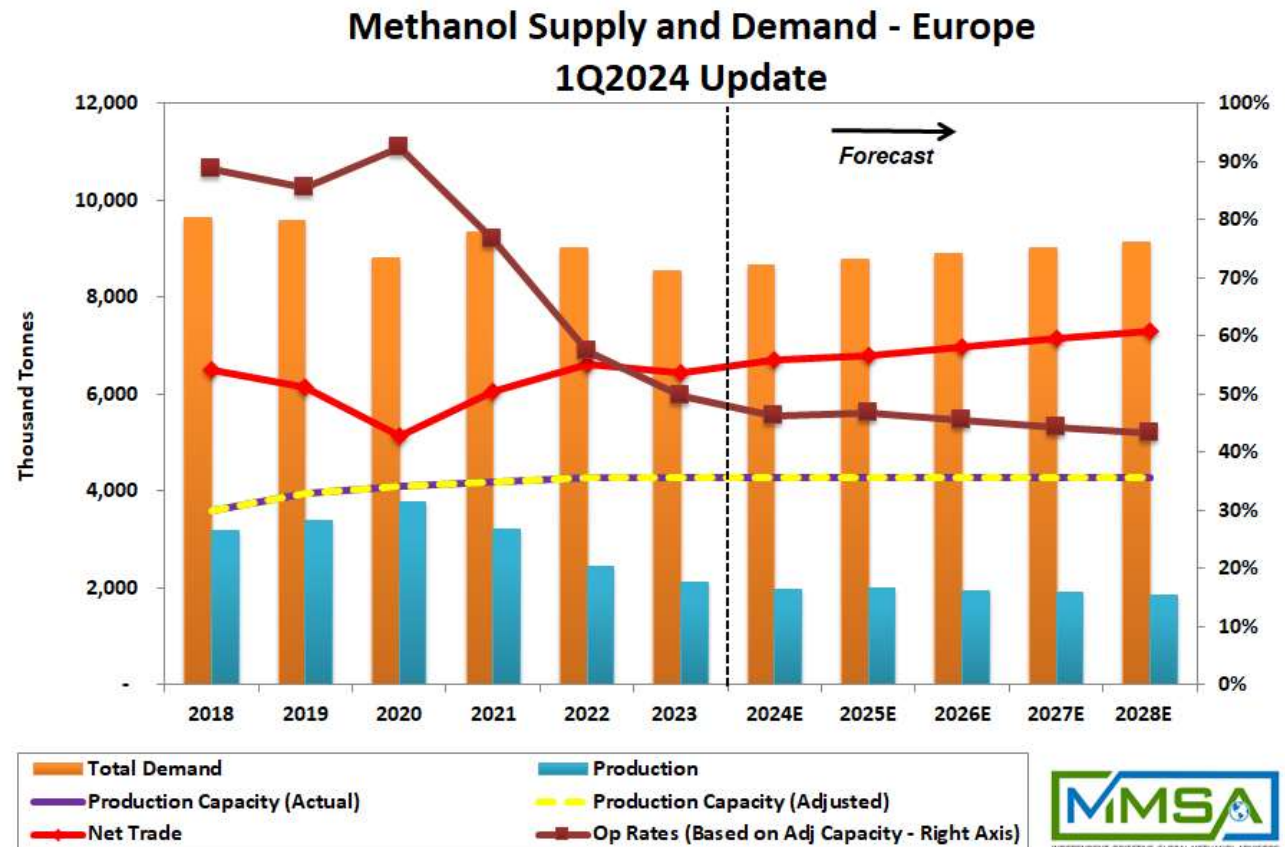
- Methanex G-3 (1.8M mtpa imminent), Koch expansion (150K mtpa – timing undetermined)
- Trinidad rationalization possible
- Exports to Europe, with Korea and South America also targeted
- US – China opportunistic via tax exemptions, arb
- Trinidad, EG supply moves to Europe
- Downstream investment: TBA (LYB), Acetic Acid (Celanese), MMA (Rohm, MRC), MDI (to be determined)



European demand recovery stalled until recently



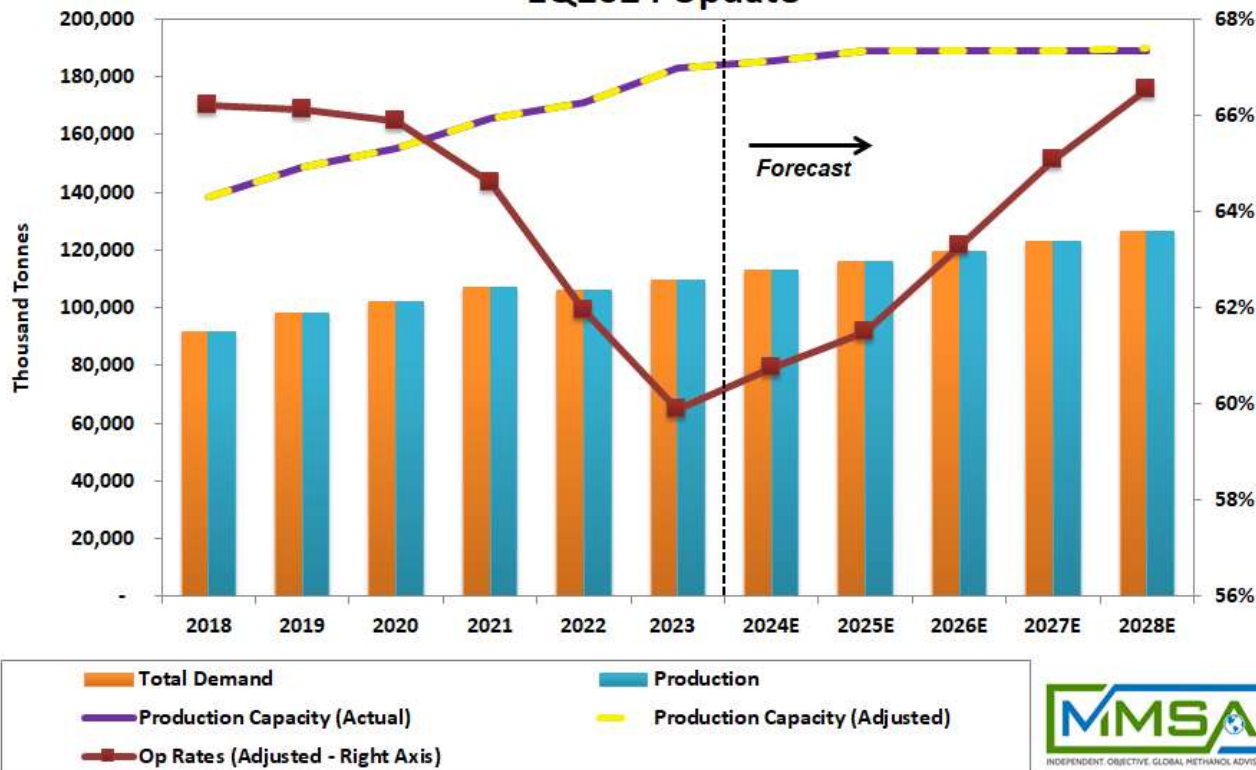
- Demand in most countries continues to sag on several factors yet will recover
- Europe is the center of investment in low carbon solutions involving methanol
- Region remains a “battleground” for overseas supply; typically, first choice for US exports



Nameplate operating rates to remain challenged near term, but must increase



Methanol Supply and Demand - World
1Q2024 Update



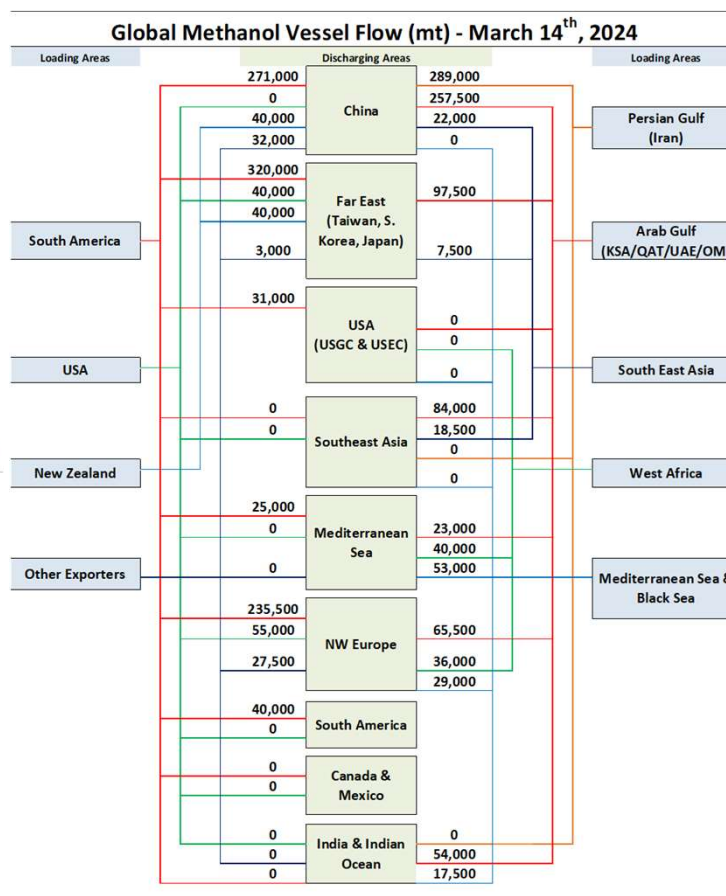
- China added significant methanol capacity during pandemic.
- Global operating rates currently low due to oversupply. Rates will improve as demand growth outstrips new methanol plant additions.
- Pricing will move from lower cycle to upper cycle to incentivize reinvestment



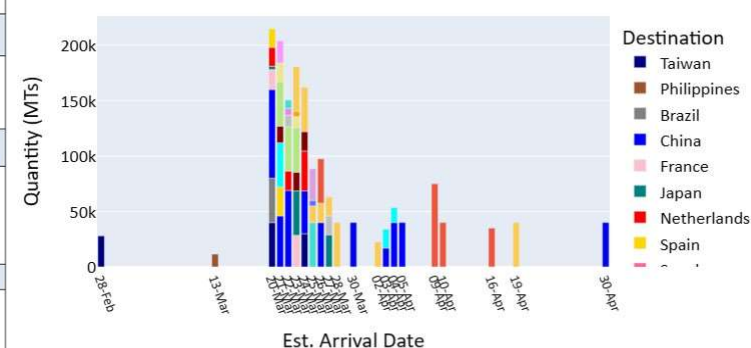
MMSA Vessel Tracking Analysis follows 765+ meOH capable vessels daily



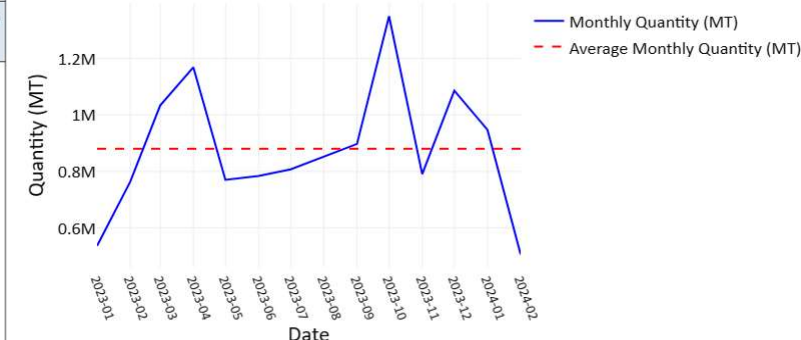
- From Sep '20
- Daily reports:
 - Vessel/Operator, Port & Country of Loading and Discharge, Quantity (MT), Load & Discharge Days, Waiting Times
- Interactive Web Tools:
 - Estimated Daily Shipments
 - Cargo Delivery Forecast
 - Monthly Vessel Summary
 - Cargo Maps
 - Downloadable Data, Charts



Upcoming Methanol Shipments by Destination

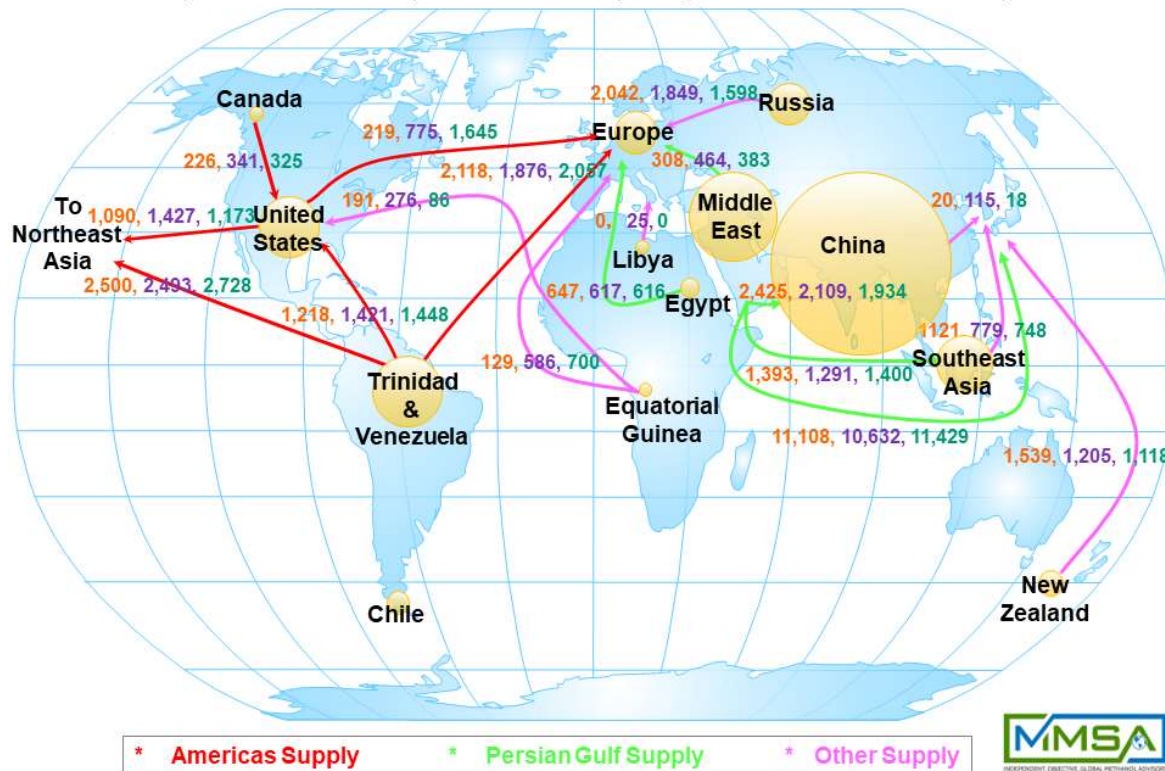


Quantity (MT) Loading in Iran



Middle East historical swing supplier, US Gulf and Caribbean surpluses clear out to Asia

2020, 2021, 2022 Methanol Trade Flow
(Bubble Size Proportional to Capacity to Produce Methanol)

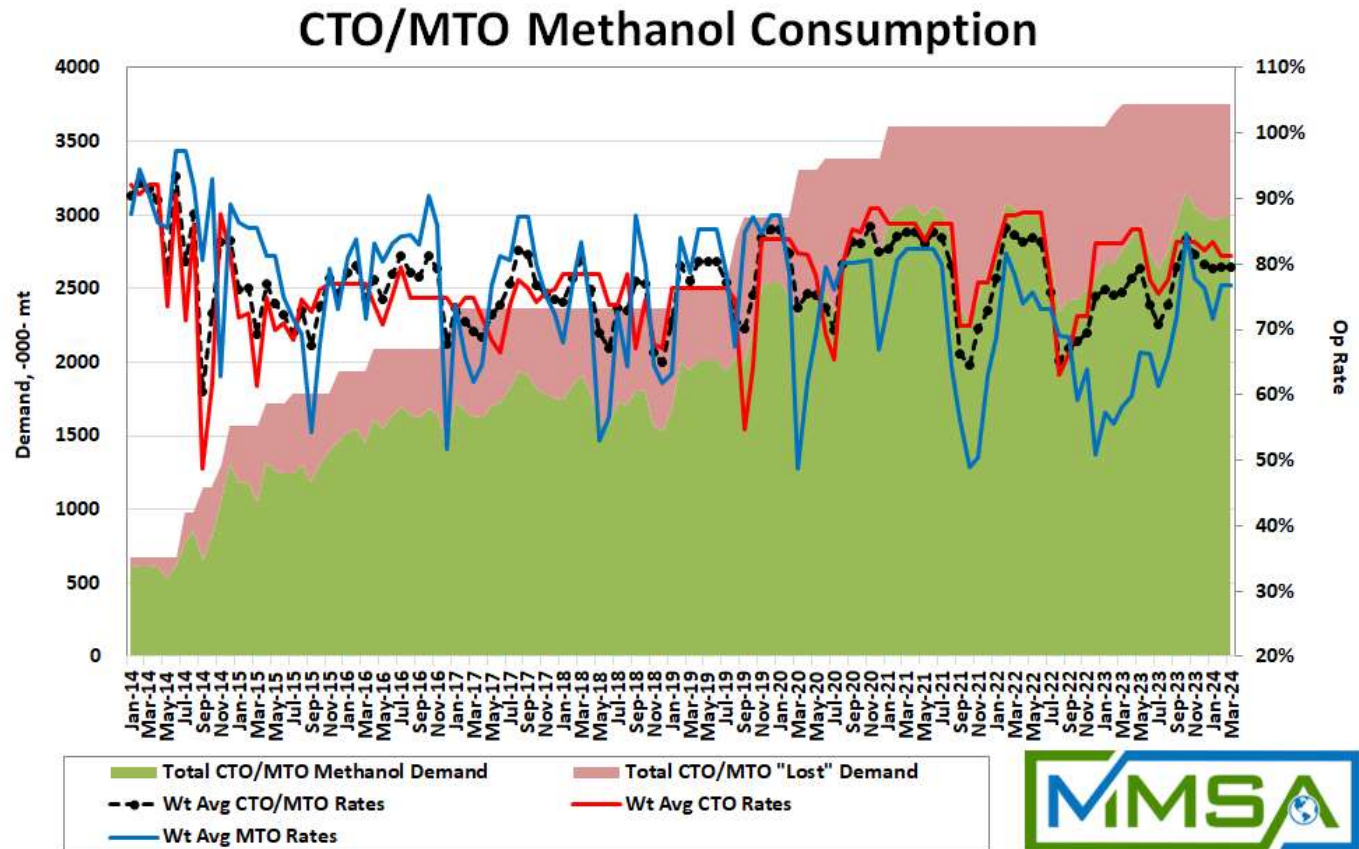


- Trade from Atlantic to Pacific slowly increasing as US moves from net import to net export market.
- Middle East product mostly to Asia; still the swing region
- Russian exports reduced and mostly going to China
- Canal restriction impacting global trade, while improving, remains a constraint in the medium term.

MTO operations have been trending upwards with improved economics and established markets



- China loves its MTO; required to satisfy China olefins demand
- Operating rates adjust to economics
- Only a few producers can switch between making and buying olefins
- Technical issues, engineering and design flaws have been a far greater trigger of lower operating rates. Re-engineering work to extend catalyst life is ongoing.



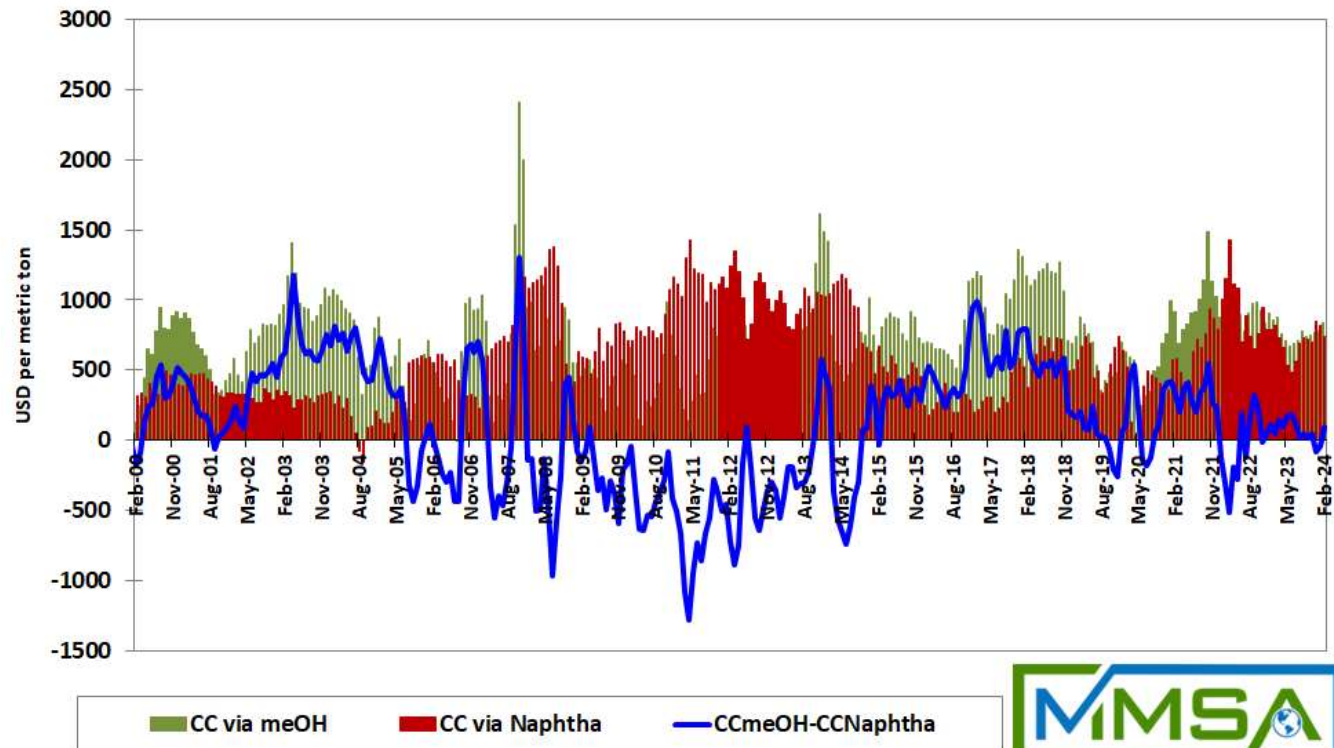
Methanol to olefins economics prosper vs naphtha when crude and propylene prices elevated



- MTO (and CTO) economics were highly favorable most of '05 – '14
- 5-year period of intensive MTO capacity additions ensued.
- Demand surge and affordability elevated methanol prices to historic highs 2017-2019
- MTO and naphtha cracking economics have been competitive in a depressed olefins market

Ethylene Cash Cost vs. Feed Type

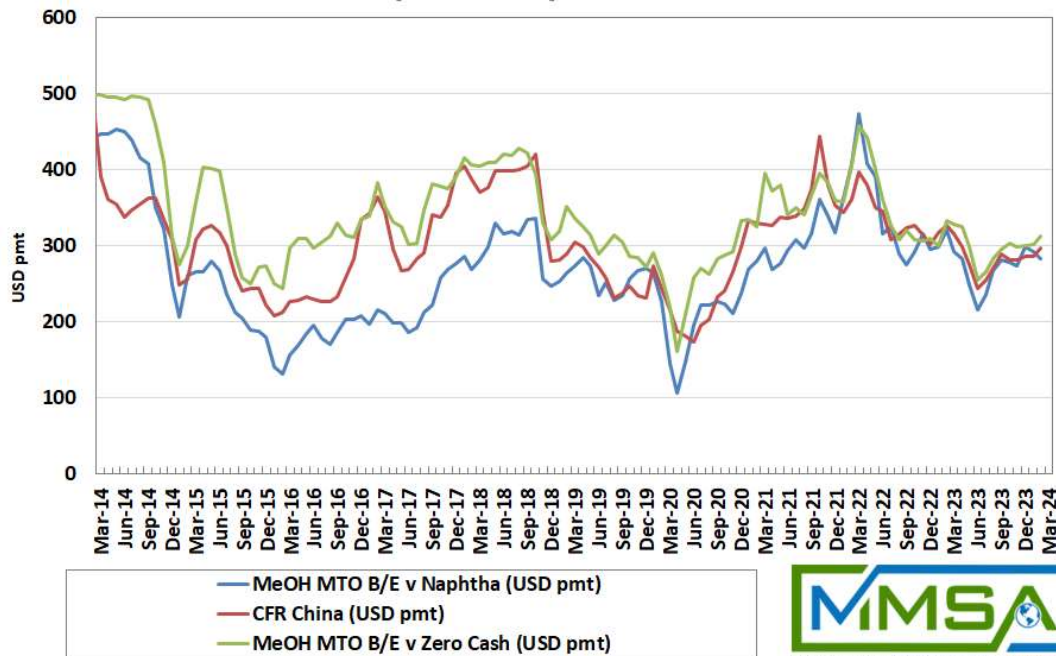
Hypothetical Asia, 1.2 tonnes propylene/tonne ethylene



Merchant methanol pricing now a function of MTO “break even” economics



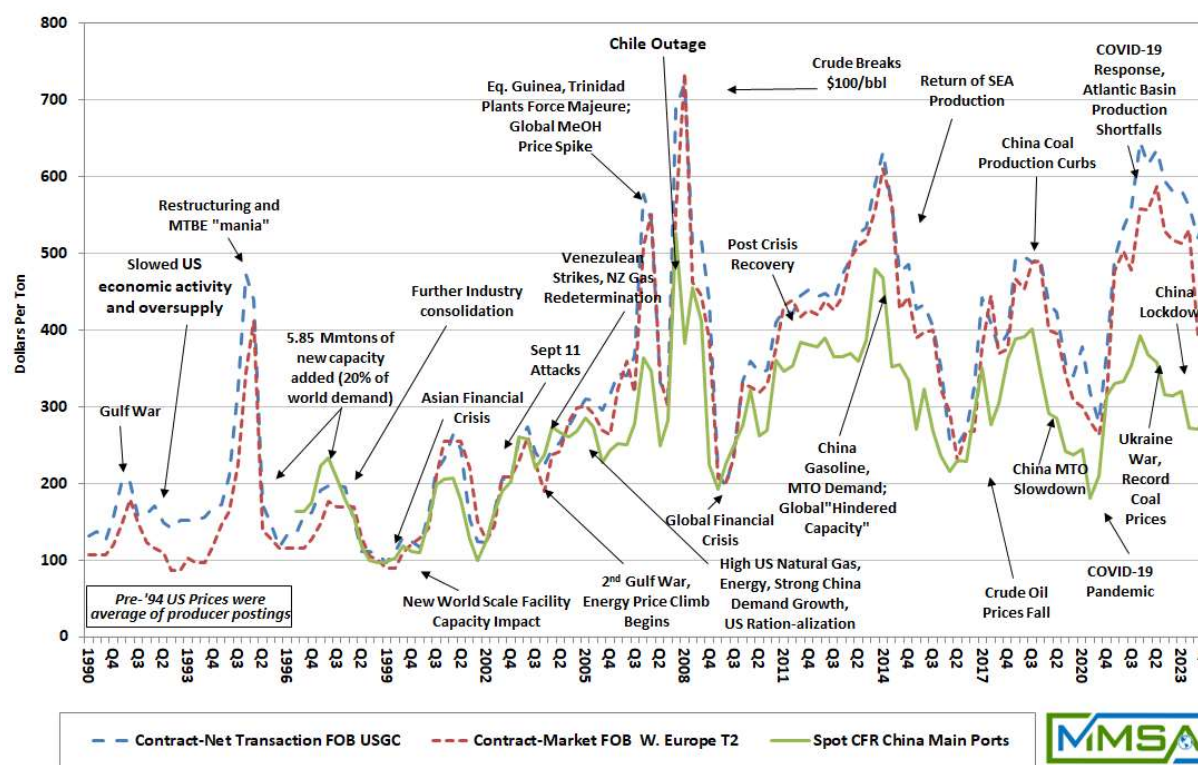
**Methanol Prices: CFR China, Breakeven,
Naphtha Equivalence**



- Non-integrated MTO now accounts for 12% of global methanol demand and creates a significant “pull” on the globally traded, merchant methanol market.
- MTO producers typically run at breakeven costs, the ceiling for methanol pricing in China (impacting globally)
- Methanol pricing is supported by naphtha cracking equivalence when markets allow
- Methanol pricing typically prospers with high naphtha cracker margins

Methanol prices cycle on internal, external factors

Historical Quarterly Methanol Prices, 1990 to Present

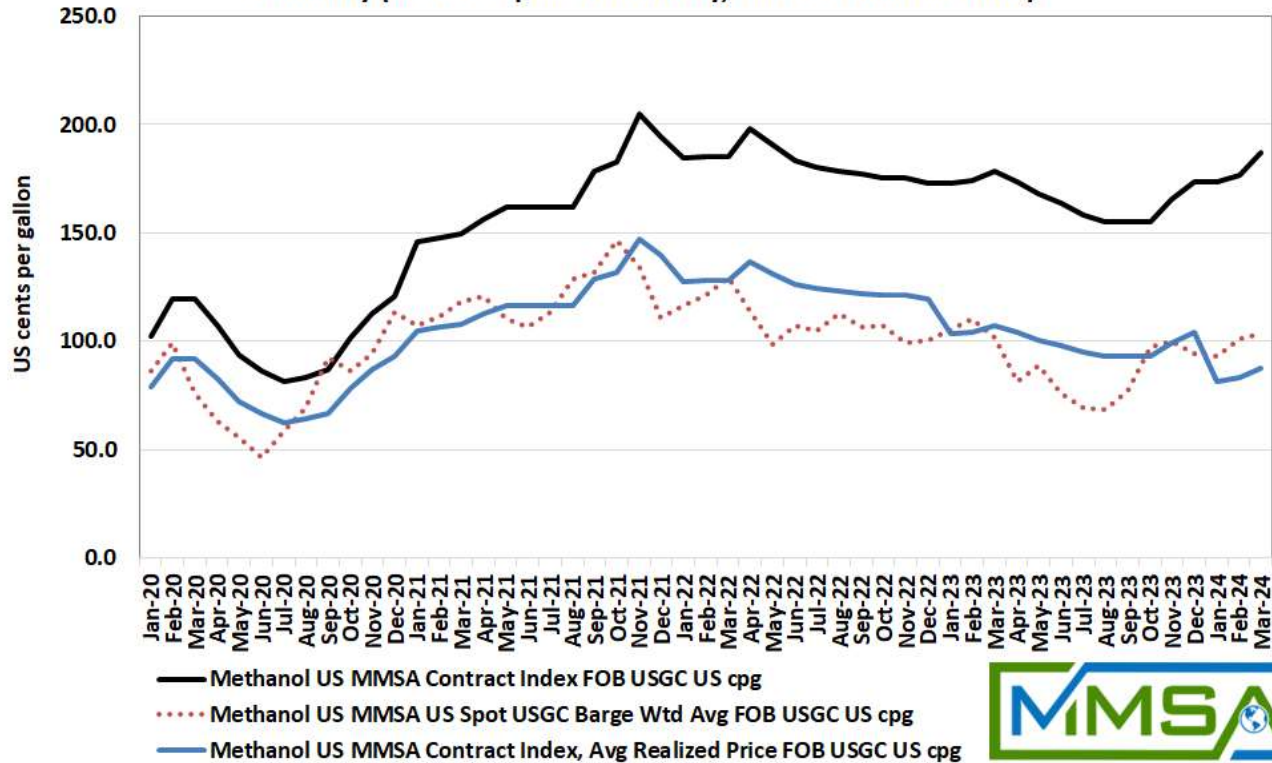


US contract market almost fully contracted. Spot very thinly traded, mostly to balance supply chain gaps



USGC Methanol Prices

Monthly (Mar '24 Spot Preliminary, Mar '24 Contract Final)

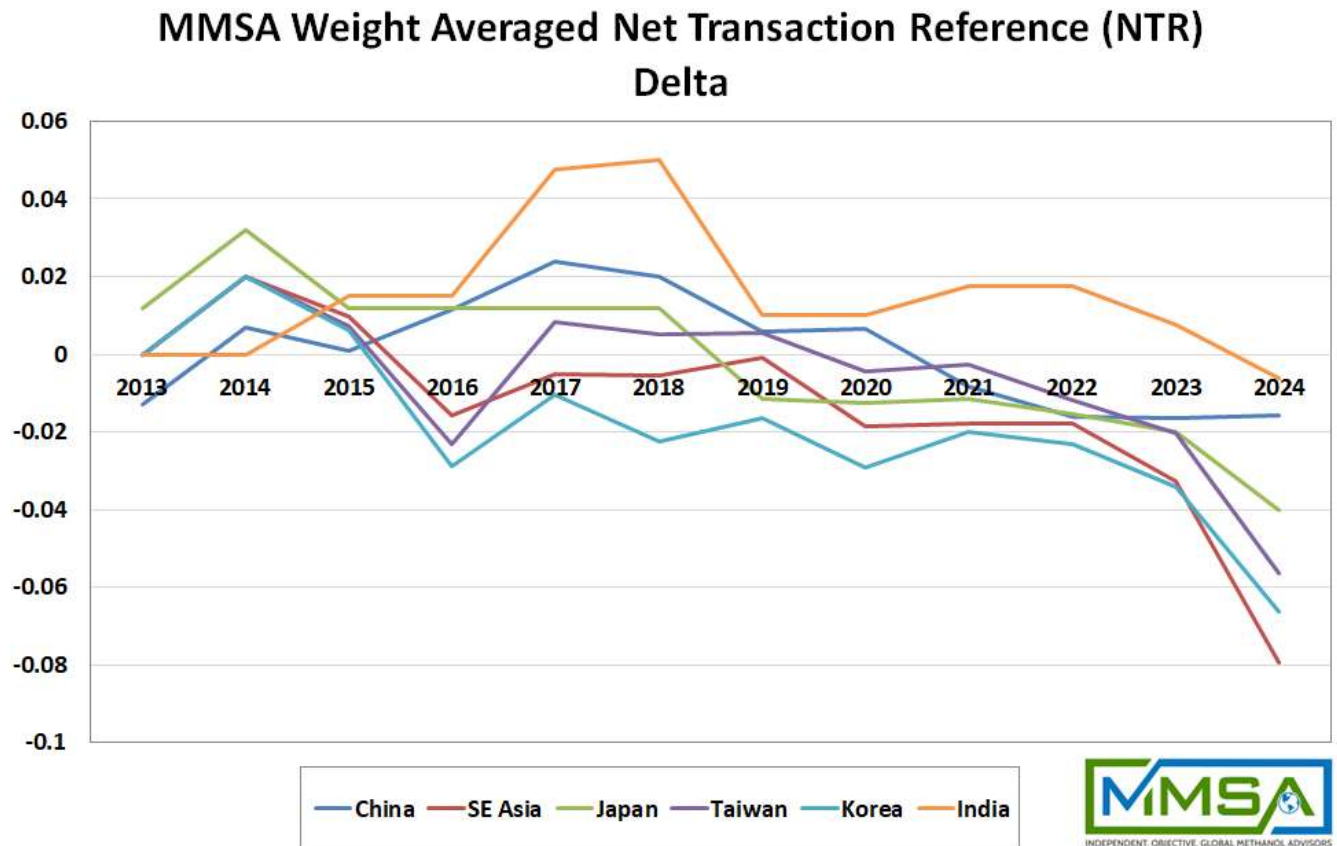


- US market highly contracted, almost all methanol sold off monthly posted contract prices minus annual discounts
- Market is less fragmented than Europe with fewer supply choices
- Spot trades are miniscule percent of consumed product
- Spot prices typically below net contract yet liquidity for buyers to capitalize scant
- Annual discounts have widened substantially for a variety of reasons

Asian market discounts and premiums vary by country and by year



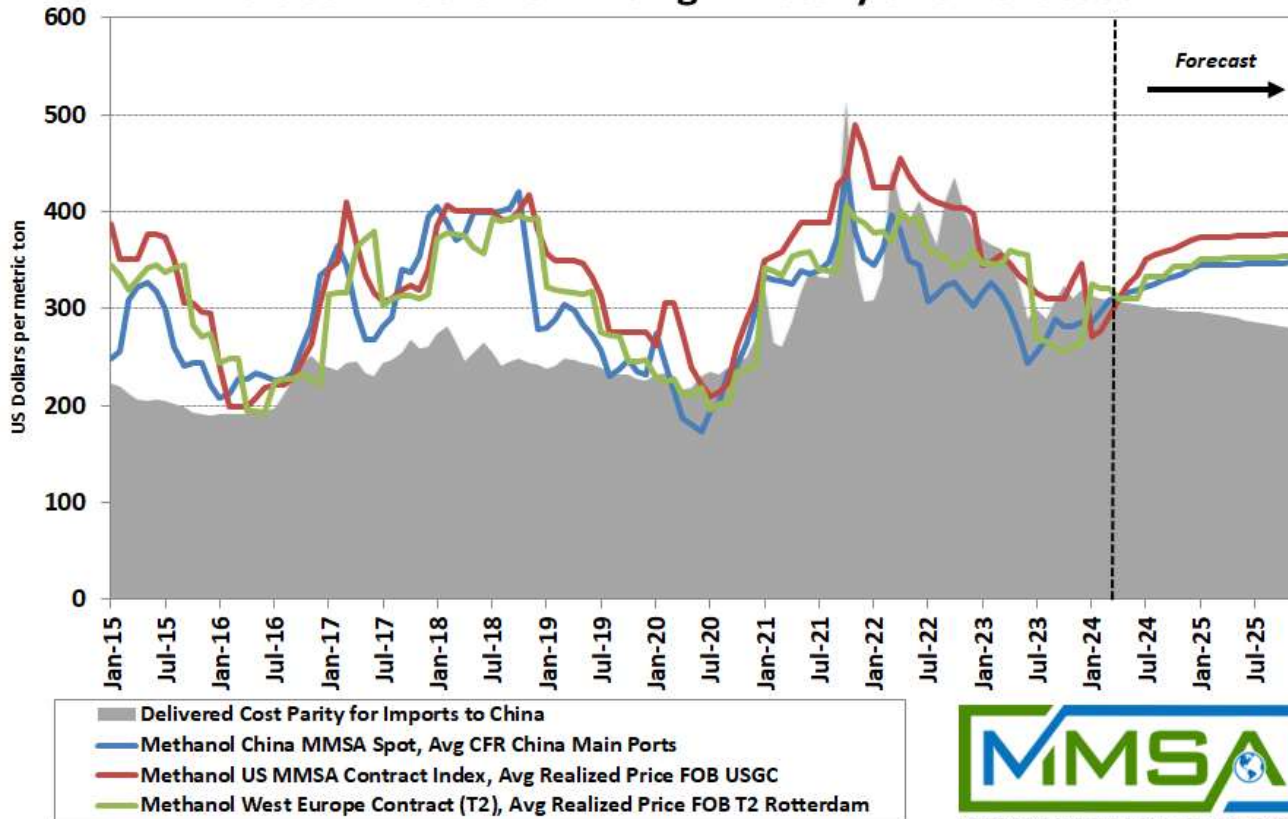
- Chart shows contract discounts and premiums for major Asian markets
- Discounts and premiums apply to a contract index for each market
- Contract indexes are posted monthly by MMSA for each market based on historic spot transactions
- Discounts and premiums are negotiated annually and vary with perceived market conditions in coming year



Methanol prices at upper ends of affordability in China, USGC premium to persist, coal pricing to correct



Global Methanol Pricing - History and Forecast

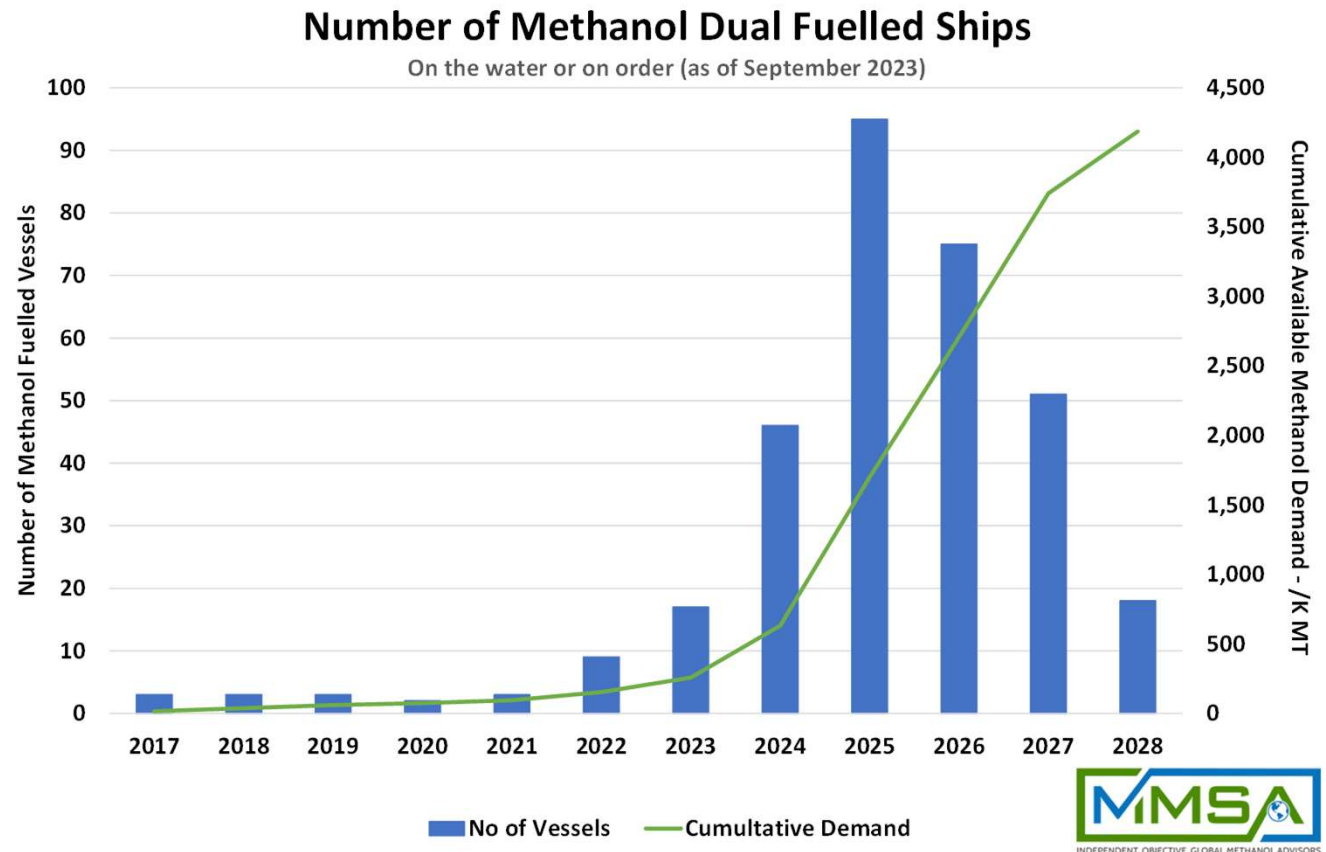


- Cycle bottom set by marginal coal-based supply. Pricing rarely stays at bottom of cycle (4-6 months), excepting COVID.
- Cycle top is moderated by marginal demand – DME in 2008, MTO in 2018 and 2021
- Prices expected to rise until 2025, limited by olefins economics
- Reinvestment economics required
- Regional differentials to prevail

Number of announced methanol fuelled ships continues to surprise



- More than 400 methanol fuelled ships on the water or on order books at shipyards.
- Likely more will be announced as shipowners forced to make future fuel choices for new-builds.
- Low carbon methanol provides good decarbonization option, regular methanol is lower in PM, NO_x and SO_x than oil bunkers.
- Available demand for methanol is highly subjective but theoretically now in multiple millions.

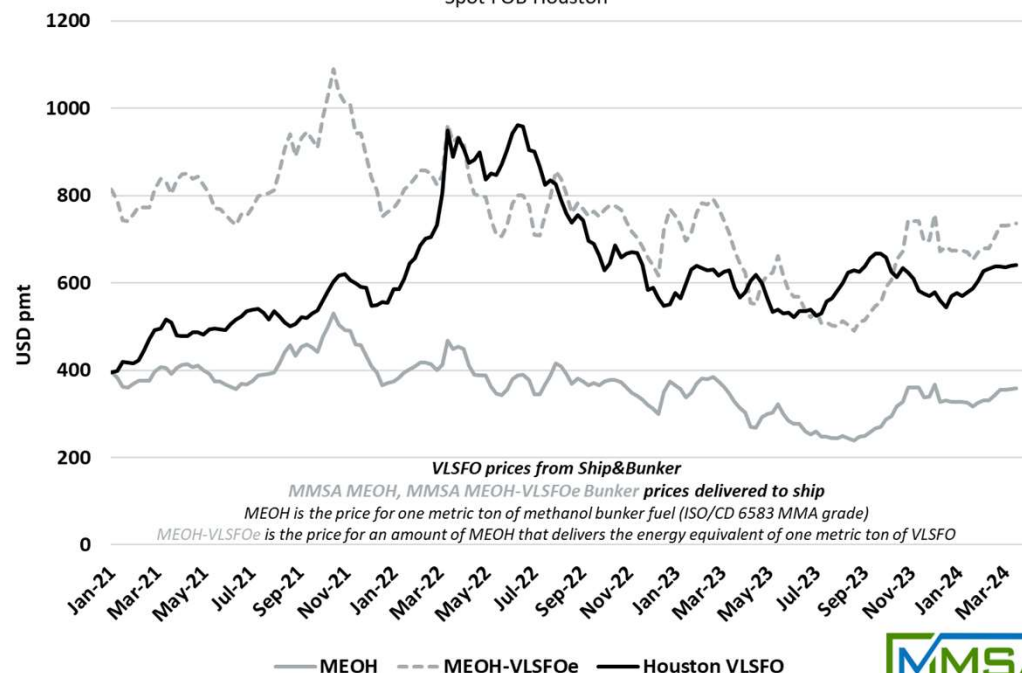


MMSA conventional meOH marine fuel postings cover major global bunkering hubs



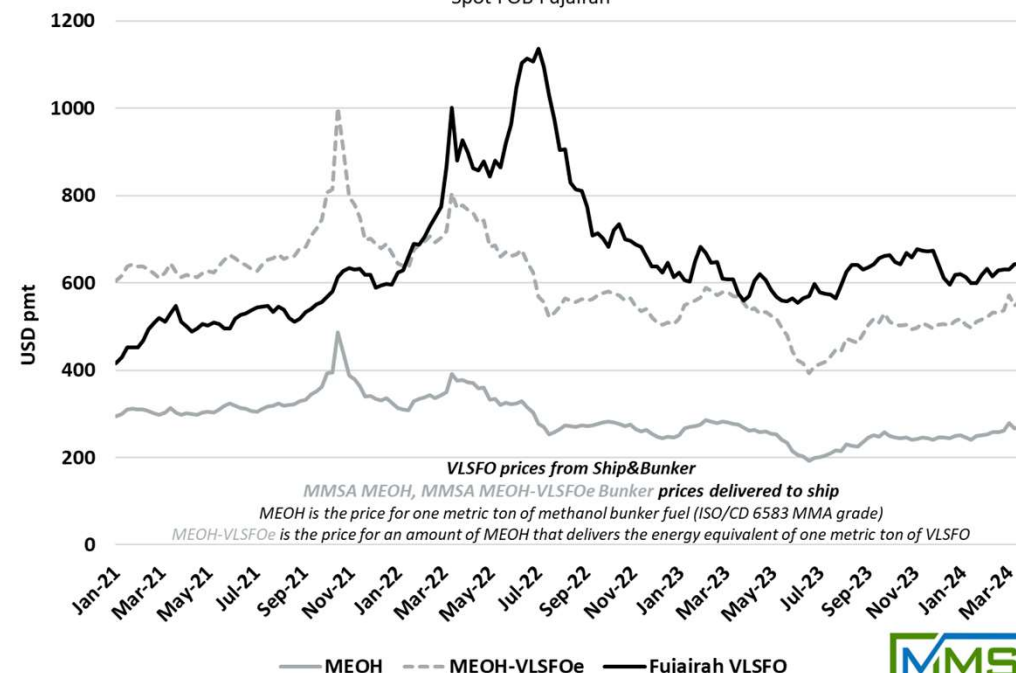
Methanol Bunkers vs VLSFO

Spot FOB Houston



Methanol Bunkers vs VLSFO

Spot FOB Fujairah



Many sources for low carbon methanol demand; chemicals uses can be considerable

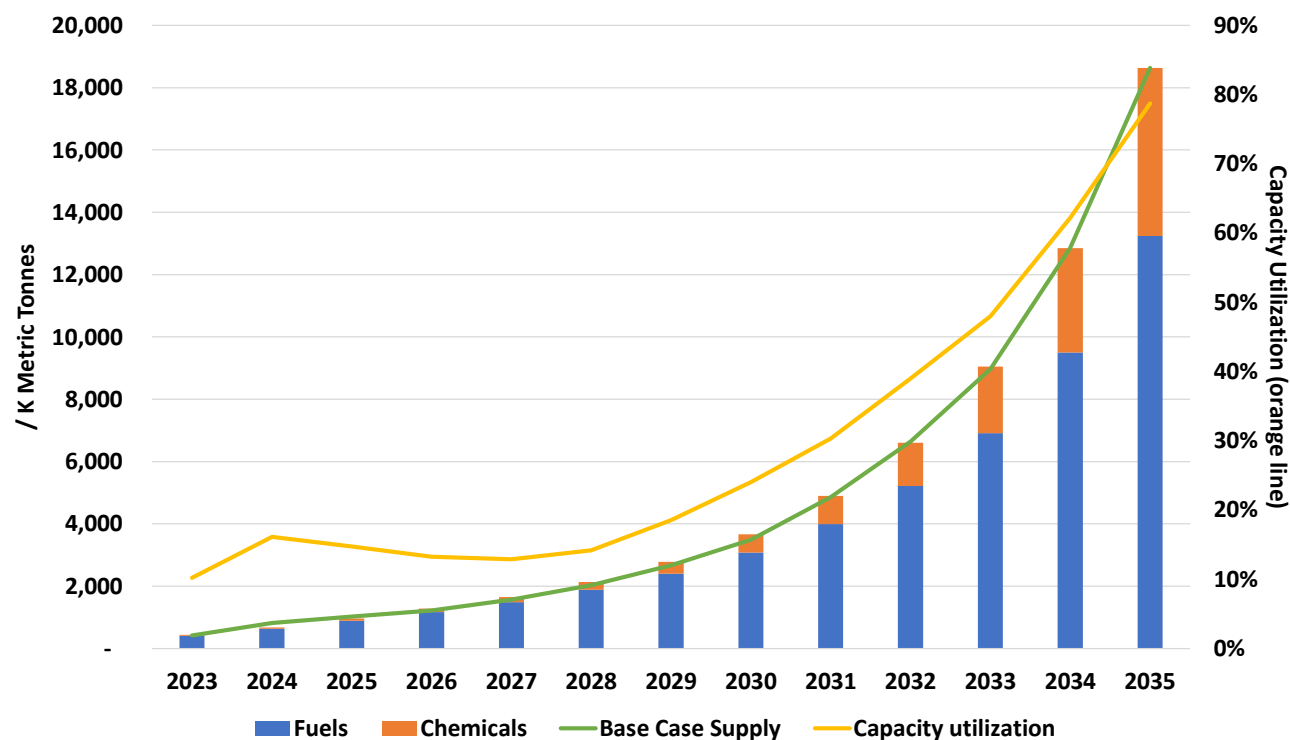


- Sustainable Aviation Fuel (SAF) offers (very) long-term option for methanol
- Road transport fuels demand in Europe and US more resilient due to slower phase-in of new energy vehicles
- Chemical applications can bury CO₂ and avoid use of hard to decarbonize materials

MMSA base case supply and demand forecast



Low Carbon Methanol Supply and Demand Forecast *Base Case Supply*



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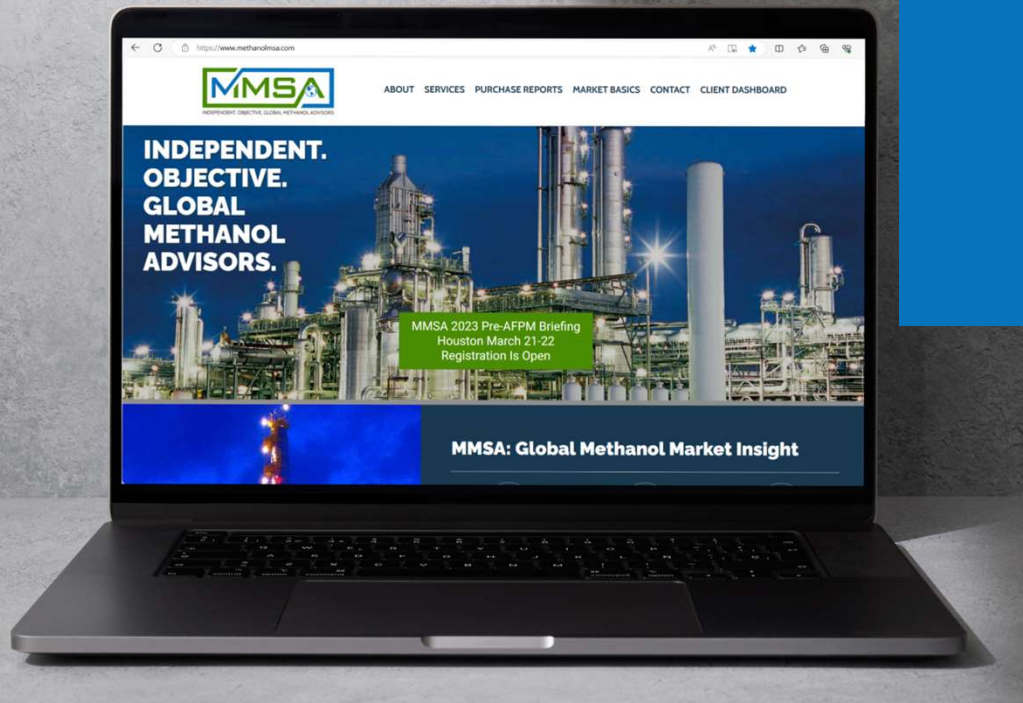


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Thank You



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