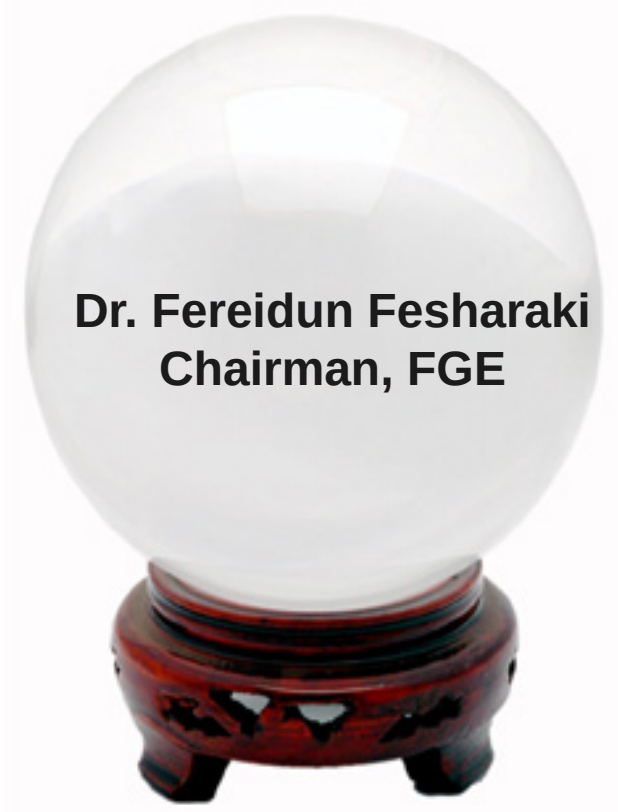
A Crystal Ball for the Global Energy Markets

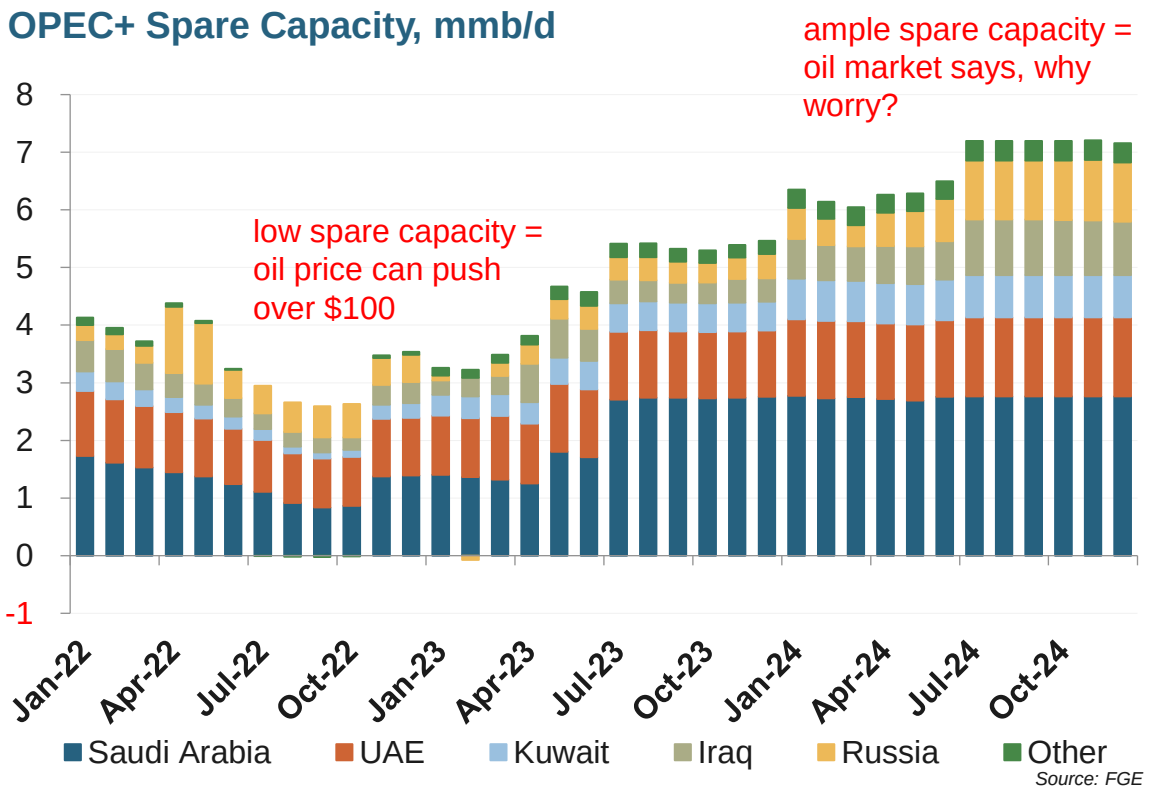
Prepared for 43rd Japan Cooperation Center for Petroleum and Sustainable Energy (JCCP)

29 January 2025



Dr. Fereidun Fesharaki
Chairman, FGE

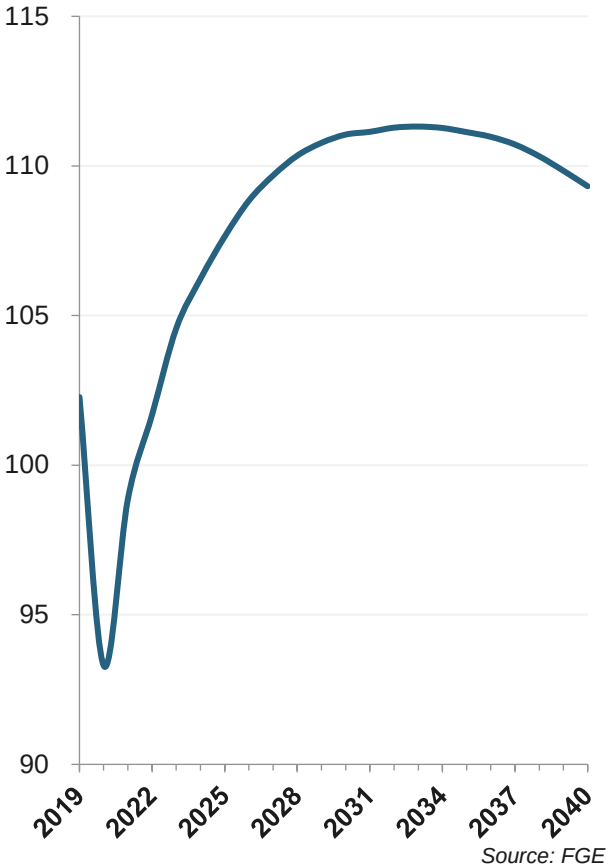
Let’s start with today’s crude market…macro issues and OPEC+ spare capacity



- **Global Economy:** Moving at two speeds, with US charging ahead and EU/China lagging. Major implications for the US dollar, which can impact oil demand/price.
- **Crystal Ball says:**
  - Strong dollar remains in force through 2025, although Trump’s comments/policies will make for a wild ride.
  - China’s economy struggles—despite some stimulus, economic growth taking a back seat to government control. Growth in rest of Asia helps make up for China.
- **Fundamentals:** Global oil demand growth is still pretty good (1.3 mmb/d growth in 2024). With Mideast tensions high and sanctions everywhere, why haven’t oil prices spiked a lot?
- **Crystal Ball says:**
  - Ample OPEC+ spare capacity means disruptions, conflicts, etc., have less impact on oil price. The market says, “why worry”?

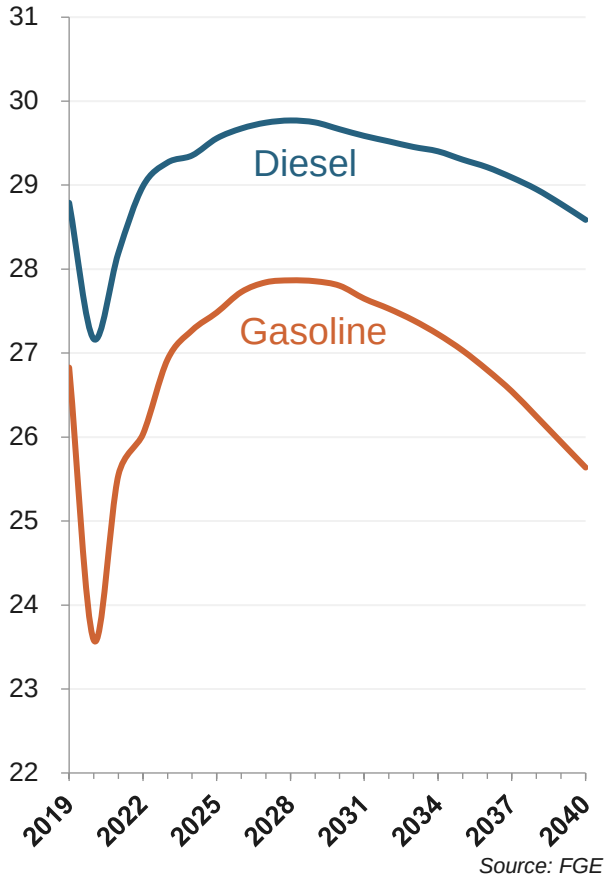
Crystal Ball Wonders: Oil demand collapse ahead?

Global Total Oil Demand, mmb/d



Source: FGE

Global Gasoline and Diesel Demand, mmb/d



Source: FGE

- **Long-Term Growth and Oil Price**
  - Does oil demand peak? OPEC says no/never. IEA says yes/soon.
- **Crystal Ball says**:
  - Oil demand growth is not over!—still some 5 mmb/d of growth before global oil demand peaks in the 2030s**.**
  - China's oil demand peaks by 2028/29, Asia peaks by 2040.
  - Gasoline peaks and declines faster than diesel. Despite excitement over EV sales, the main impact on the overall global fleet is only felt starting in the 2030s.
  - Bottom line is that EVs are by far the largest threat to oil demand. Impact of everything else, like SAF in air travel and methanol/ammonia in shipping, is uncertain and much further off…
  - Best described as a plateau…still 109 mmb/d of global demand in 2040—higher than today.

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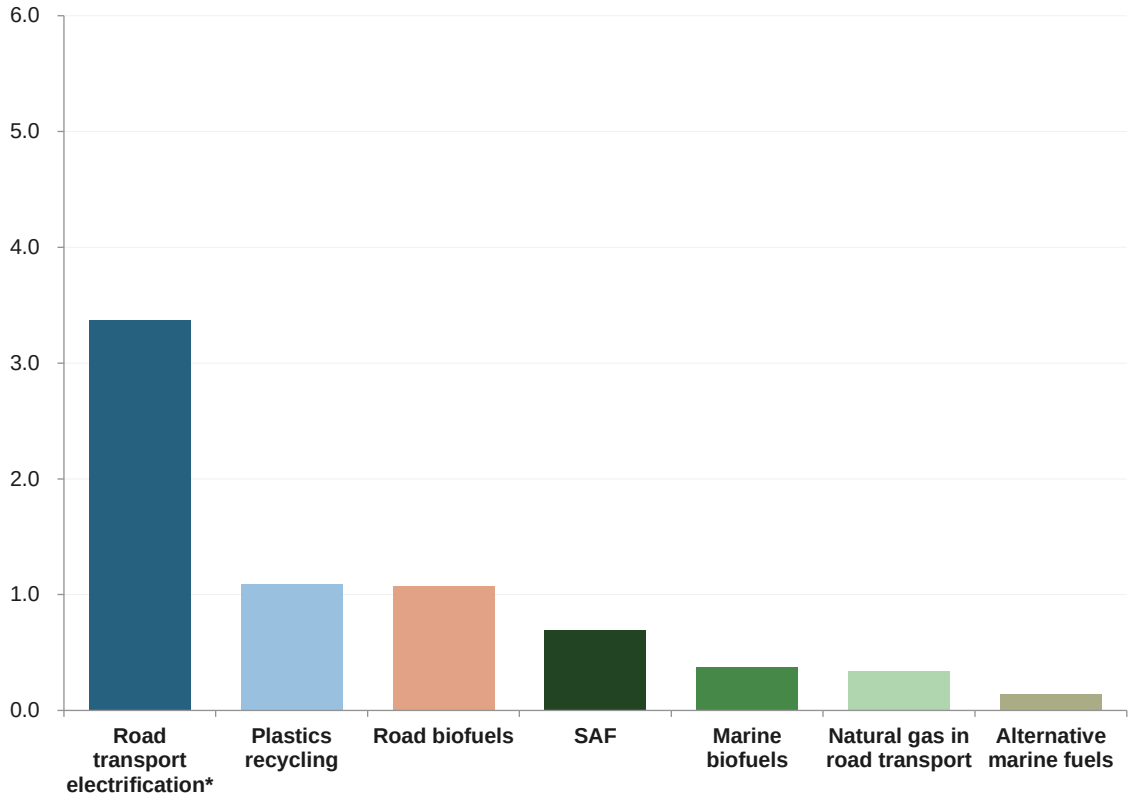
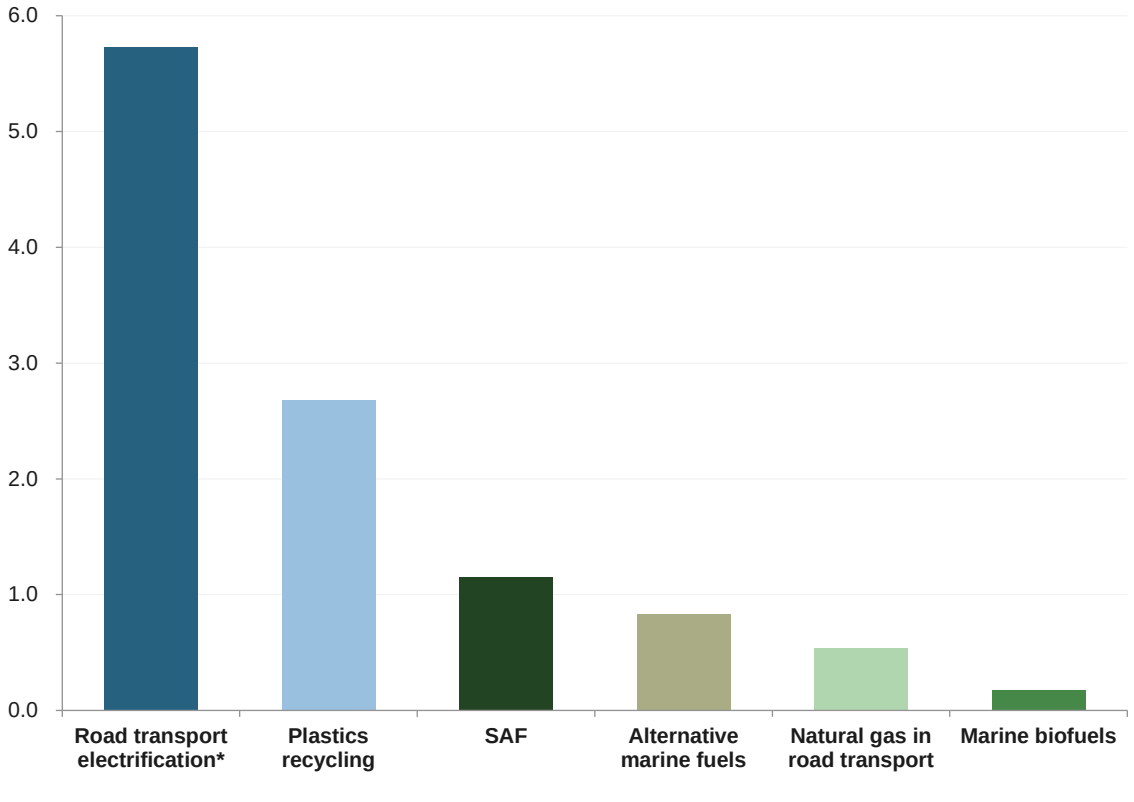
The Crystal Ball Knows: Electrification has the largest potential impact on oil demand…other areas relatively small

Alternatives Impact on Oil Demand 2023-2035, mmb/d



Source: FGE
**: excl. hybrids*

Alternatives Impact on Oil Demand 2035-2050, mmb/d



Source: FGE
**: excl. hybrids*

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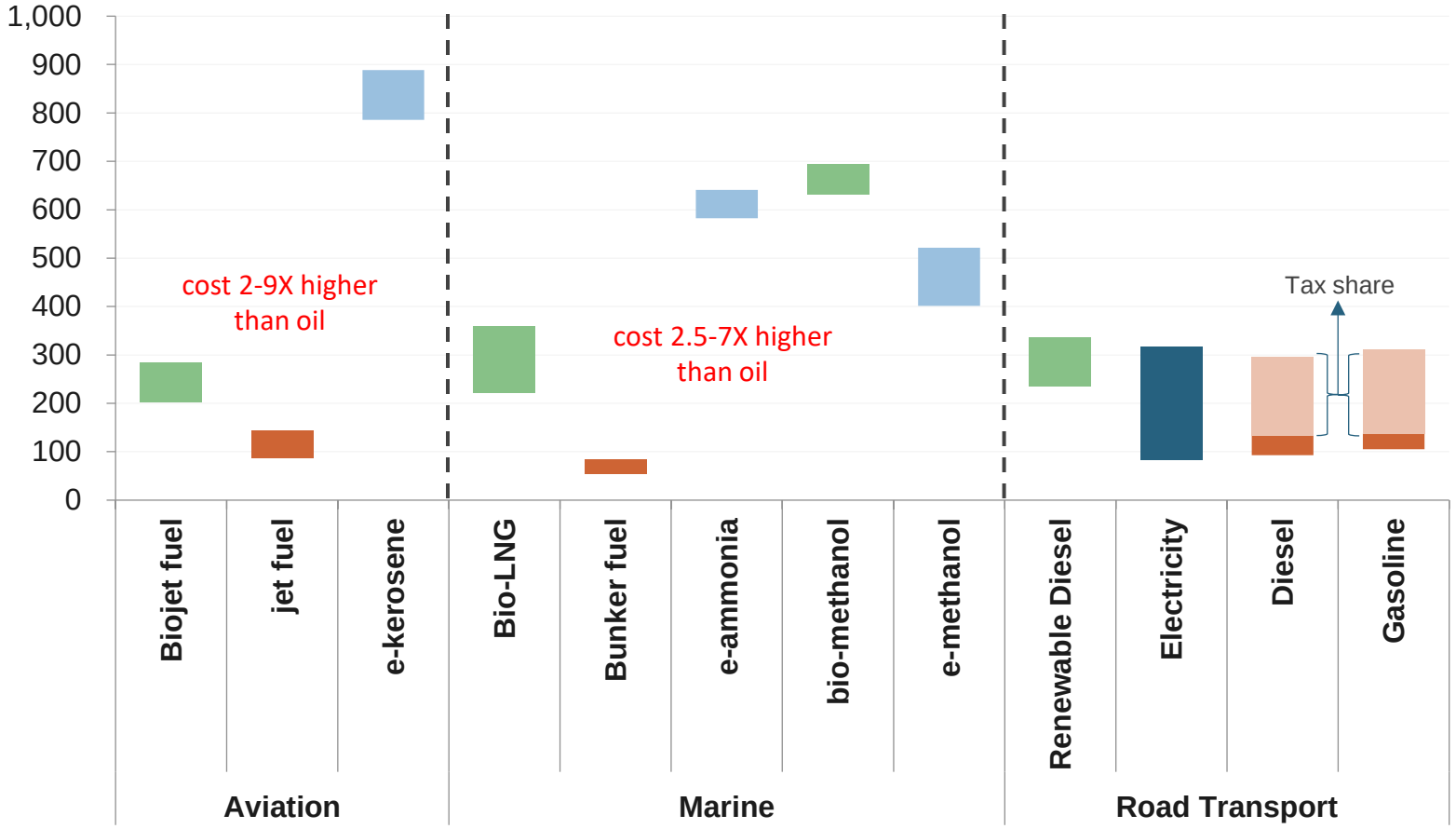
Most alternatives to oil cost significantly more, require major sustained govt support: Crystal Balls' critical question…can it be counted on???

Transportation Fuels Relative Cost Ranges, 2023 $/barrel of oil equivalent



Source: FGE

- Among the different alternatives to oil, only electricity use in road transport can compete with conventional gasoline and diesel—after considering taxes on oil products.
- Renewable diesel is expensive but can compete with conventional diesel, esp. if subsidized and diesel taxed.
- SAF is up to three times more expensive than conventional jet fuel.
- Bio-LNG is up to four times more expensive than conventional bunker fuel.
- Hydrogen based synthetic fuels are generally prohibitively expensive.

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Commercial Implications???

Crystal Ball still believes…being a leader in new energy is commercially risky—coming in second or third can make more sense

- In the past, the Crystal Ball contended that while moving as fast as possible to new energy is beneficial for the world, for individual companies it is commercially risky.
- This view hasn't changed!
- Governments are competing to throw money at new energy. Unless a company is well-positioned to receive subsidies, it should stay out of the way for now.

Crystal Ball says:

- Let governments pay to improve technology, reduce costs, and prove what works…then enter when it makes business sense.
- The Crystal Ball always reminds us that this is not the internet, where first mover companies can dominate. In new energy you can win by being 2nd or 3rd place!

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Trump Wins: Crystal Ball wonders…what is the real impact?

- Trump loves to talk about US “energy dominance”…Crystal ball wonders where will talk translate into action?

Talk and act:

- Despite roadblocks (lawsuits) Trump will certainly:
  - Reverse the Biden “pause” on US LNG exports.
  - Seek to roll-back fuel efficiency standards and push to remove the US from the Paris climate agreement.
  - Reverse emissions and flaring limitations and ramp up leasing (but only about 20% of US production is on federal land).

Talk and less action:

- Impacts on US IRA commitments probably limited.
  - Republicans like free money as much as Democrats!
- Impact on US oil and gas output largely limited to easing infrastructure approvals and marginally lowering costs.
  - Remember, oil and gas prices are the most important driver for US production…US production increased by 2.8 mmb/d under Biden.

Wild cards!

- Geopolitical wild cards: Iran sanctions, Israeli conflicts, Russia-Ukraine.
- Tariffs, Tariffs, Tariffs!...oil demand and US dollar impacted.
- Get ready for abrupt US$2-US$3/bbl oil price swings depending on Trump’s comments!

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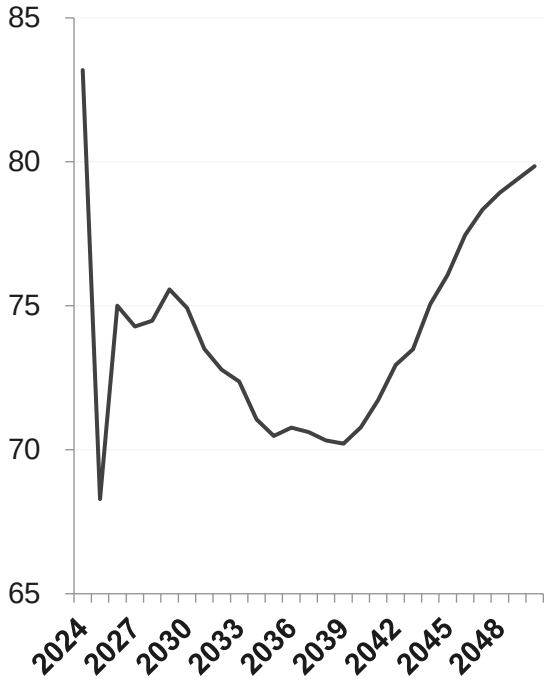
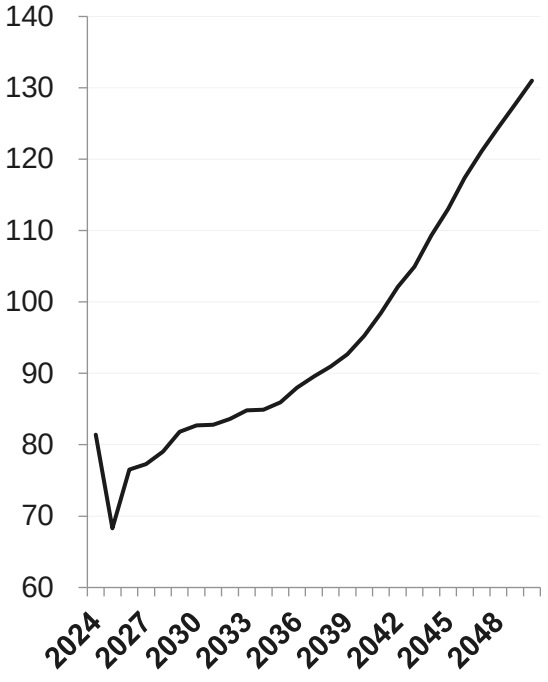
The Bottom Line: What crude price lies ahead?

Dated Brent Price Outlook (Real 2025), $/bbl



Source: FGE

Dated Brent Price Outlook (Nominal), $/bbl



Source: FGE

- **Are we investing enough?**
  - Many still say we are not investing enough due to ESG concerns, and prices will spike ahead.
- **Crystal Ball says**:
  - Prices can certainly spike. Outages, conflicts and sanctions ensure this risk is always there.
  - But the idea that the industry is not investing enough to offset declines is overblown—it is investing smarter.

  - The good projects the Crystal Ball sees attracts investment. Comparing investment to wasteful periods like 2014 makes no sense.

  - Oil prices are always volatile, but US$70-US$80/bbl (inflation adjusted) is the natural “home” for price.
    - Demand peaks, but rising carbon costs increase costs for some producers, impacting supply—and supporting price.
    - Non-OPEC supply peaks a few years after demand. OPEC+ market share rises again in the 2040s.

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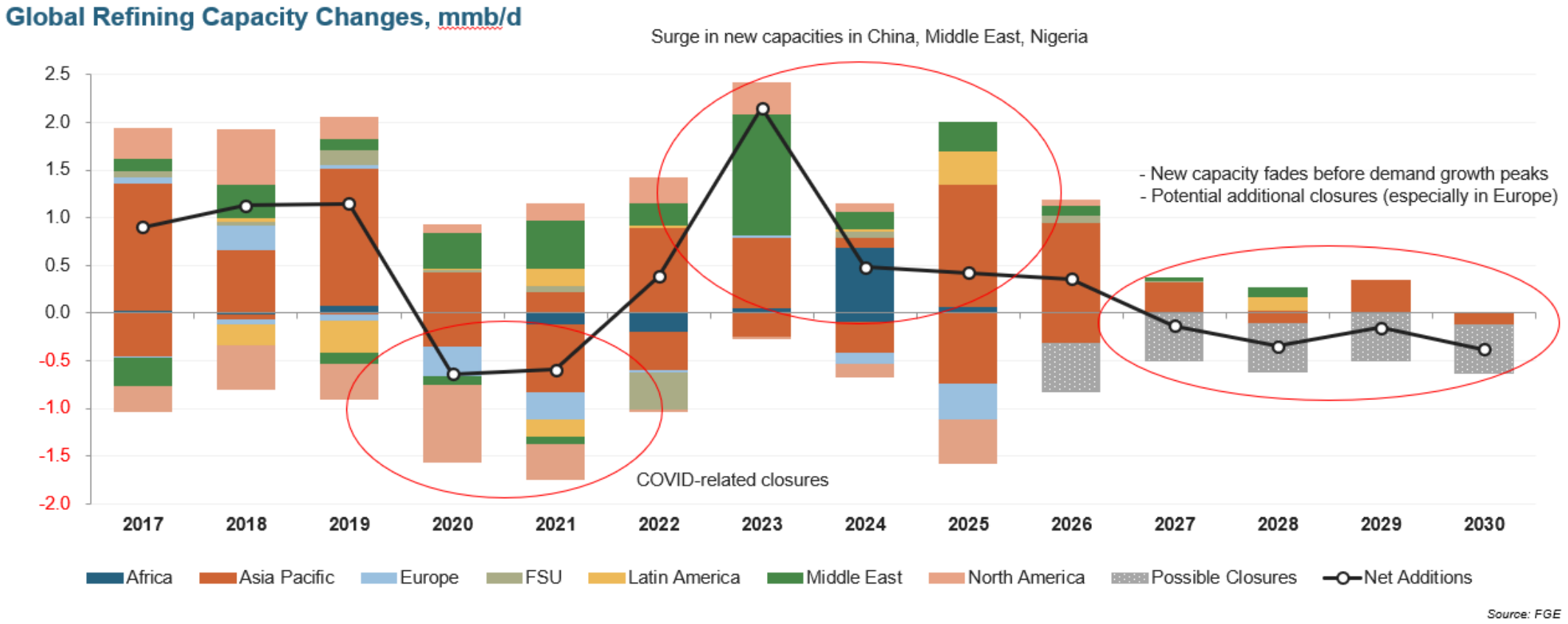
Crystal Ball rides the refinery capacity roller coaster:

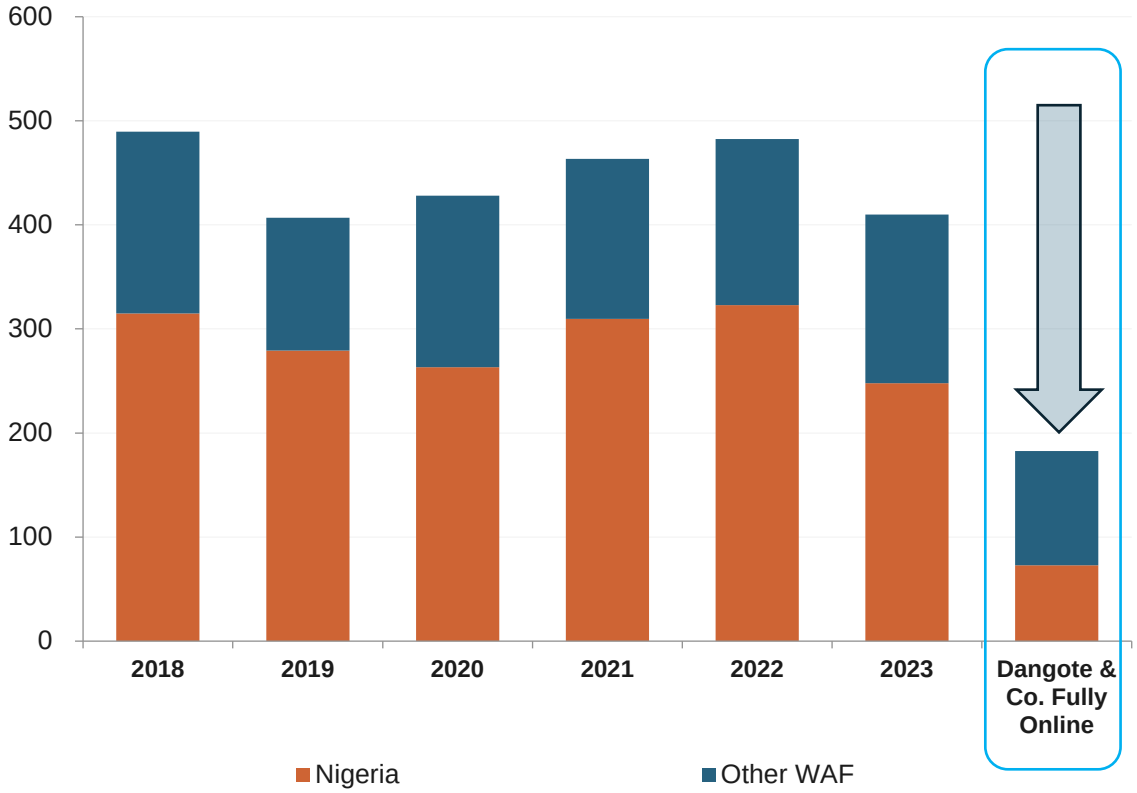
Major new additions offset by huge closures



Source: FGE

Mysteries of the Dangote refinery

EU+UK+Norway Gasoline Exports to West Africa, kb/d

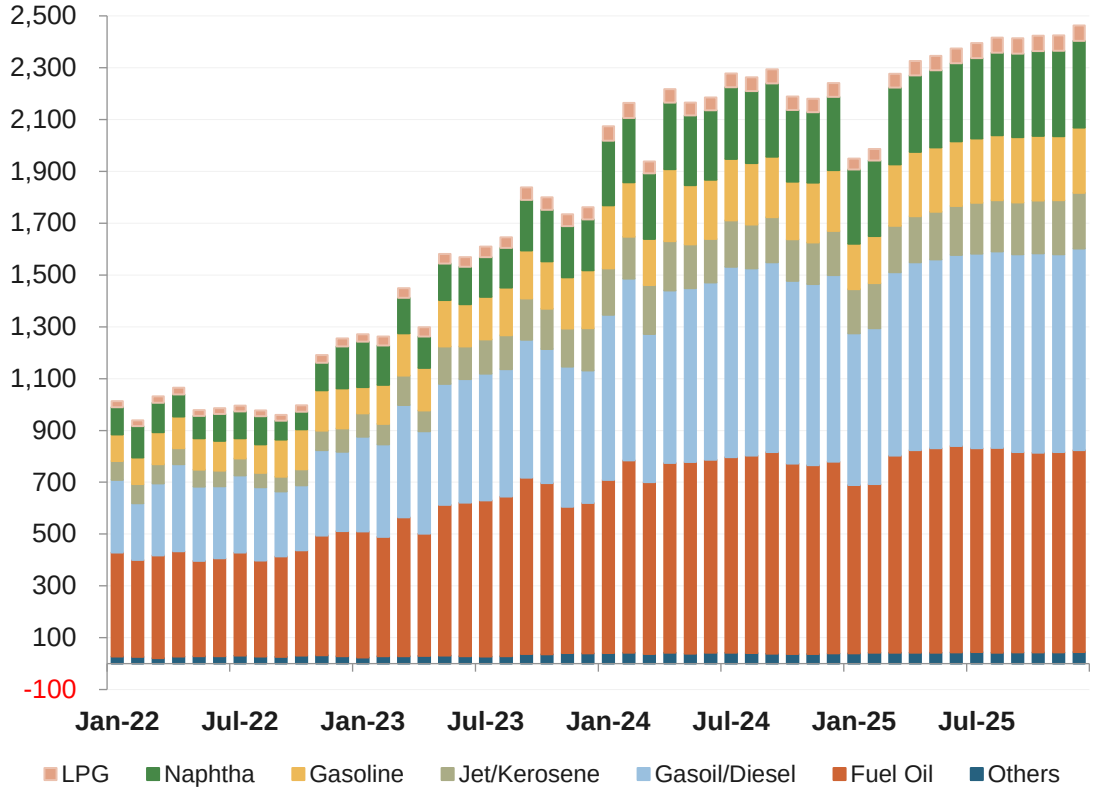


Source: Kpler, FGE

- **Dangote finally makes its appearance**
  - After numerous delays, Dangote is finally running, albeit not at full capacity.
    - What happens when it fully ramps up?
- **Crystal Ball says**:
  - The jury is still out on how reliably this mega 650 kb/d refinery will run…it may be the world's "wild card" refinery for years to come.
  - European refiners sending lower spec gasoline to W. Africa will surely suffer…adds another nail in their coffin and may accelerate closures.

The Crystal Ball knows new Middle East refineries serve different purposes

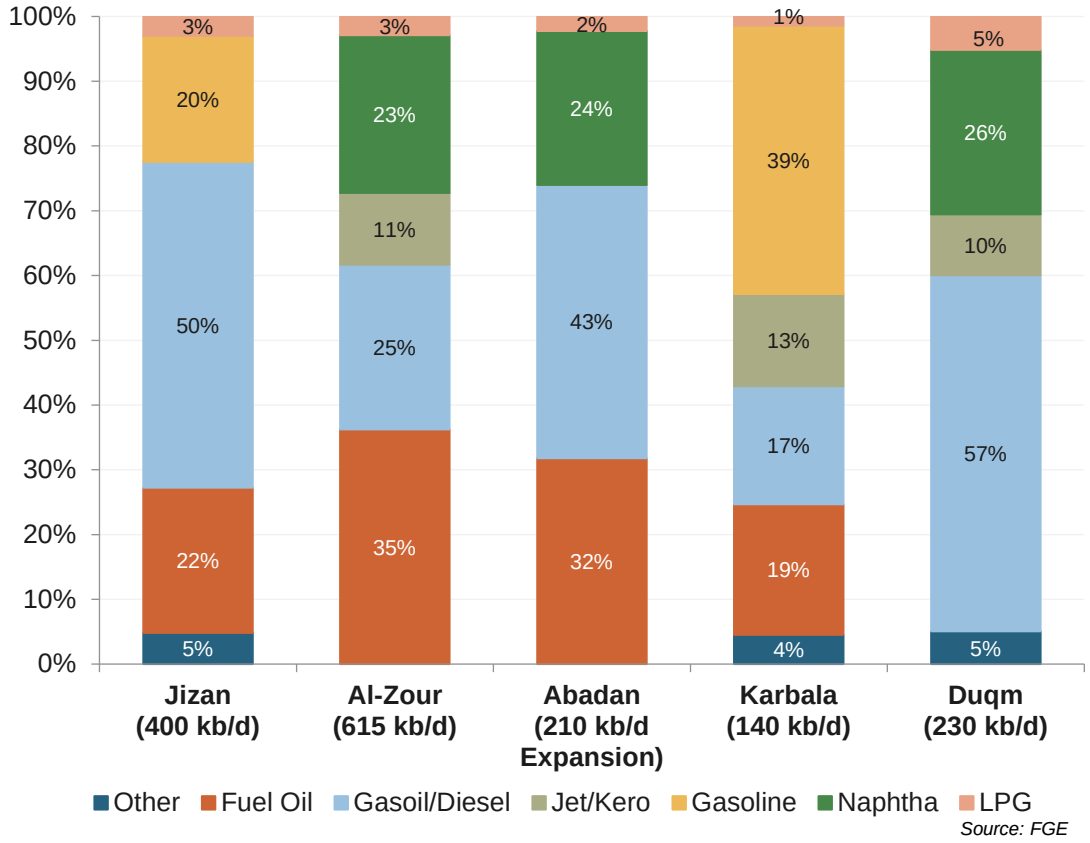
New Projects' Product Output, kb/d



Source: FGE

Note: Includes output from Jizan, Al Zour, Abadan, Karbala, Duqm, North Baiji, Basrah and Sitra

New Projects' Products Yield, Vol %



Source: FGE

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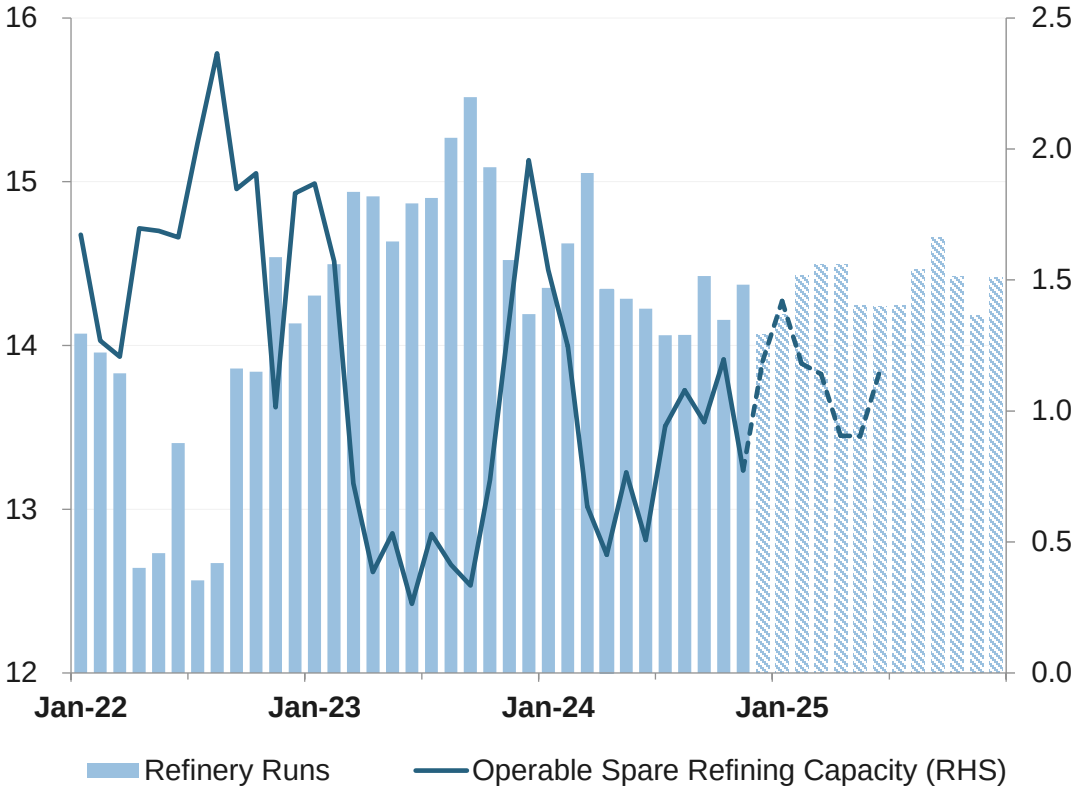
The Crystal Ball sees China as the world's refining wild card

China Refinery Runs and Operable Spare Capacity, mmb/d

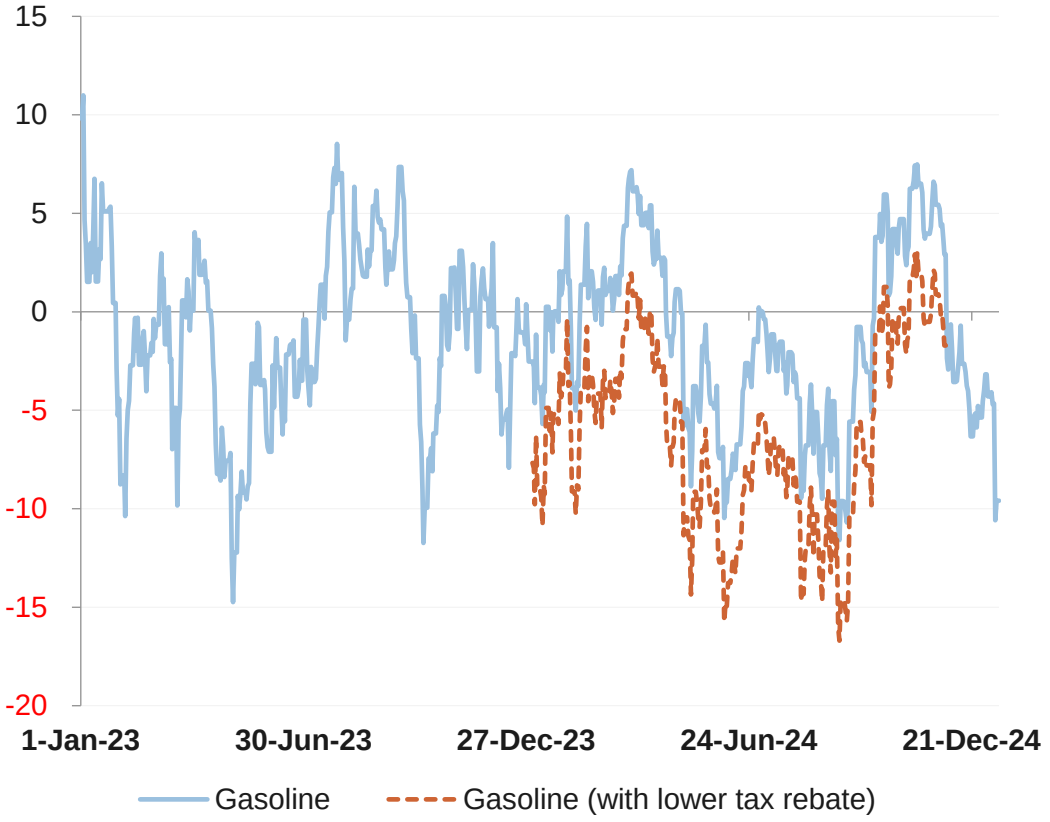


Source: FGE, China National Bureau of Statistics

- **China holds over 2 mmb/d of spare refining capacity…of this, about 1 mmb/d is operable.**
- **China's NDRC policy has been consistent…it seeks to control refiners through crude and product export quotas.**
  - The NDRC does not want to import large volumes of crude and export more products.
  - Over time, it wants to close small inefficient refineries and pivot refining capacity towards petchems.
- **BUT, as we saw in late 2022 as China emerged from COIVD restrictions, government priorities can occasionally shift…**
  - Product exports doubled, pressuring regional…and even global…refinery margins.
- **The Crystal Ball expects China to continue its policy of regulating exports, but watches it carefully.**
  - Recent moves to reduce export tax rebates further limits the incentive to export.

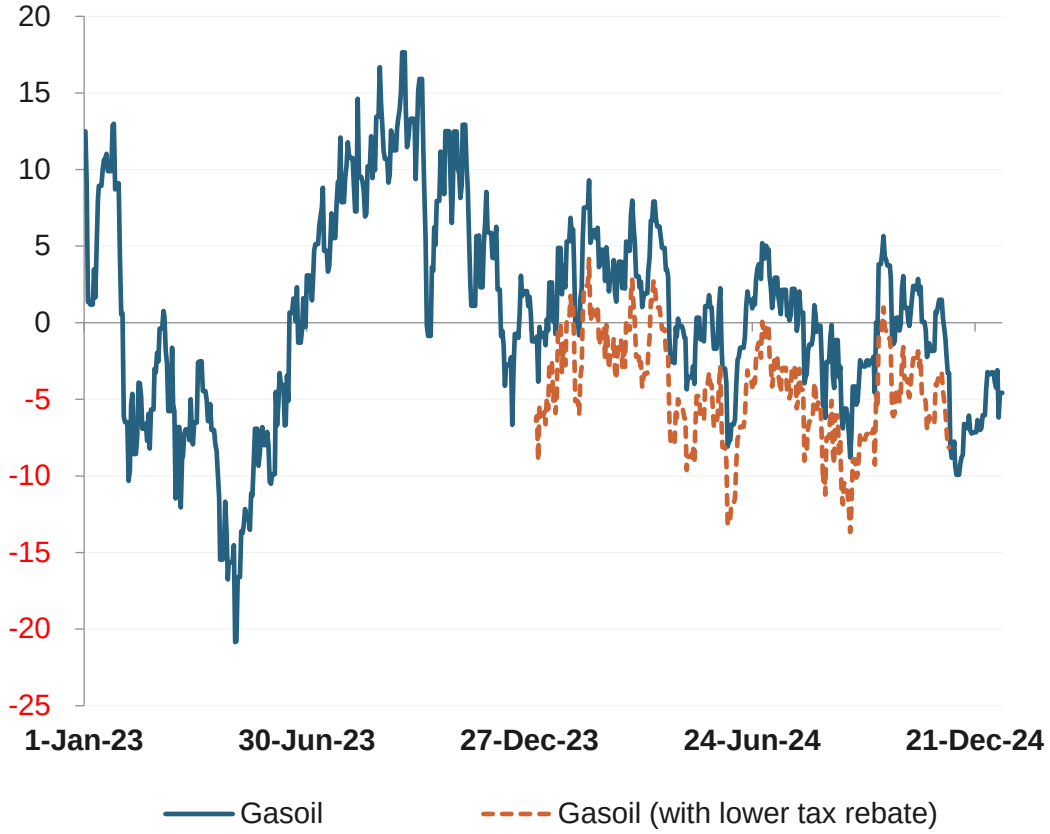
China Makes it More Costly to Export Products: Recent tax change removes US$4/bbl from export margin

East China NOC Gasoline Export Margins, US$/bbl



Source: FGE

East China NOC Diesel Export Margins, US$/bbl



Source: FGE

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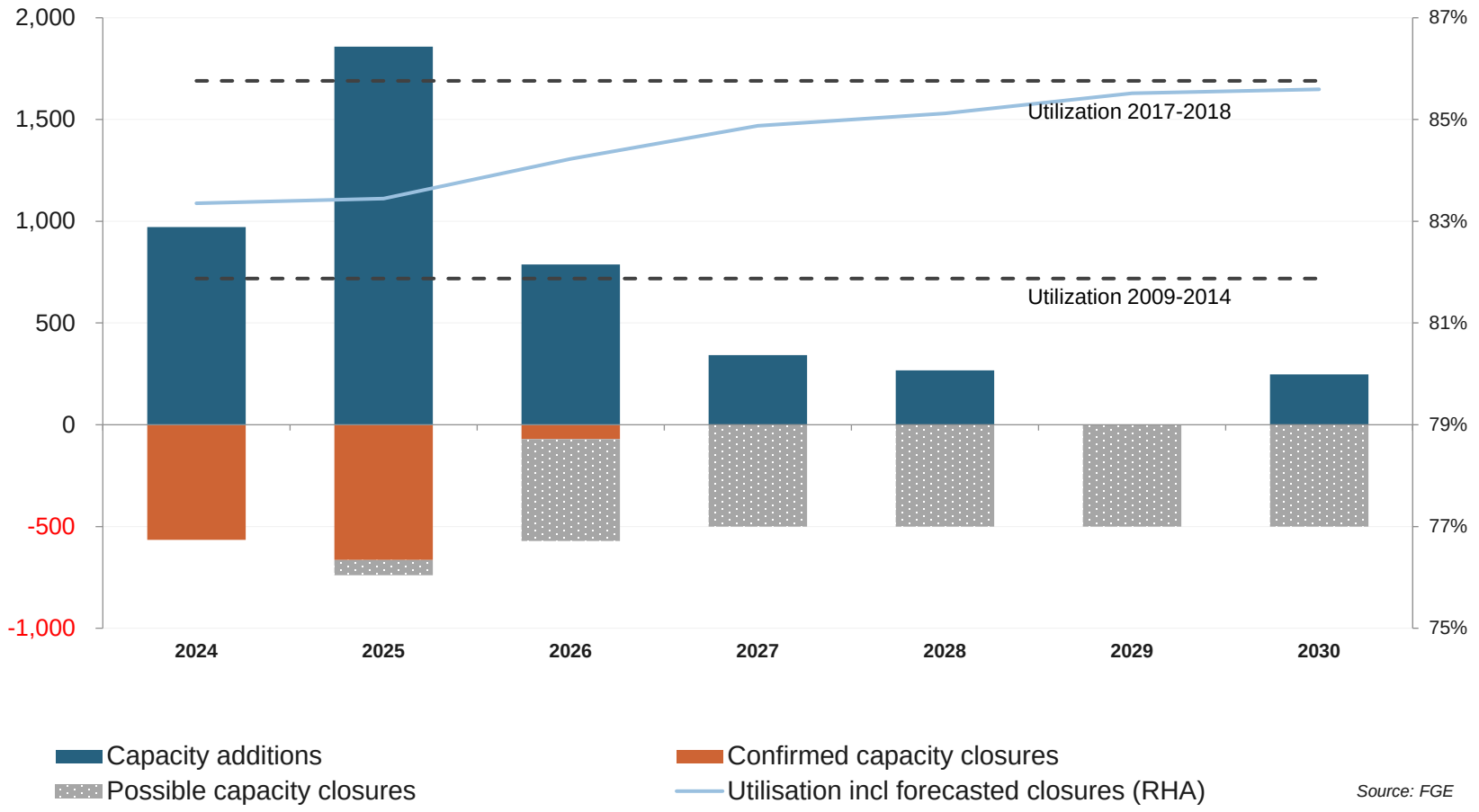
Crystal Ball Still Sees a Last "Golden Age": High refinery utilization in late 2020s

Capacity additions set to dwindle while closures expected to remain as a theme

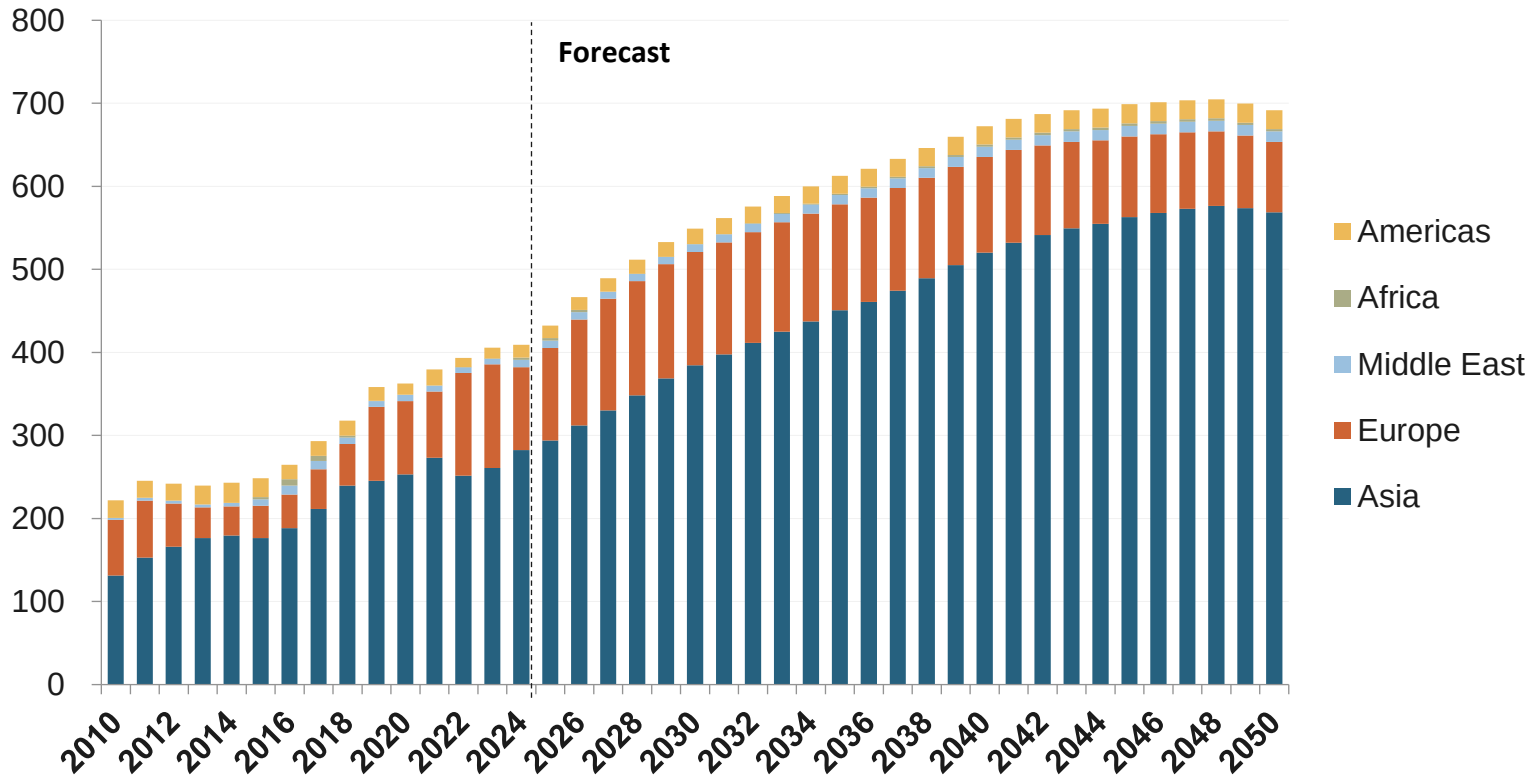
Refinery Capacity Changes, kb/d and Utilization, %



Source: FGE

The Crystal Ball sees LNG demand peaking much later than oil…not until the mid-2040s, with Asia leading the way

Global LNG Demand by Region, mt



Source: FGE LNG ODS

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LNG protects governments from their own miscalculations

The Crystal Ball sees that 90% of the world's economies have a net zero commitment…but most have no realistic plan to get there.

So, what do these markets' governments do? They set unrealistic plans!

- Because of these plans/goals, regulated utilities often can't:
  - Build out needed hydrocarbon-based power generation capacity.
  - Build out needed infrastructure.
  - Sign long-term gas supply agreements.
- When (surprise, surprise!) alternative fuel goals are not attained, the quickest solution is to fall back on gas generation and LNG (usually expensive spot supplies).
- We have seen this story many, many times in Korea and Japan, where overly optimistic renewables and nuclear forecast have been the norm.
- The Crystal Ball knows this overpromising and underdelivering will be repeated as countries wake up from their net zero dreams and face reality down the road. Inevitably they will turn to relatively clean and flexible LNG. They will have no choice!

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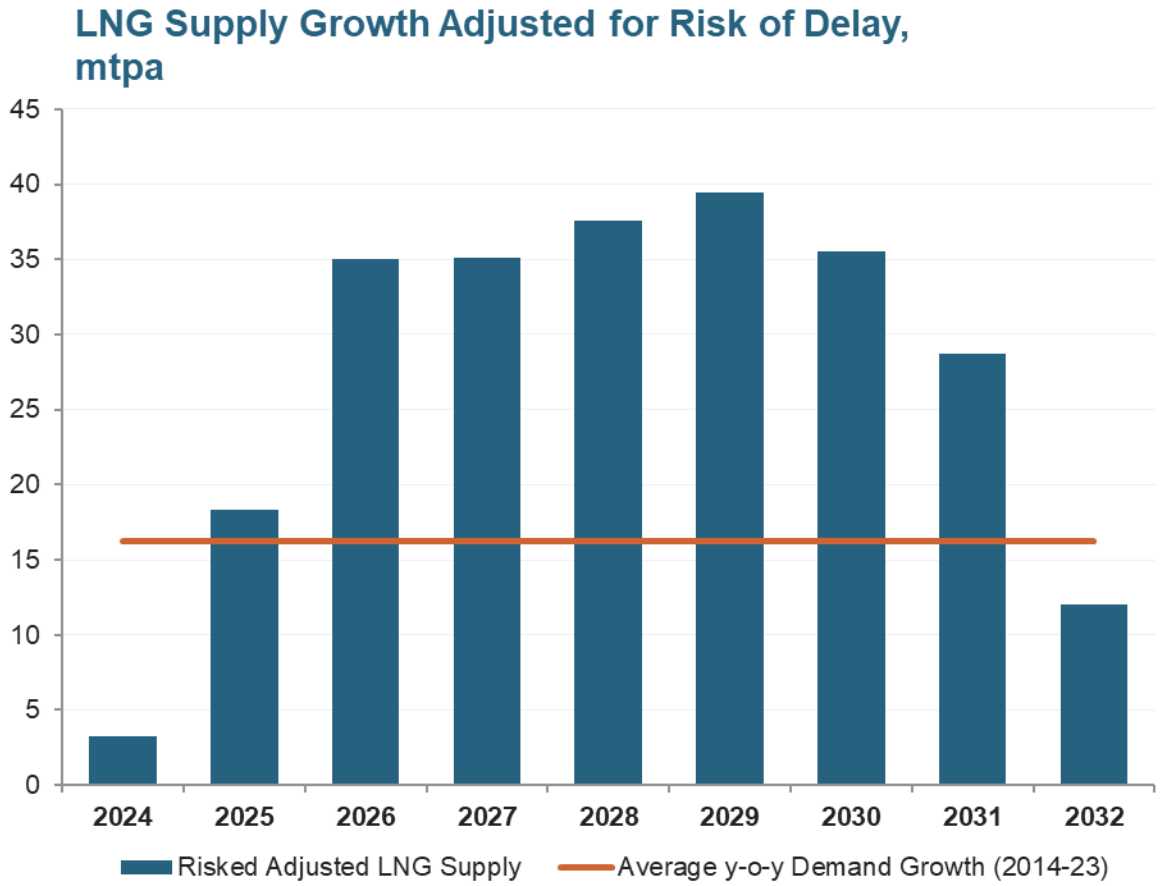
Get ready for the greatest wave of LNG supply ever!



Supply includes output from operating (Op), under-construction (UC), and likely (L) projects and takes into account possible outages and delays to project start-ups

Source: FGE

- **Crystal Ball says**:
  - The LNG market is notoriously cyclical, but we've never seen anything like this before.
  - Currently, the market is a little over 400 mtpa and more than 190 mtpa is under construction. That's around a 50% increase in only a few years!
  - The market will absorb the supply surplus, but the process can be volatile and painful.

  - Be ready for spot prices to occasionally drop to levels where flexible US supply is shut in, around US$4/MMBtu in Europe.
  - The Biden LNG pause hurt the US' reputation, but it is inconsequential in the bigger picture. Many US companies are hurt, but it spreads the global surplus out.

  - China's increasing dependence on US LNG can create chaos in the LNG market if there is political conflict.
  - Opportunities ahead:
    - Buyers should be mindful of market cycles and consider LNG requirements beyond 2031 to secure term volumes at attractive slopes.
    - Interest from emerging buyers in pre-FID supply will be limited. IOCs, traders, and established buyers are presented with an opportunity to support some pre-FID projects in a bid to take advantage of a potential market tightness from 2032.

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The Crystal Ball sees two dominant LNG sellers and a dominant buyer

- A few years back, we saw four major suppliers: US, Qatar, Australia, and Russia (and hopes of growth out of Mozambique remains).
- This has changed. On the supply side, the growth story is US, US, US + Qatar.
  - LNG supply capacity: Over 220 mtpa by 2030 in the US alone with under-construction and possible projects included; Qatar will have 142 mtpa by the early-2030s.
- On the demand side, China, China, China + Southeast/South Asia.
  - Many say Russia will sell more pipeline gas to China, but China is not so excited! At summits, Putin talks about new pipeline gas sales…and Xi politely changes the subject.
  - Russian pipelines cannot replace LNG. Power of Siberia 2 is not expected before 2030s.
- In 2022, SPAs for more than 75 mtpa were signed, and over 57 mtpa with North American project players (more than half by IOCs and a sizeable portion by the Chinese). In 2023, SPAs for over 73 mtpa were signed, and more than 31 mtpa with North American project players.
- We also note the fact that Chinese buyers bought 11 mtpa of DES LNG from QatarEnergy through 27-year SPAs during these years.
- In 2024, the secured volumes grew to over 76 mtpa, with a little over 24 mtpa with North American projects.
- Political friction between the US and China is unlikely to affect oil and gas flows with one major exception: An invasion of Taiwan means no US LNG for China, leading to chaos in LNG markets. Trump sees LNG as a bargaining chip…pushing others to take it or taking it away.

Thank You

If you have any questions regarding this presentation, please contact us at

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