



# The Global Refining Industry: Golden Age in an Era of Electric Cars?

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*JCCP International Symposium*

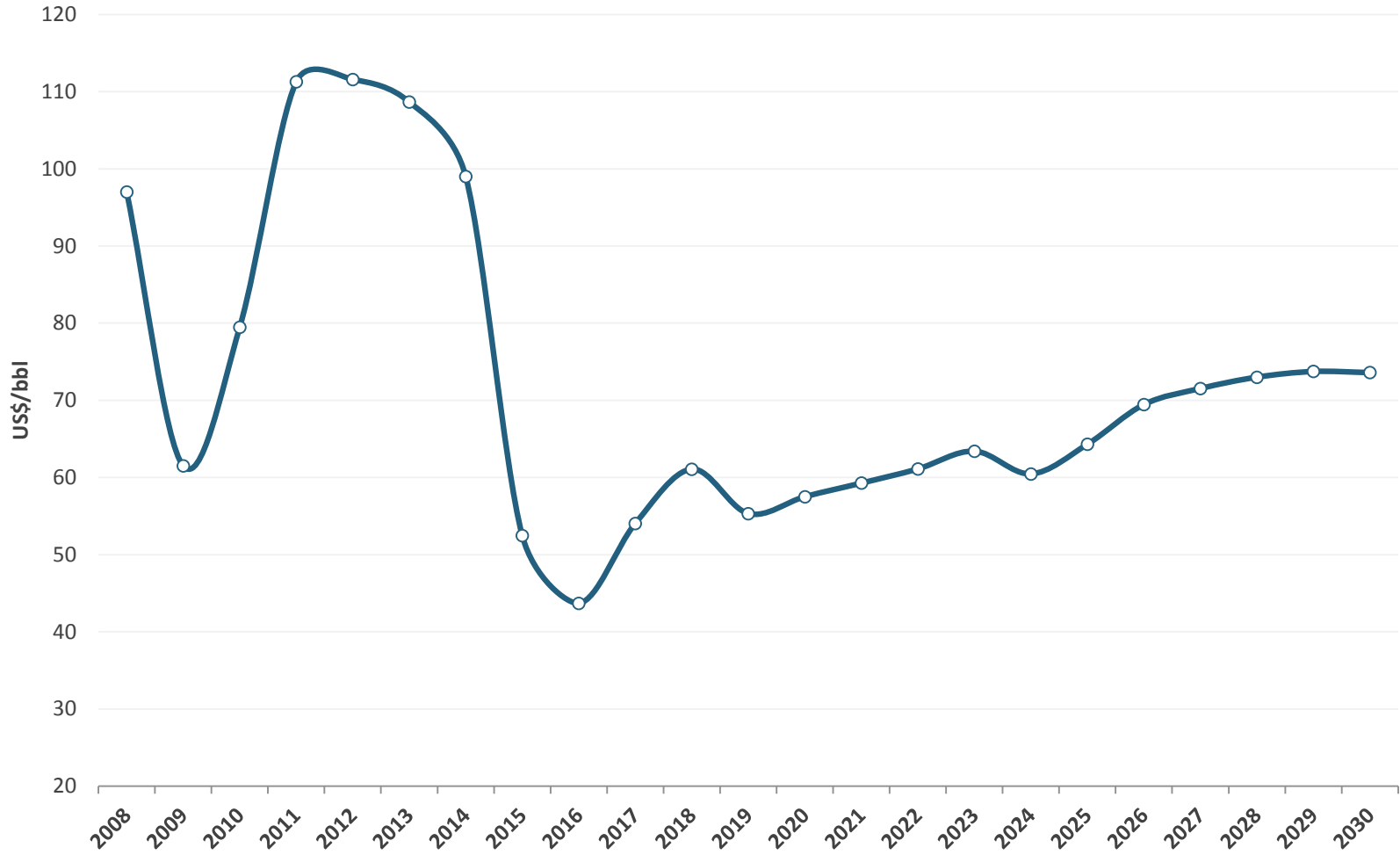
*January 25, 2018*

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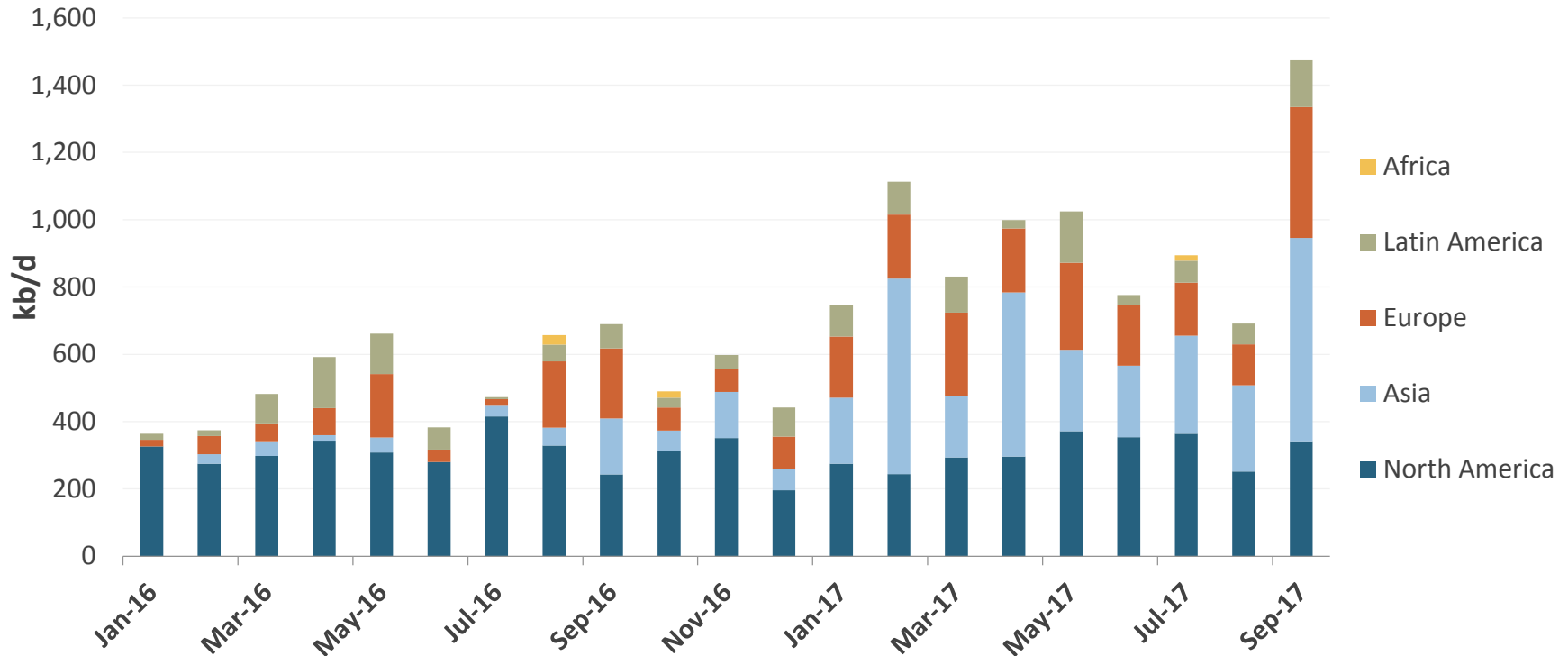
# Oil Outlook—Rebalancing Almost Complete?

# Brent Crude Outlook: A Bumpy Ride



*Nominal prices shown before 2017 and real 2017 prices for forecast.*

# Asia Emerging as Major Market for US Crude



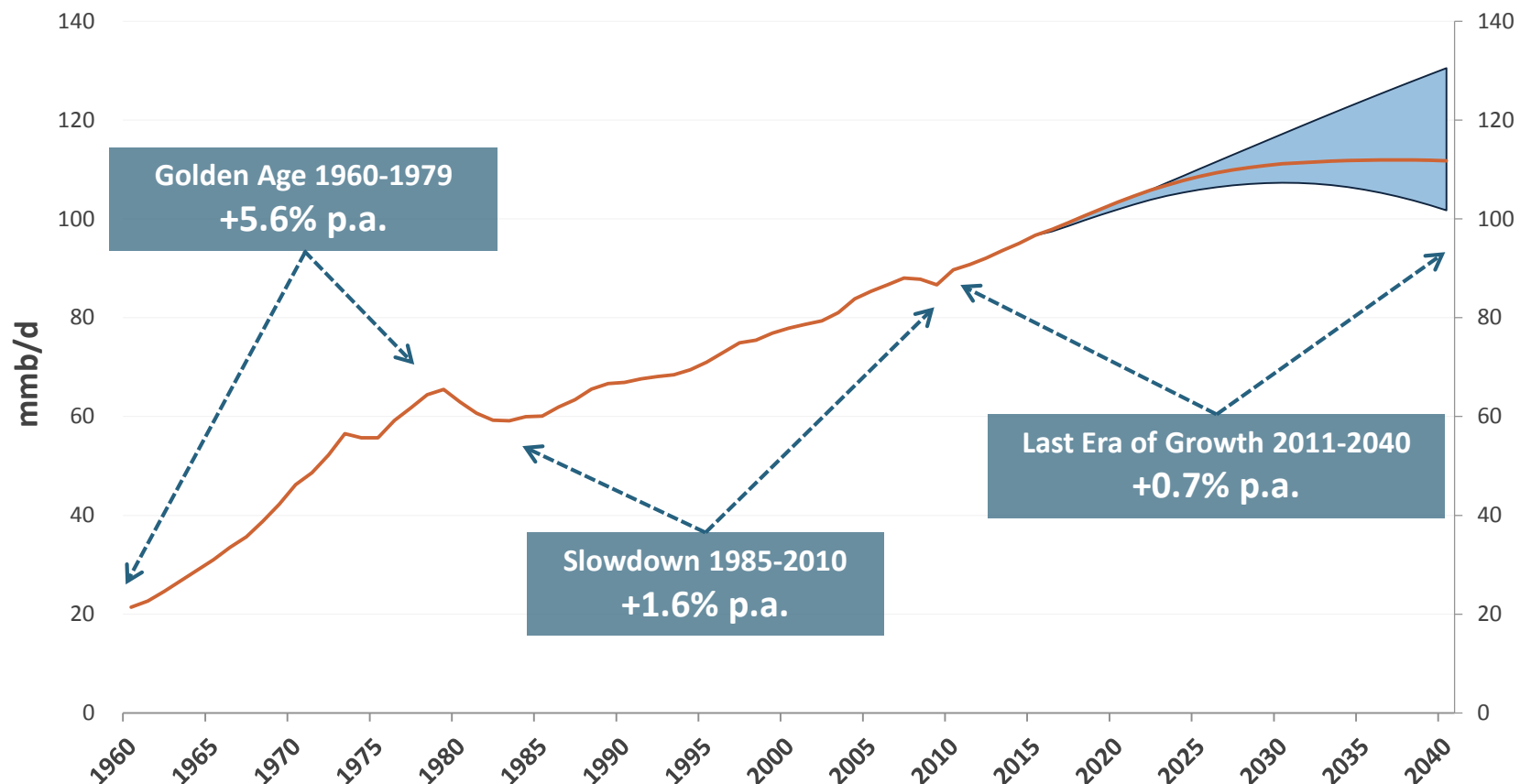
- OPEC cuts support Dubai prices and open arb to Asia from Atlantic Basin.
- Increased medium crude supply from both Latin America, GoM, and Canada puts pressure on Mars type crude.
- Mars/Dubai diff narrows, and Mars arbs to Asia.

# Global Oil Demand Trends

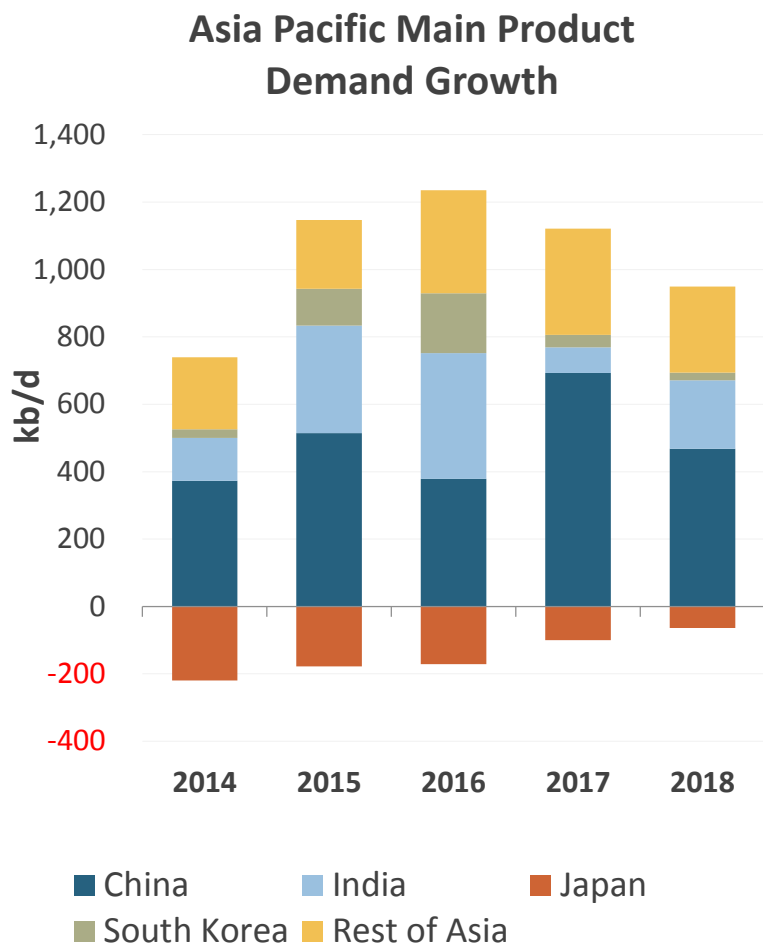
We project global oil demand to approach 112 mmb/d by 2040, compared to 98 mmb/d in 2016.

A peak around 2030 is possible in the case of strict implementation of environmental policies and strong efficiency gains, predominantly in OECD countries.

A continuous growth post-2025 is possible supported by relatively low oil prices and strong economic growth, predominantly in non-OECD countries.



# Asian Demand Moderating, But Still Solid Growth



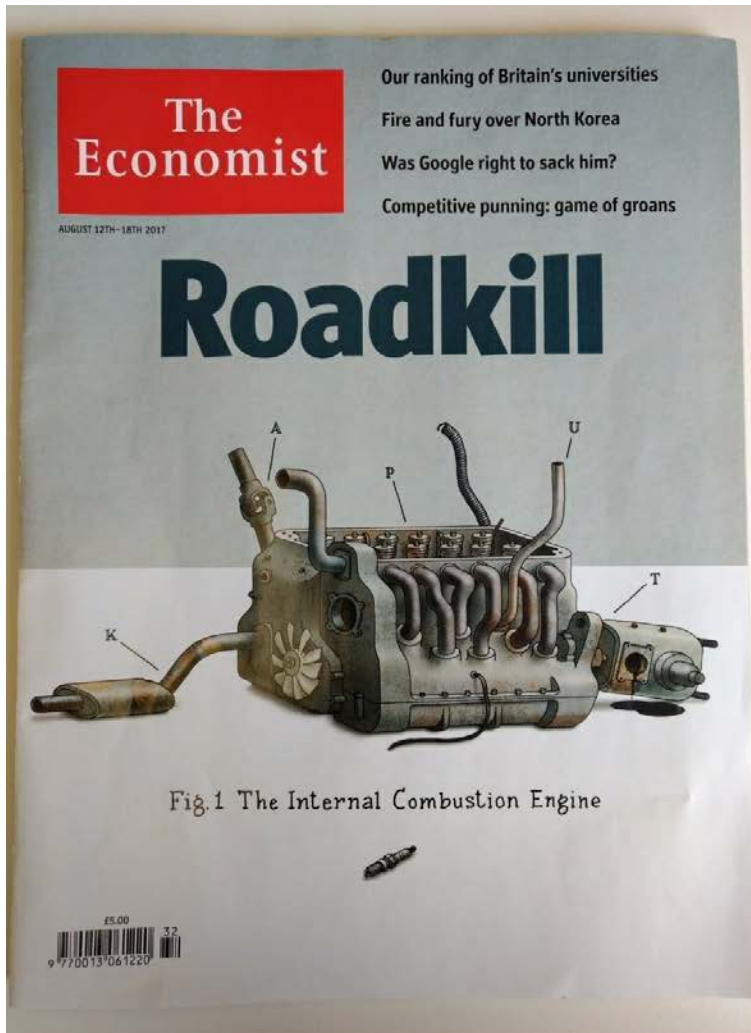
Total Oil Demand Growth,* kb/d					
	2014	2015	2016	2017	2018
China	373	514	378	693	468
India	127	319	374	167	204
Japan	-220	-178	-171	-100	-64
South Korea	26	109	178	37	23
Rest of Asia	214	204	306	316	256
<b>Total</b>	<b>520</b>	<b>969</b>	<b>1,065</b>	<b>1,113</b>	<b>886</b>

\*Includes other products and direct crude burn for Japan

# Oil Is Dying!...What's Real and What's Not

Aug 2017

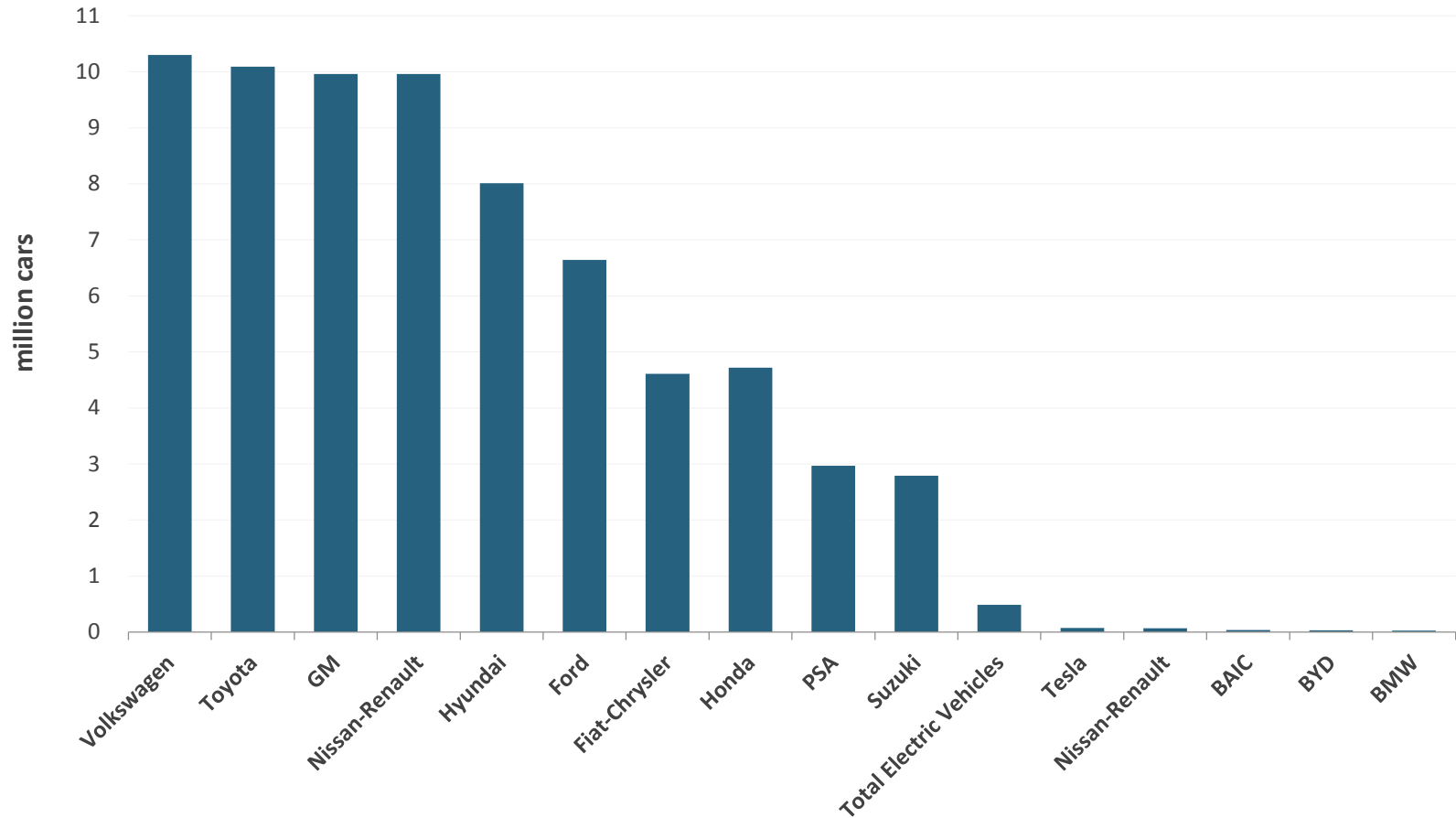
Oct 2003...Demand 17 mmb/d Below Today



# Electric Vehicles: A Lot of Excitement, But Still a Long Way to Go

Source: [FGE Long-Term Global Oil Market Outlook to 2040 / Road Transport and Electric Vehicle Section](#)

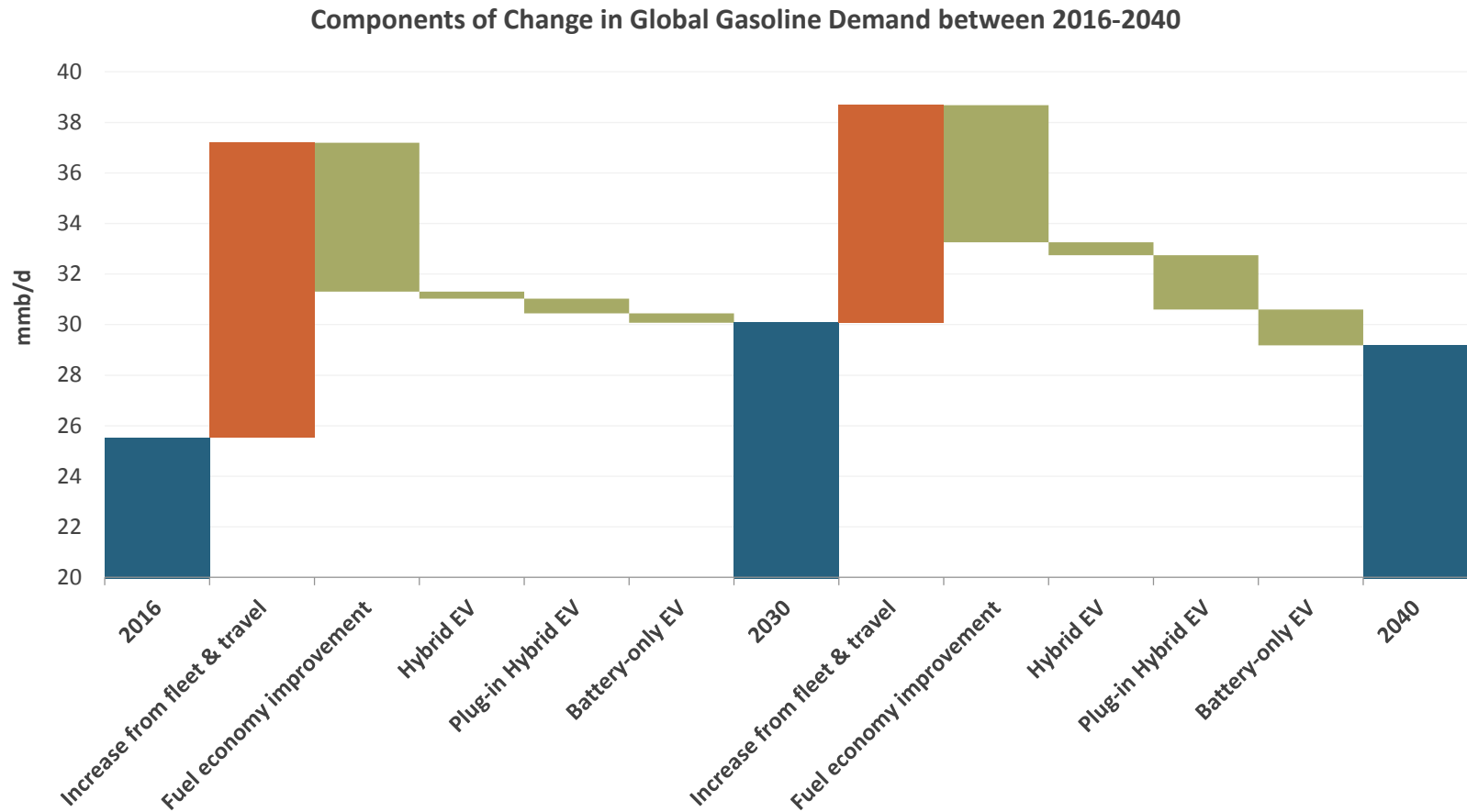
Sales of World's Top-10 Cars vs. Top-5 BEV Producers (2016)





# Road Transport: Fuel Economy is Biggest Near-Term Threat

Source: [FGE Long-Term Global Oil Market Outlook to 2040 / Road Transport and Electric Vehicle Section](#)

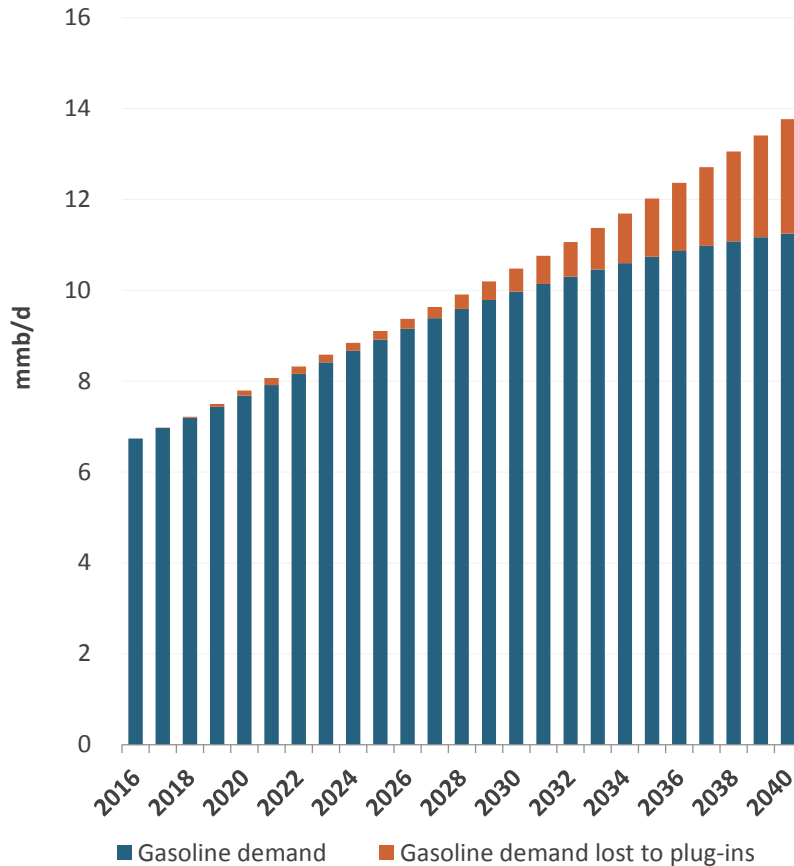


- Between 2016-2040, HEVs, PHEVs, and BEVs will erode close to 6 mmb/d of demand, while fuel economy improvement will “cost” twice as much (12 mmb/d).

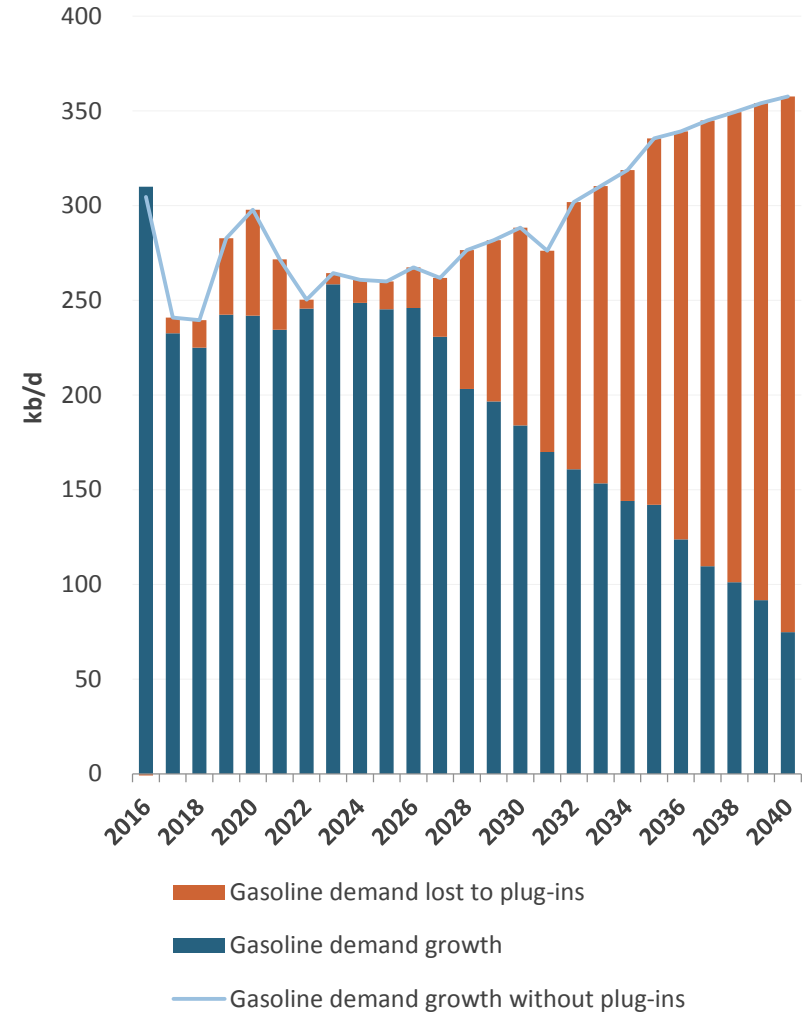
# Asia Gasoline Demand Outlook

Source: [FGE Long-Term Global Oil Market Outlook to 2040 / Road Transport and Electric Vehicle Section](#)

### Asian Gasoline Demand Lost to Plug-Ins

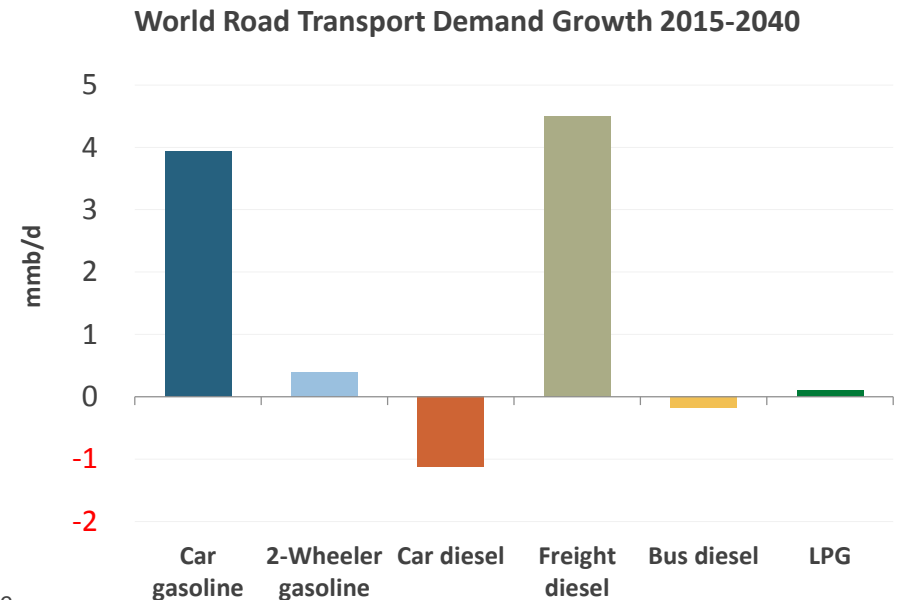
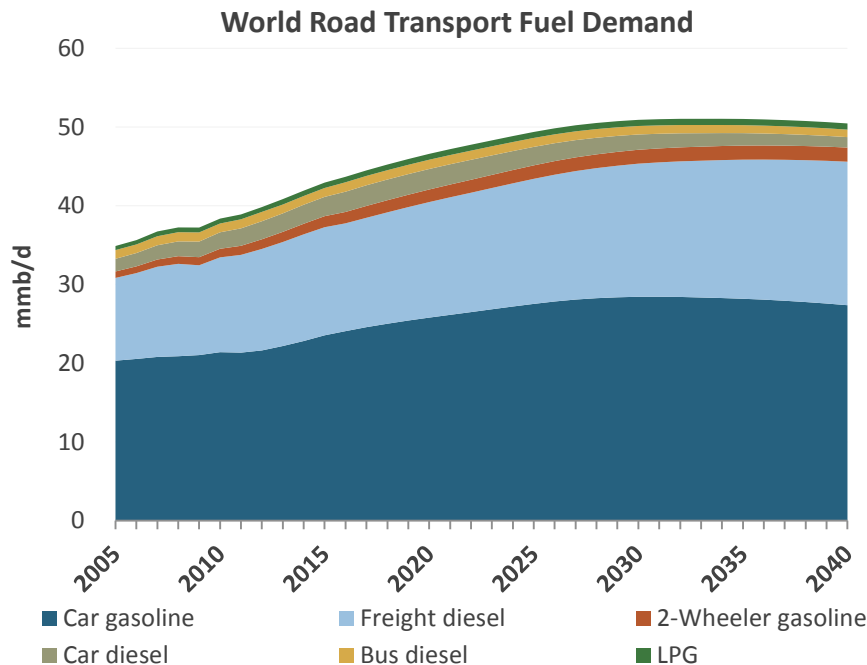


### Plug-In Effect on Asian Gasoline Demand Growth



# Road Transport: Overview

Source: [FGE Long-Term Global Oil Market Outlook to 2040 / Road Transport and Electric Vehicle Section](#)



- Vast majority of global road fuel consumption consists of car gasoline (60% as of 2015) and freight diesel (32%).
- Global road transport fuel demand will grow by 7.6 mmb/d between 2015-2040; but demand is expected to plateau after 2030 at around 51 mmb/d, predominantly due to peak gasoline consumption and the decrease of diesel use in the passenger car segment.
- In the post-2030 period, main growth item will be freight diesel.

# Refining Outlook: Good News, Bad News, Good News

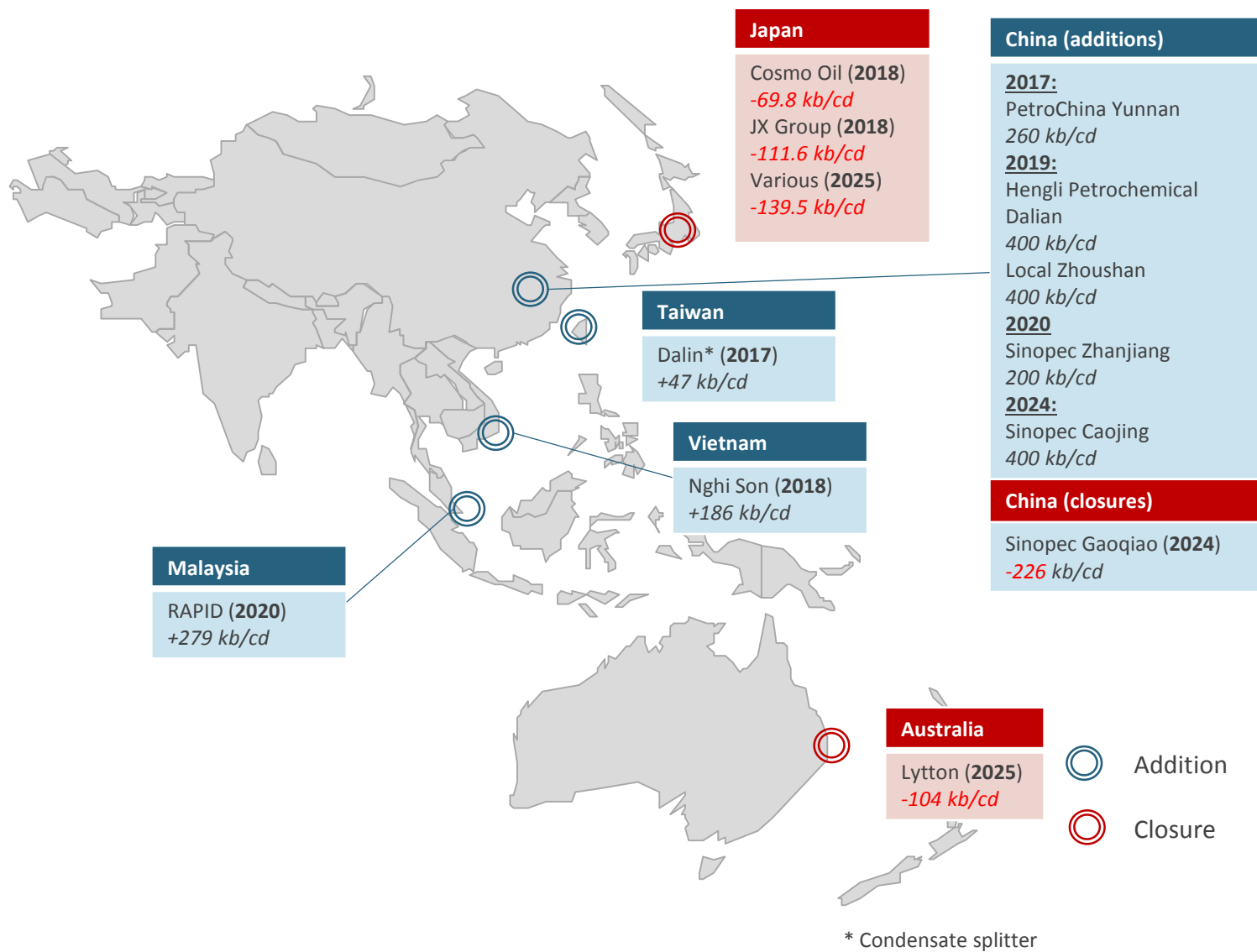
- Great margins in 2015. Pull back early 2016, then rebound. Why?
- Lower crude prices help refining margins.
- Demand surge + refinery cancellations/deferrals/closures tighten balance.

But...

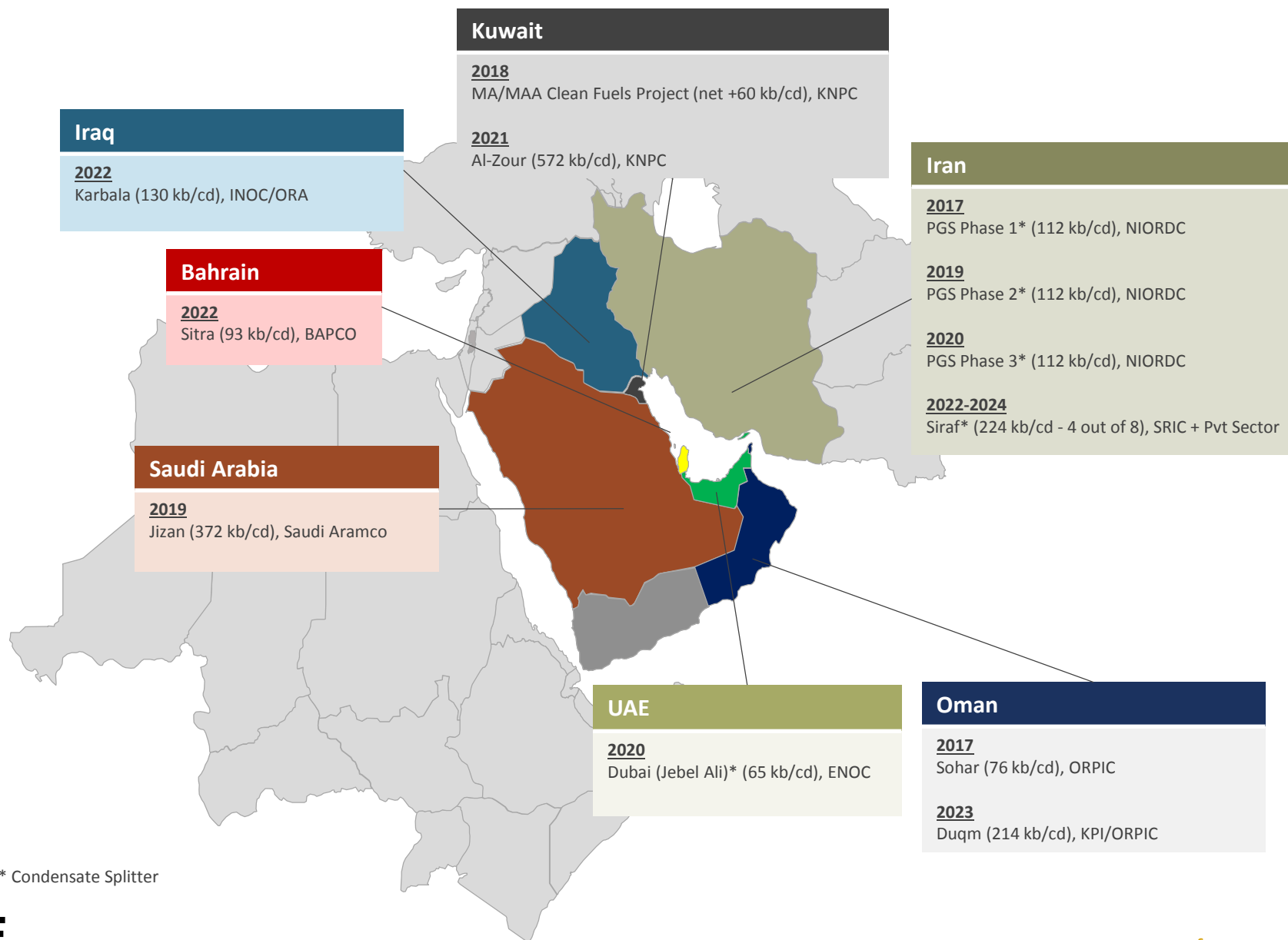
- Chinese exports surging.
- Complex Mideast refineries fully onstream and condensate splitters coming.
- **Overall: Picture better than it looked a few years ago...with big potential boost from IMO bunker spec change!**



# Asia Grassroots Refinery Additions and Closures, 2017-2025



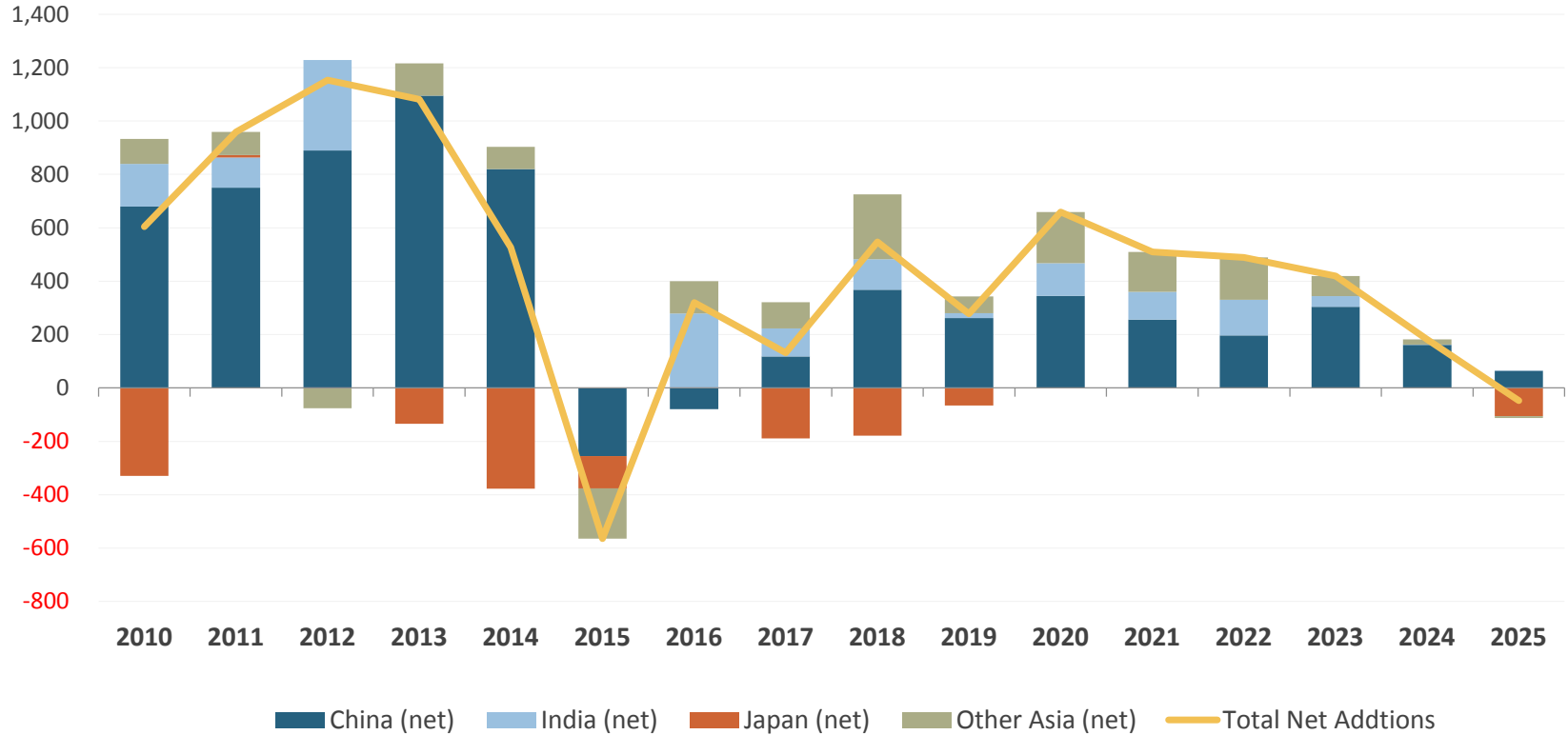
# Middle East—Refinery CDU Projects (Firm & Likely, Up to 2025)



\* Condensate Splitter

# Asian Additions Fade...

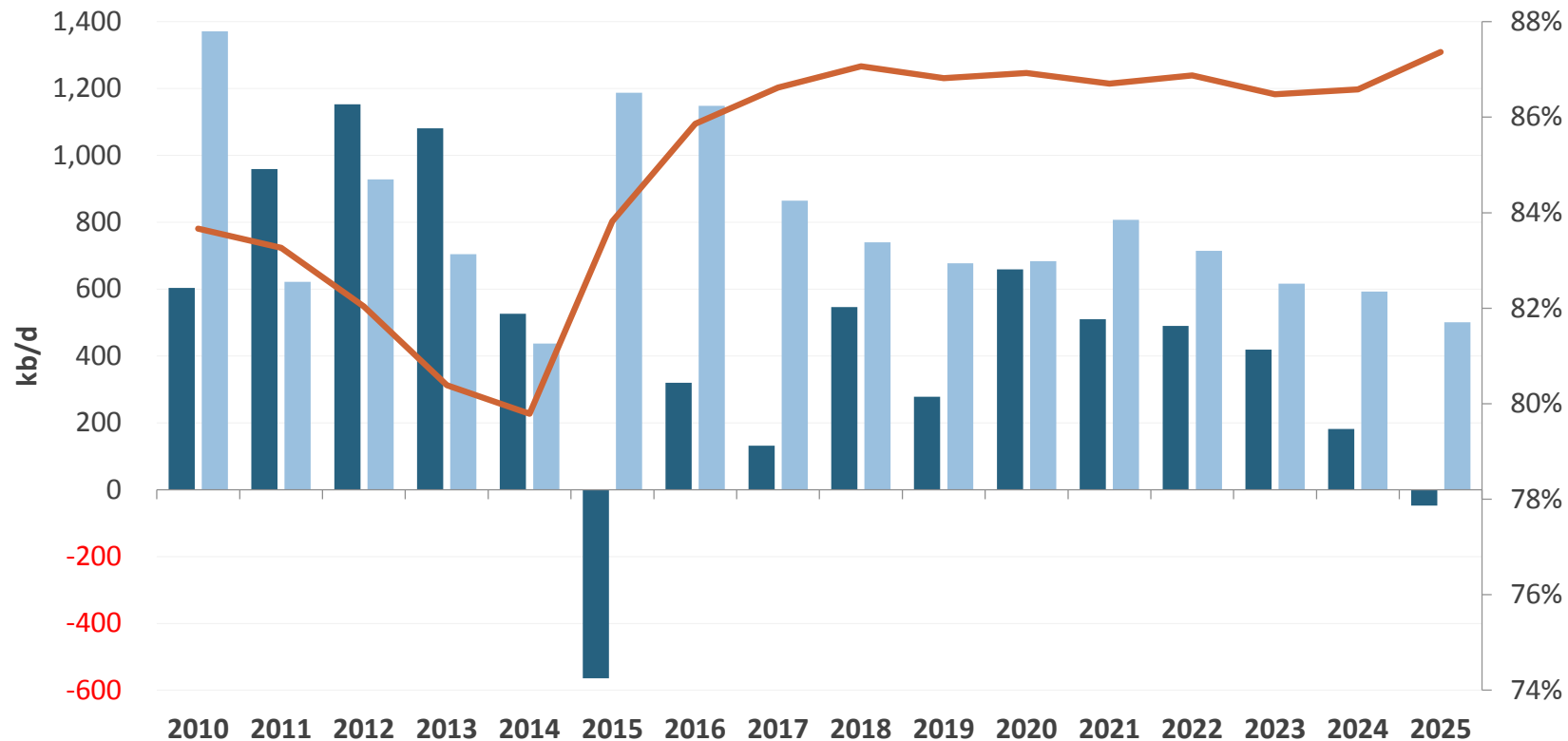
Asia Refining Capacity Additions, kb/cd



Note: Projections for 2017-2025 based on Firm & Likely CDU additions—weighted for risk of delays (base case)

# ...Even as Demand Continues to Grow

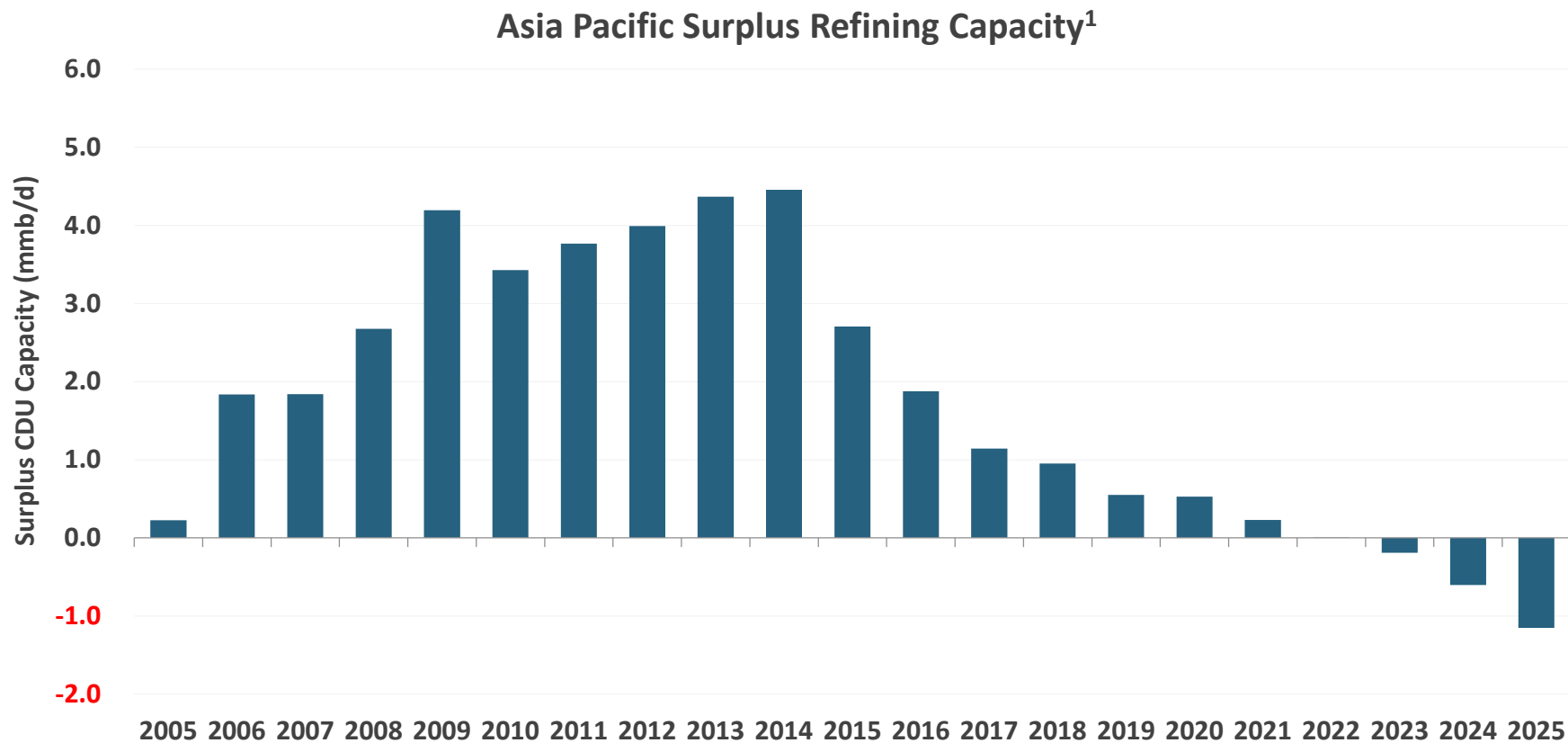
## Asia Pacific Net CDU Capacity Additions vs. Refined Product Demand Growth



- Net CDU Capacity Additions
- Refined Products Demand Growth (exc. Biofuel and non-ref LPG)
- Refinery Utilization (%)

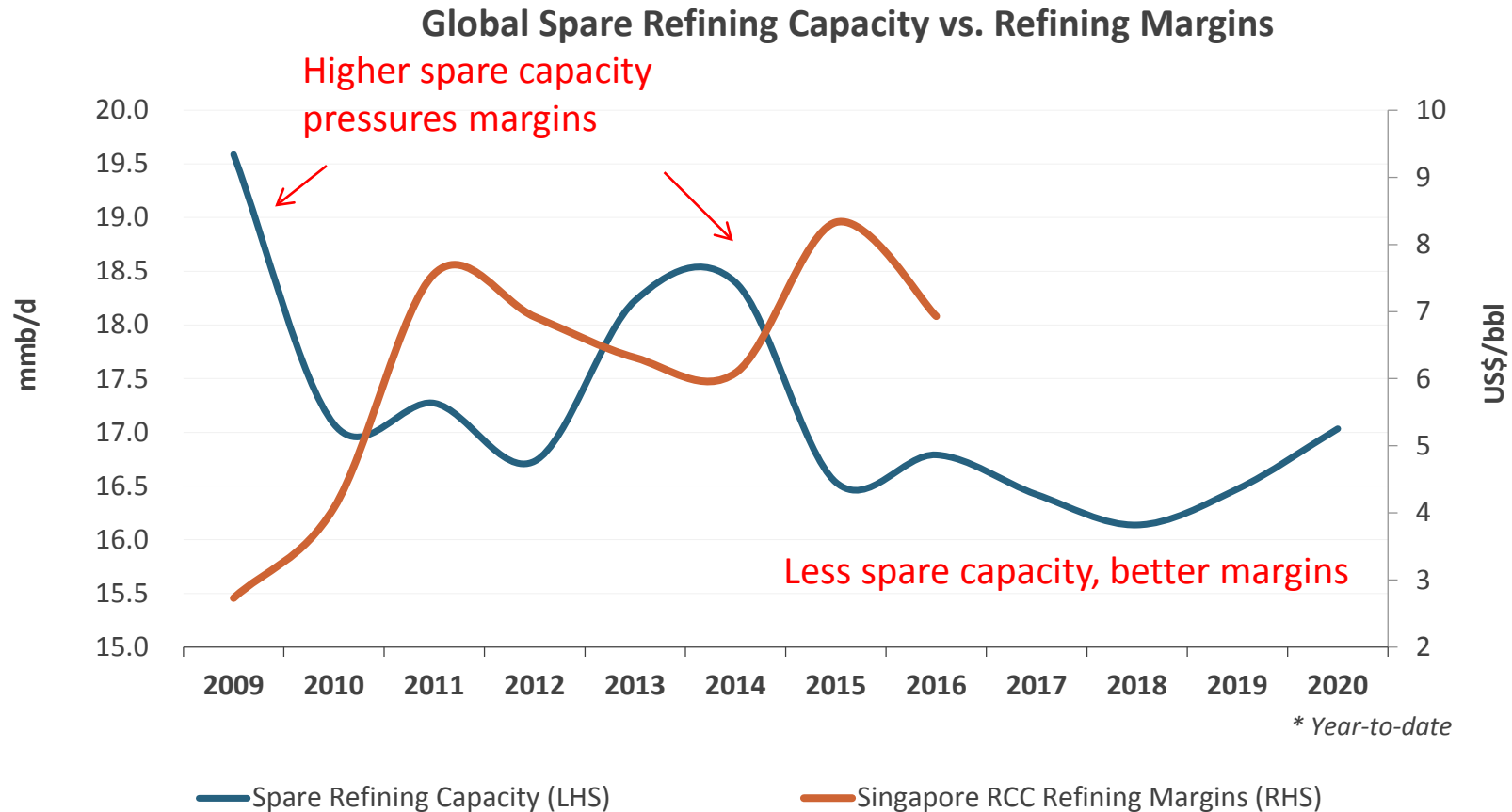


# Declining Surplus Refining Capacity Implies Tighter Market



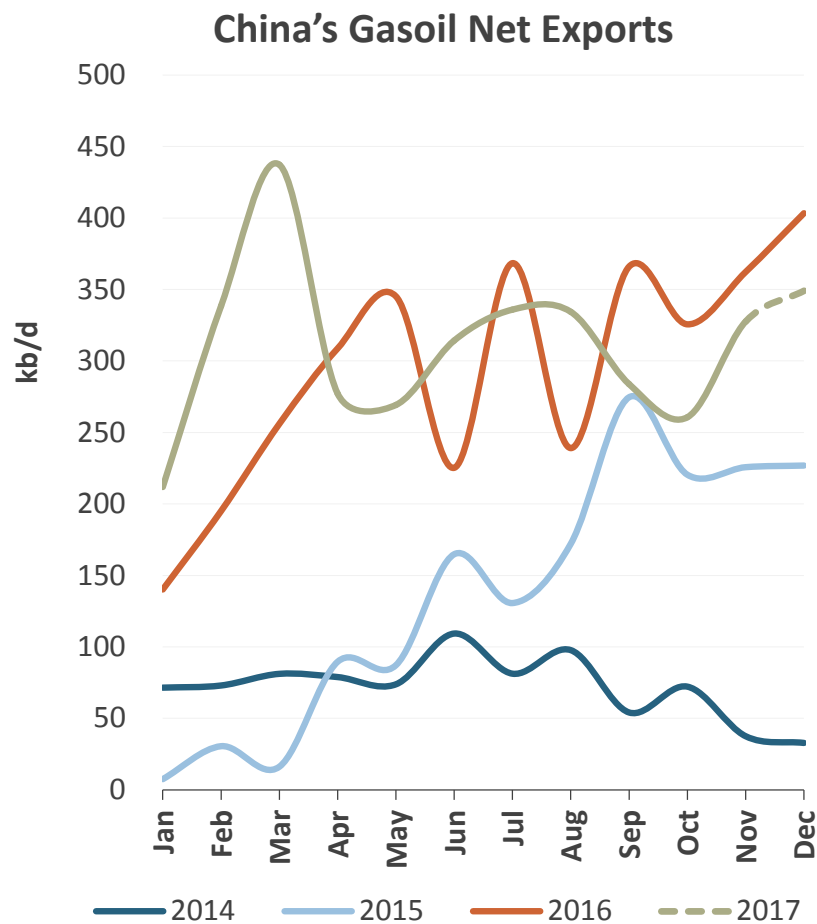
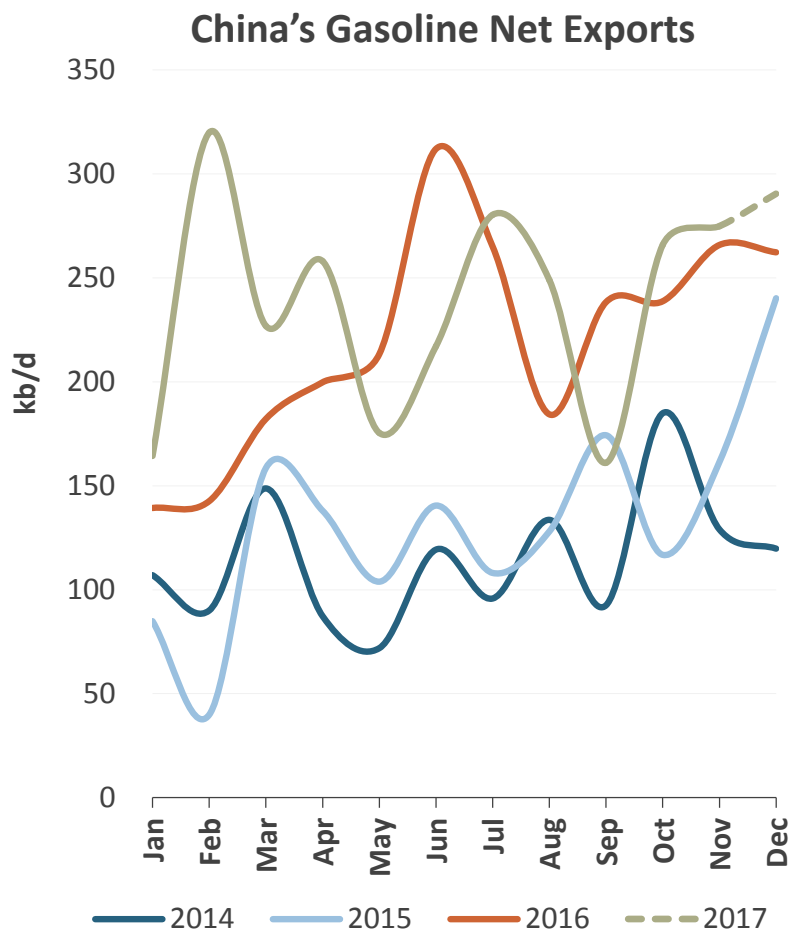
<sup>1</sup>Total Firm/Likely CDU Capacity – Total Refined Products Demand

# Global Spare Capacity Erodes...Supporting Margins



Source: [FGE Annual World Refining Outlook 2017](#)

# China's Gasoil Exports Rise, Pressuring Regional Cracks...China's Robust Gasoline Demand Growth Should Contain Exports

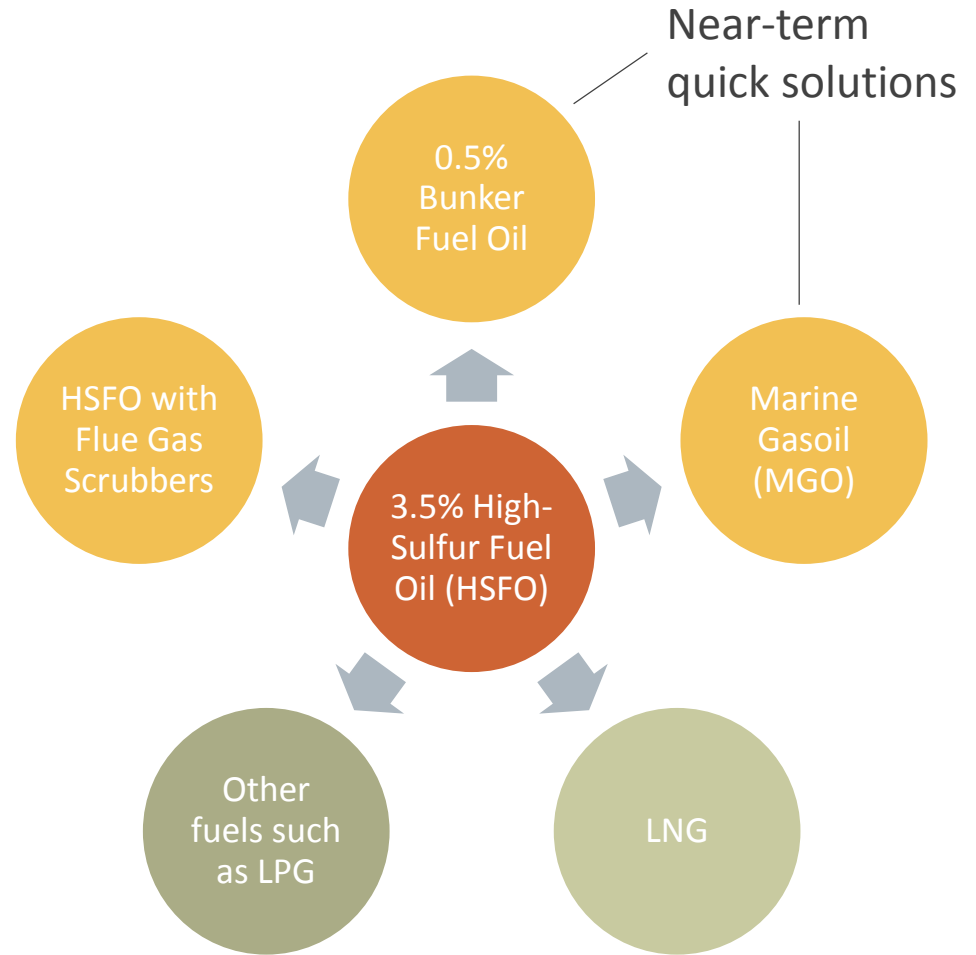
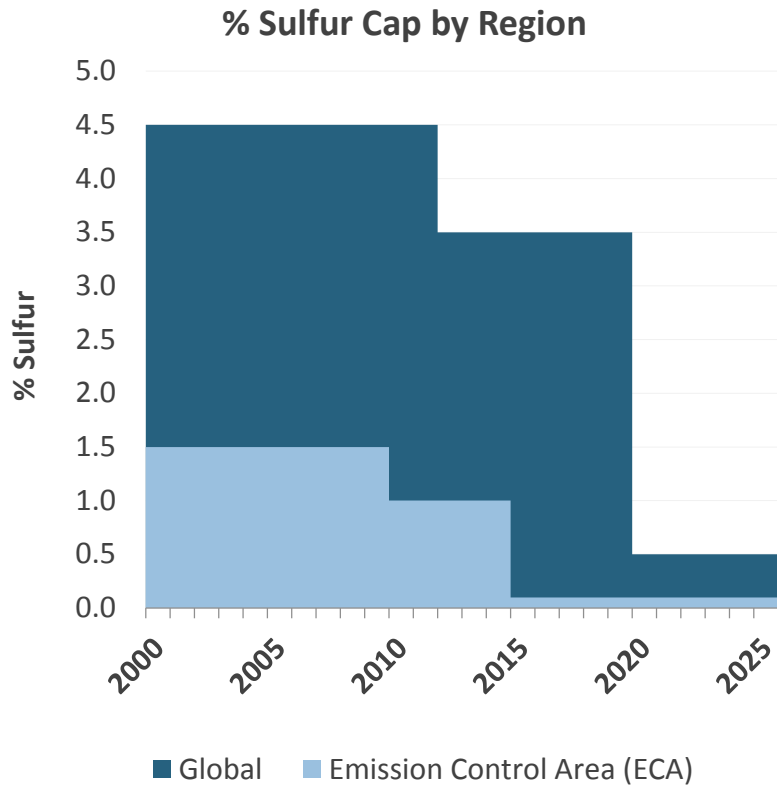


# IMO's 2020 Move to 0.5% Global Sulfur Cap Changes Everything



**Biggest single change for refiners and shippers—ever**

# Several Solutions...All Costly



# Where Will the Surplus High Sulfur Fuel Oil Go???

2.3 mmb/d HSFO displaced from bunkers in 2020



About 1.2 mmb/d absorbed in the refining system and low sulfur components will enter 0.5% bunker FO pool



Power generation, but where? Storage?

Needs to find a new home?

~2.3 mmb/d of HSFO



~1.2 mmb/d taken out at attractive price

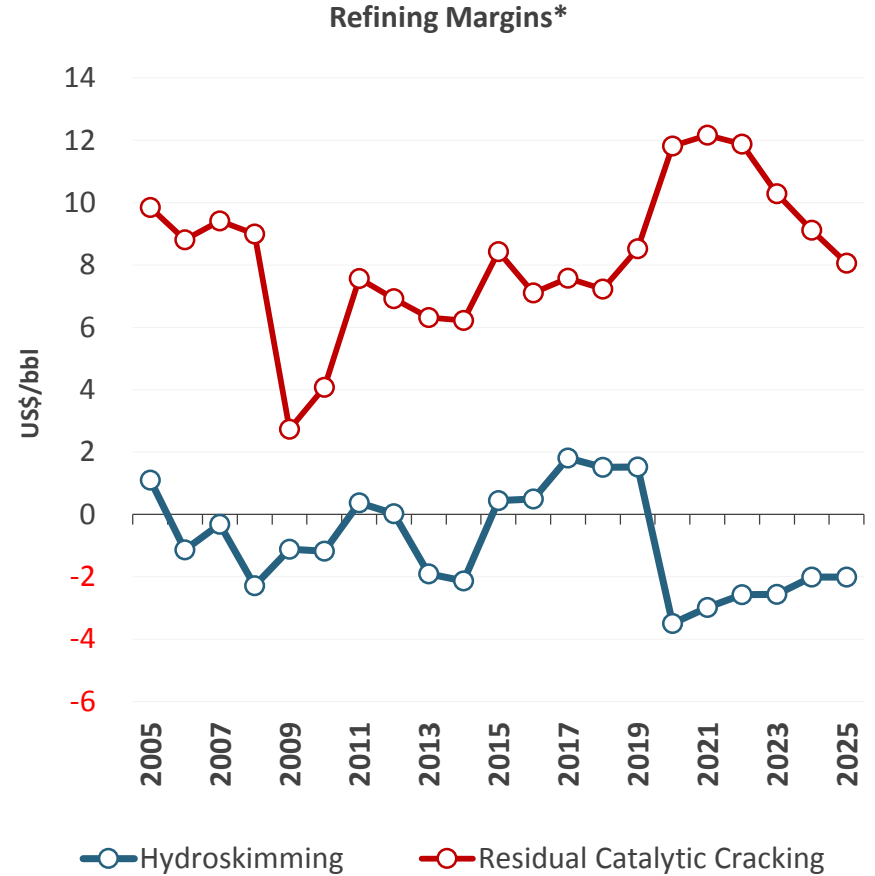
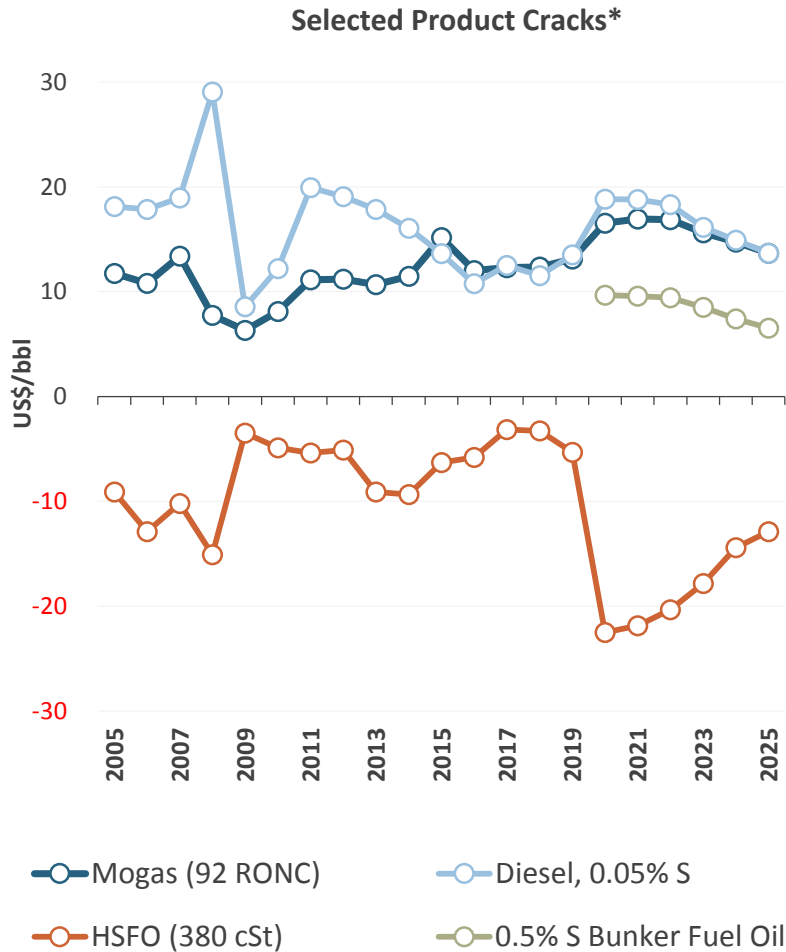


~1.1 mmb/d of HSFO

- 5% average increase in coking and SDA utilization globally
- Increased processing of heavier feedstocks through FCC and HDC
- Distillate cutter stock released from HSFO pool; less gasoil diluent
- LSFO absorbed in 0.5% BFO pool

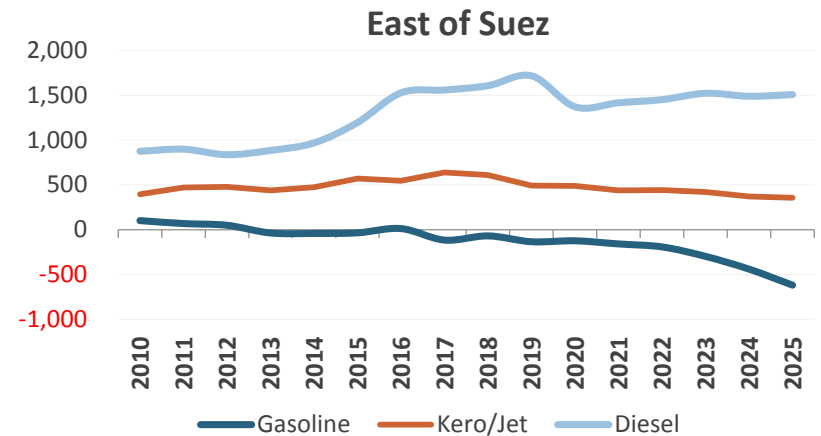
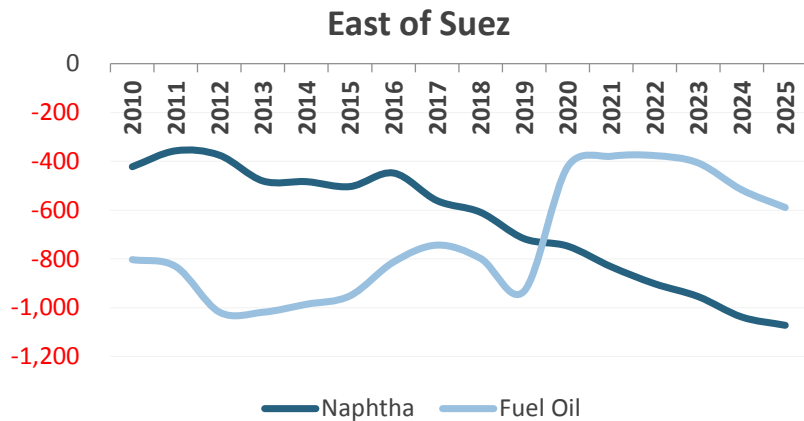
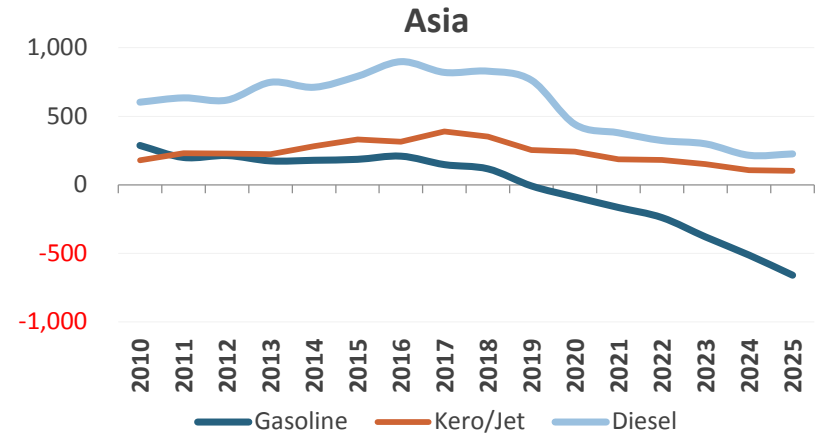
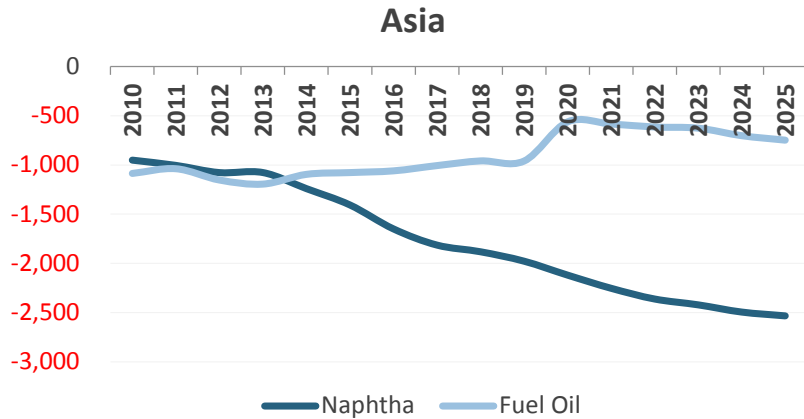
# Big IMO Impact: Singapore Product Cracks and Refining Margins

## And Sour Crudes Suffer! Brent/Dubai Widens to US\$7/bbl in 2020!



\*Versus Dubai Crude

# East of Suez Net Product Balances Expected to Continue Tightening After the Wave of Middle East Refinery Projects Starts Up



All in kb/d.





# Thank You

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