



TEXAS OIL & GAS ASSOCIATION

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# Challenges in Refining Valuation

**Outlook & Trends**

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# Key Refining Industry Considerations



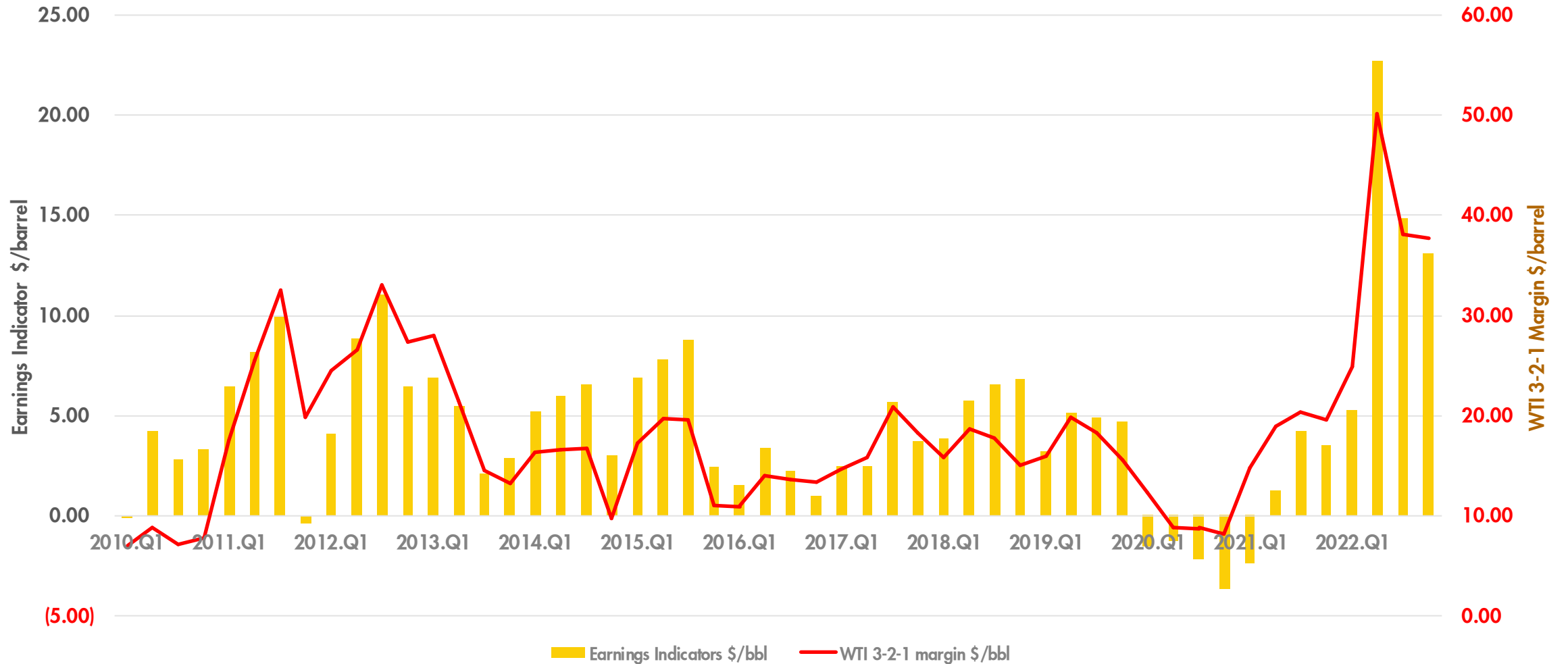
## Refining market drivers in 2022

We experienced an incredible year due to stacked 'black swan' events

- Ukraine war impact on global supply & demand
- Economic recovery from forced lockdowns by governments
- Record inflation, Federal Reserve moves, fear of global recession
- Continued assault on refining & consumer end markets by government to reduce emissions, eliminate IC engines, mandate EV.

Earnings reflected forced disruption in markets that won't last

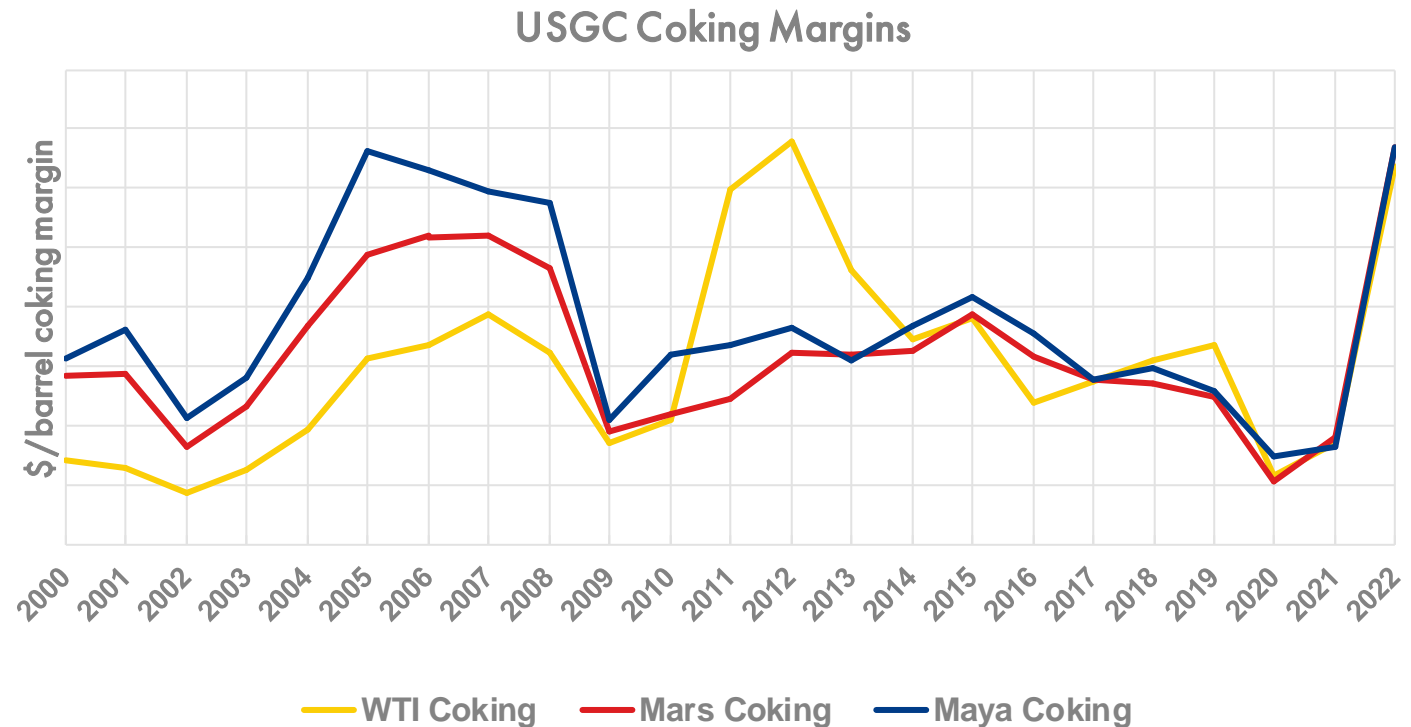
# Preliminary 2022 Refining Earnings Indicators



# 2022 is not the first margin spike we've seen

- Other past margin spikes:
  - Heavy sour refinery margins during the 'Golden Age' 2004-2007
  - Light sweet refinery margins during the 'Shale Oil Boom' 2011-2013

- Neither previous spike continued
  - *Nor will this one*



# Transactions & Market Indicators

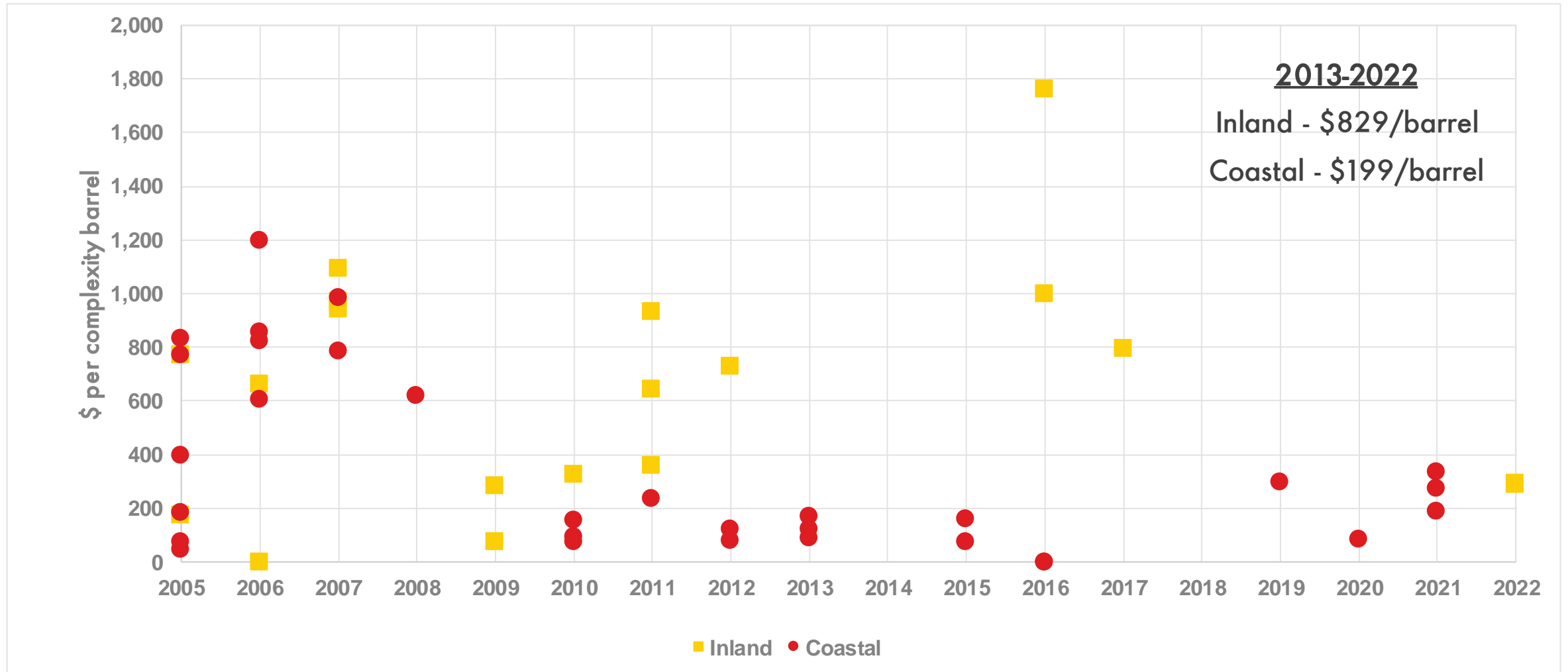
## ■ U.S. refining market still has capacity shutting down; lackluster sales

Shutdowns		
<u>Year</u>	<u>Facility</u>	<u>Capacity (BPD)</u>
2020	Shell Convent	240,000
2020	Marathon Gallup	27,000
2020	Marathon Martinez	161,000
2020	HF Sinclair Cheyenne	52,000
2021	Phillips 66 Belle Chasse	255,000
2022	Phillips 66 Rodeo/ Santa Maria	120,200
2023	LyondellBasell Houston	264,000

Sales					
<u>Year</u>	<u>Facility</u>	<u>Buyer</u>	<u>Capacity (BPD)</u>	<u>% RCN</u>	<u>\$/EDC</u>
2022	BP Toledo	Cenovus	240,000	12.8%	291
2022	ExxonMobil Billings	PAR Pacific	60,000	5.5%	295
2022	Phillips 66 Belle Chasse	Harvest Midstream	161,000	NA	

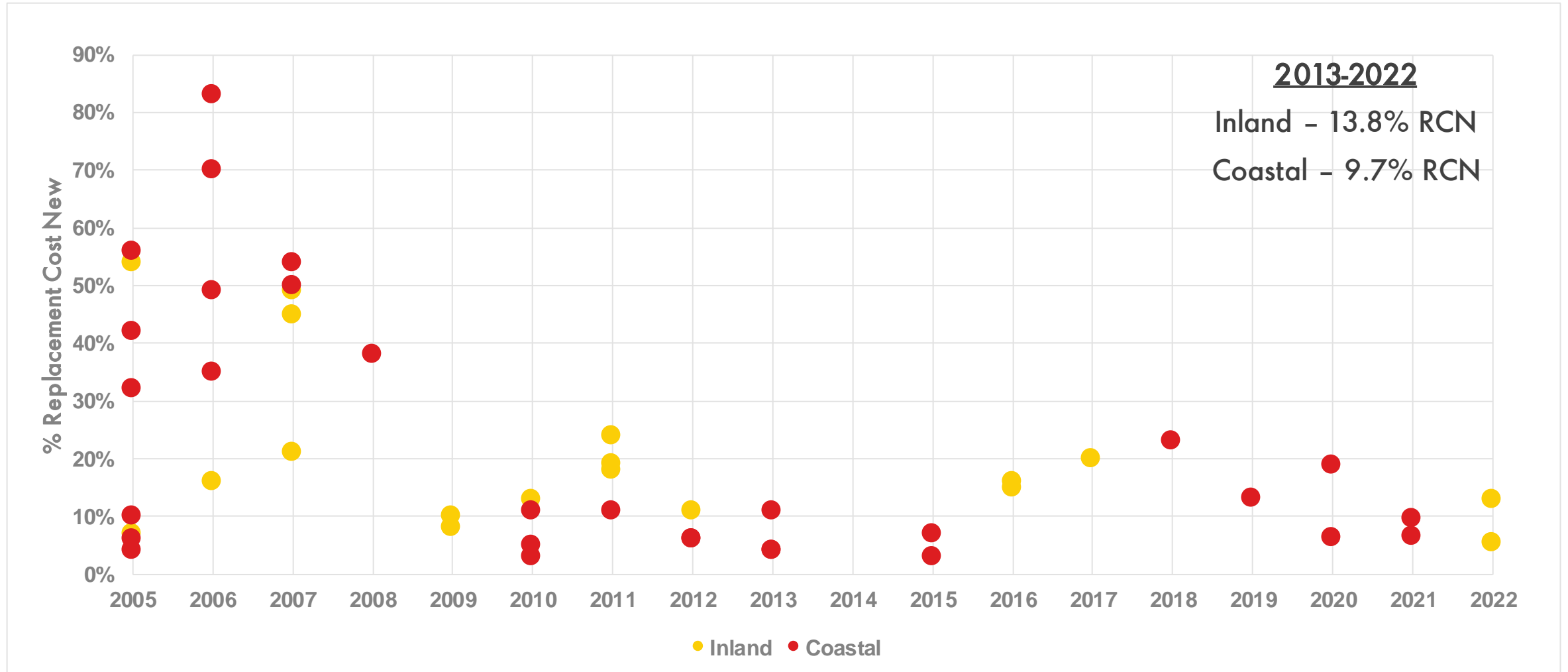
Note: Toledo, Billings are inland refinery sales in process

# Refining Sales since 2005 - \$/complexity barrel





# Refining Sales since 2005 - % Replacement Cost New (RCN)



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# What should we consider in near-term?

# Bearish natural gas futures

*“If you’re suffering from a bit of whiplash from the gas market, you’re probably not alone. How did we go from almost \$10/MMBtu gas and one of the tightest, most volatile markets in over a decade to sub-\$3/MMBtu gas and one of the most bearish scenarios we’ve seen in a long time – all in the span of just over six months?”*

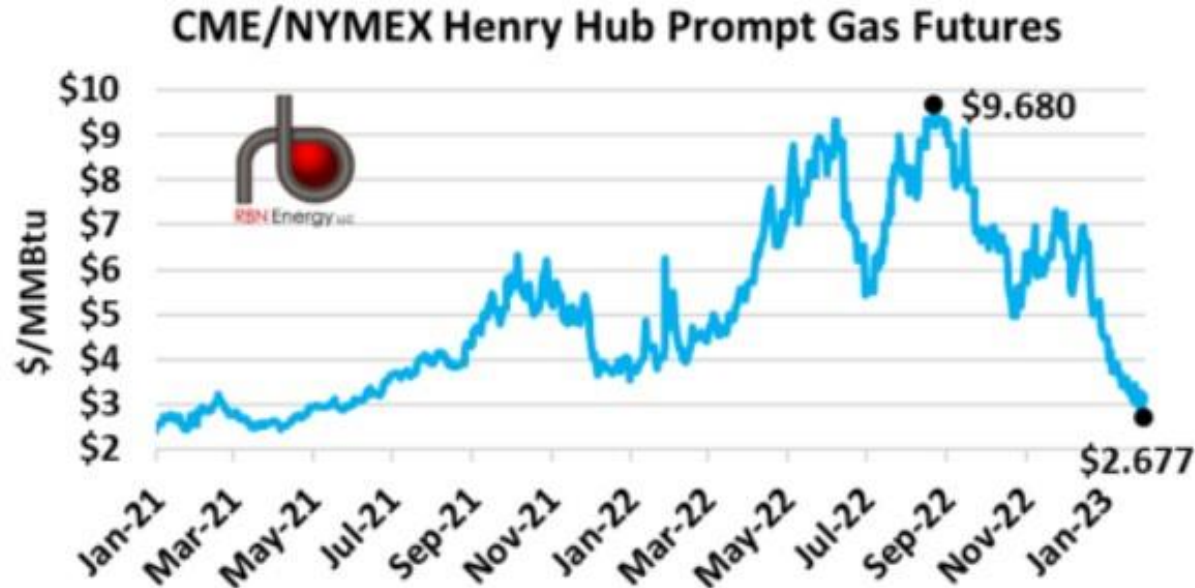
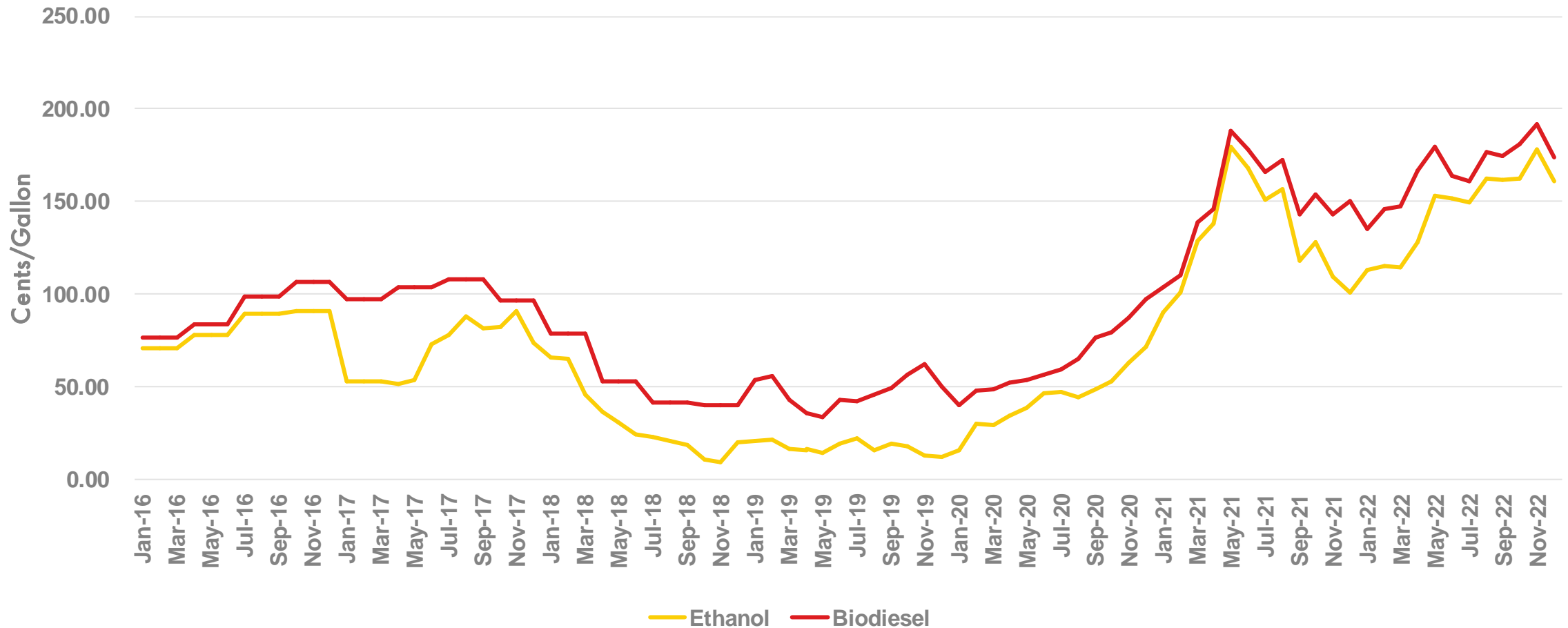


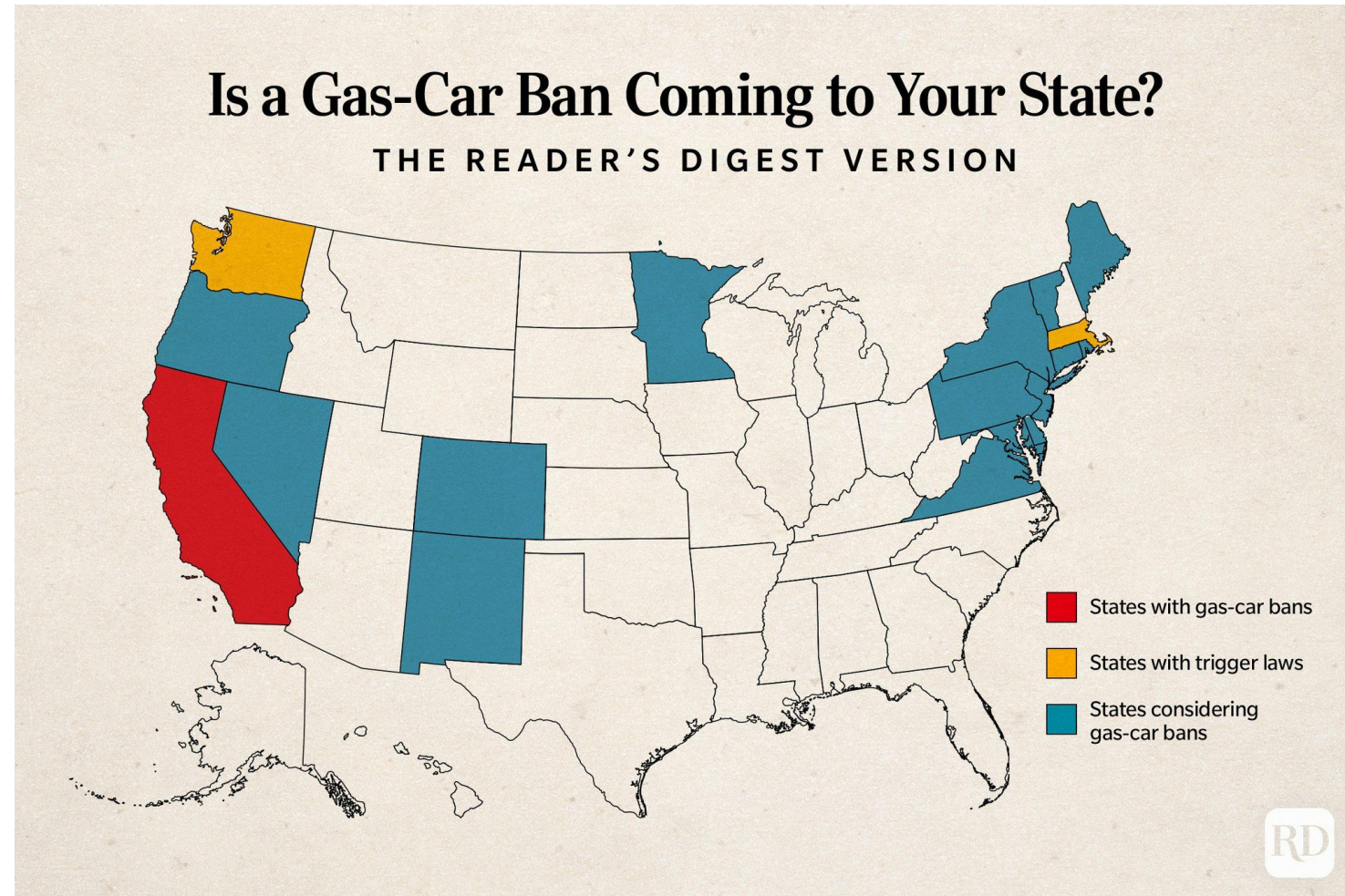
Figure 1. CME/NYMEX Henry Hub Prompt Gas Futures Price History. Source: Bloomberg

# RINs continue to be a major cost problem



## Additional Government Actions (or obstacles?)

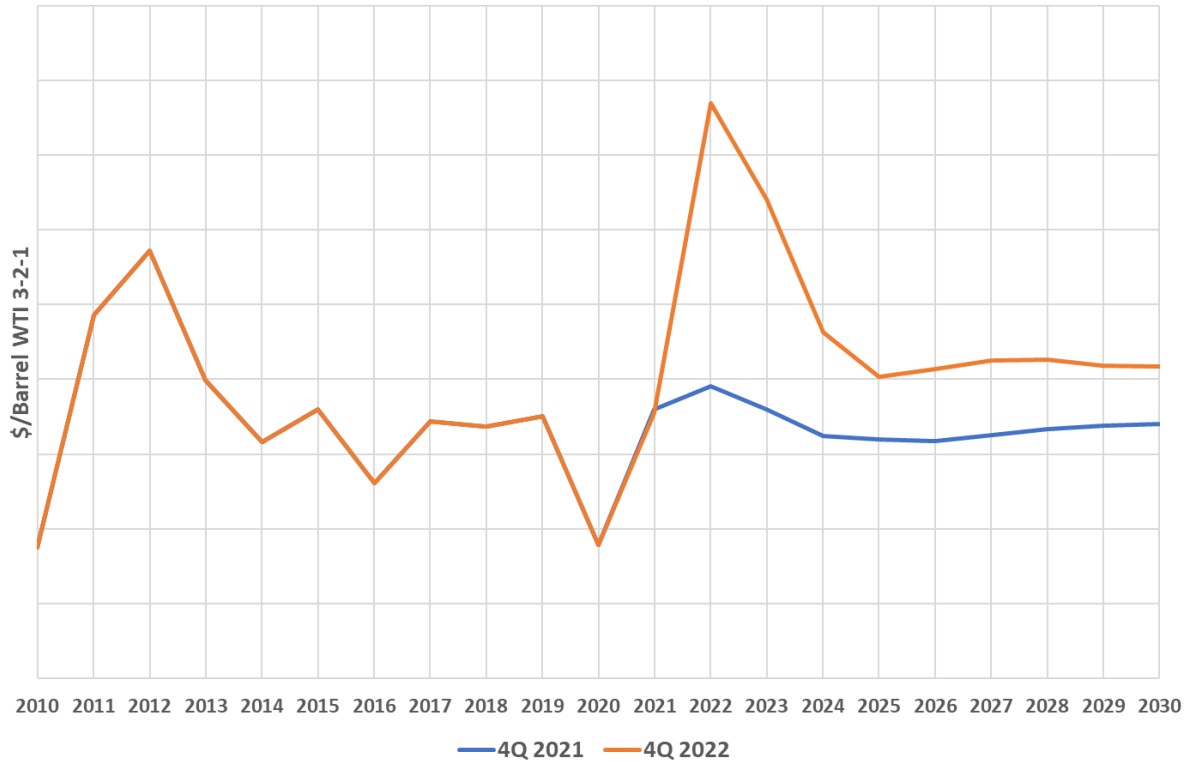
- Canceling or delaying pipeline projects (Keystone XL, Mountain Valley, PennEast, Mariner 2)
- “Inflation Reduction Act” push to EV; clean energy credits for hydrogen hubs, carbon capture
- Proposed NAAQS standard changes
- Various state bans on internal combustion engines



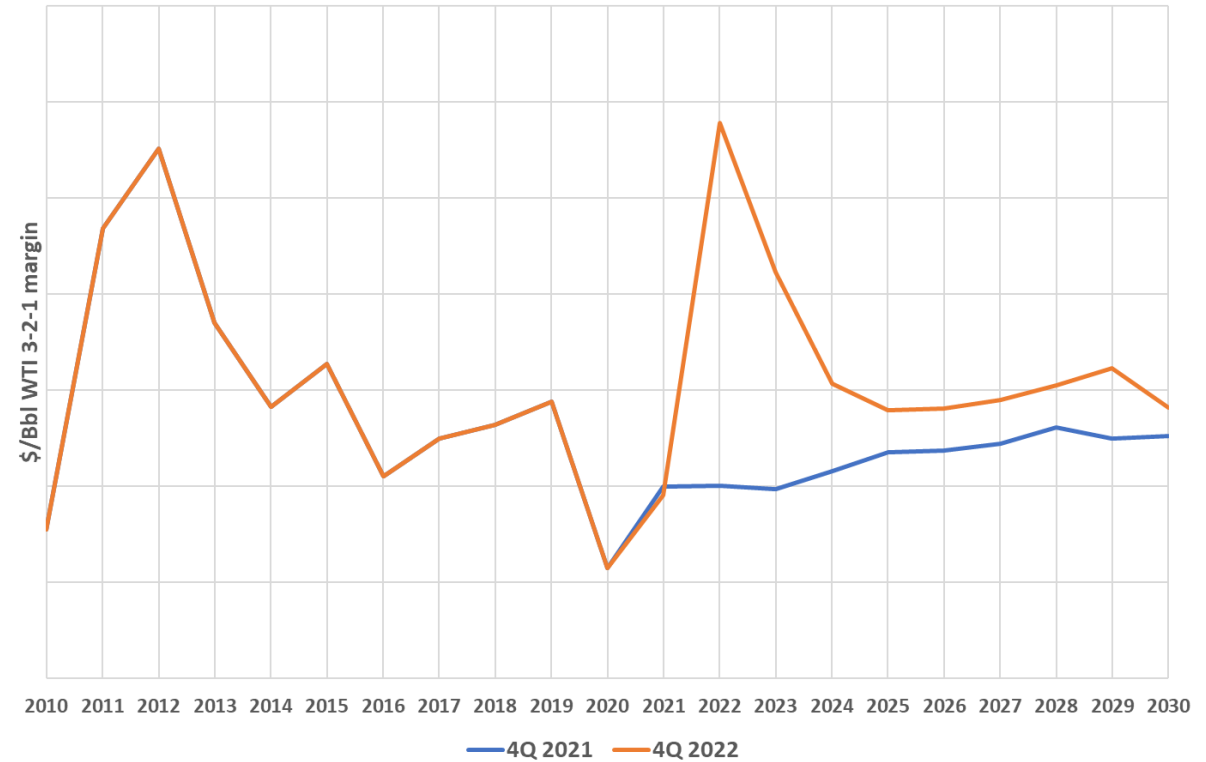
Sources: RBN Top 10 Prognostications for 2023 (1/2/23); Inflation Reduction Act; RD.com (1/5/23)

# Comparing 3<sup>rd</sup> party price forecasts 2022 vs. 2023

Comparison of 4Q21 Forecast to 4Q22 Forecast WTI 3-2-1  
Forecaster A



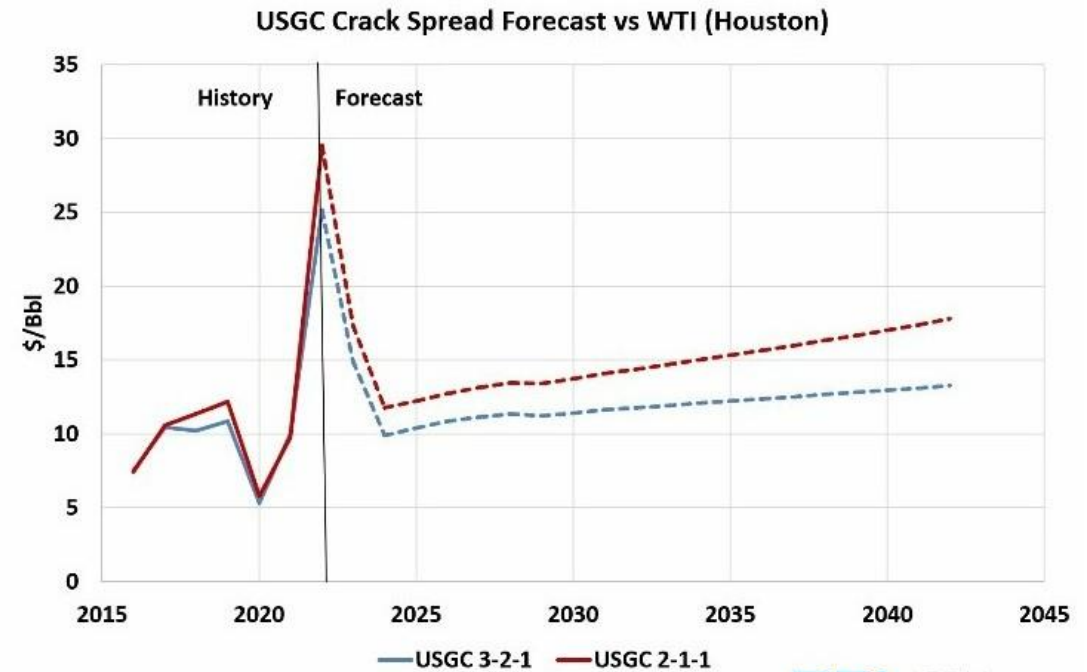
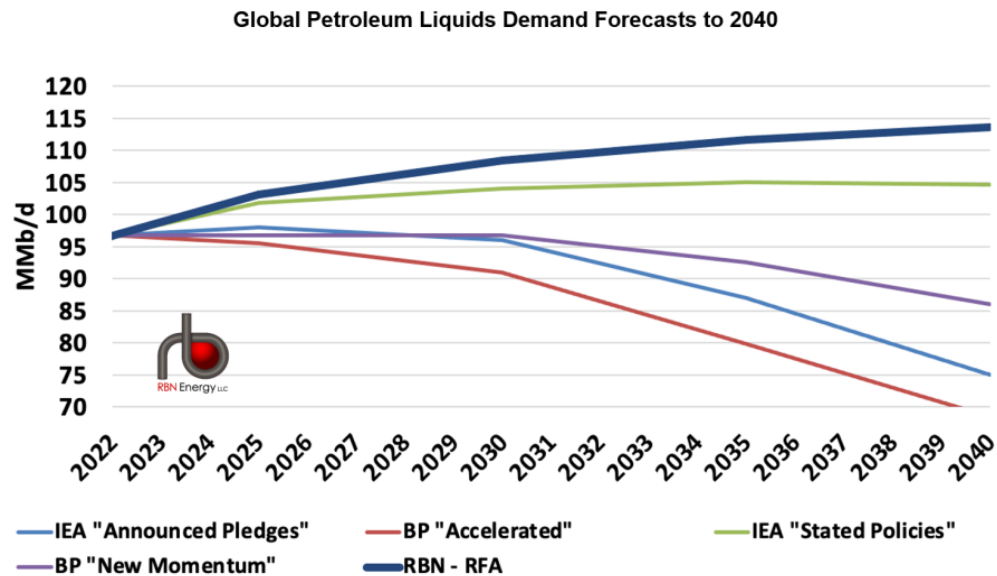
Nominal \$ WTI 3-2-1 Forecast 4Q 22 vs 4Q21  
Forecaster B





# Not everyone agrees on the industry's outlook

- Some forecasters think demand will go up, that we haven't reached peak demand
  - Although government policies skew the market, overall global supply & demand grow, flatter margin outlook



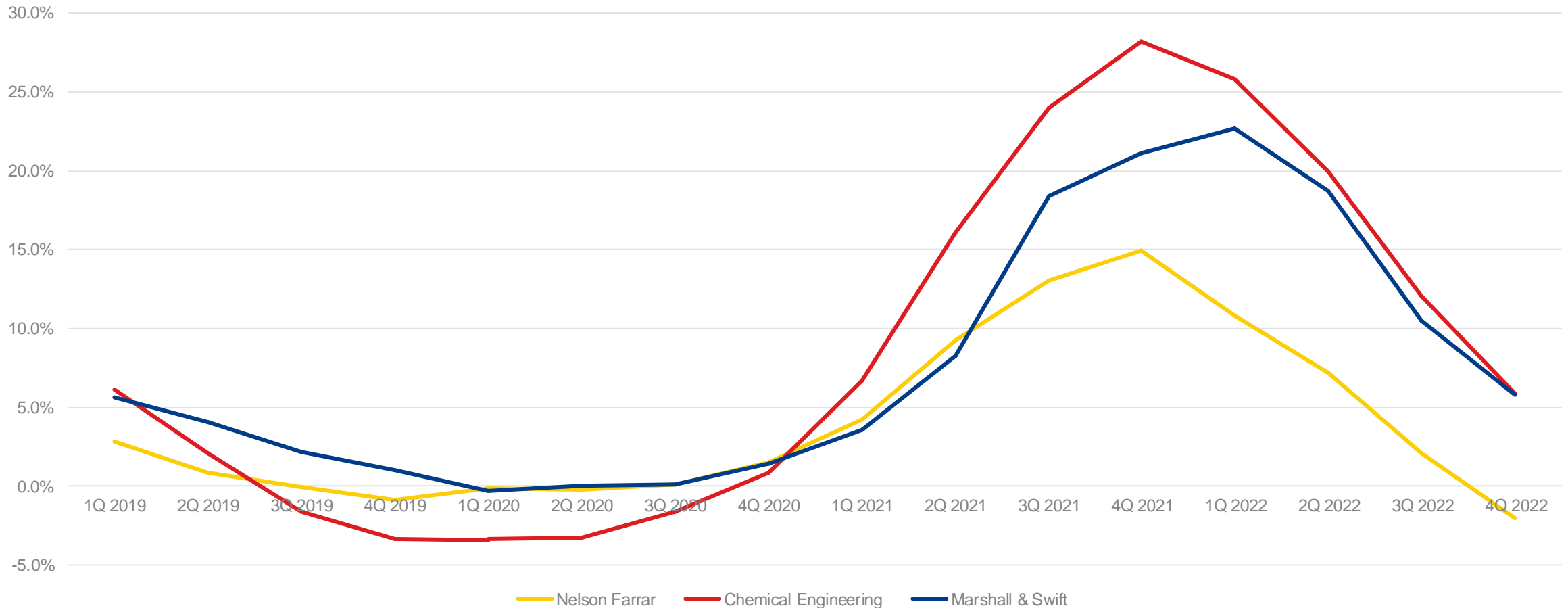
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**Better outlook? Higher risk!**

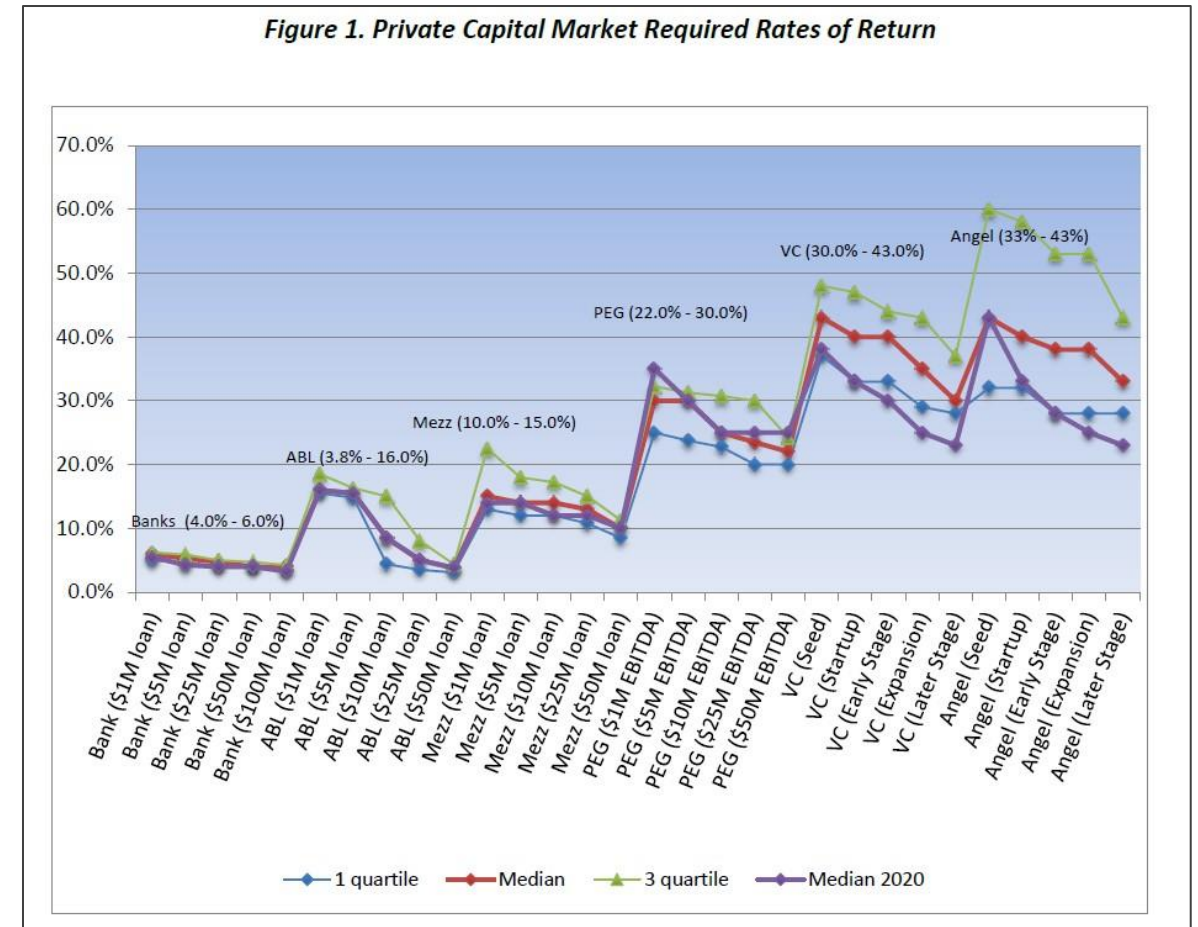


# Cost Escalation impacts

% Change escalation Q/Y over Q/Y



# Changes in discount rate inputs



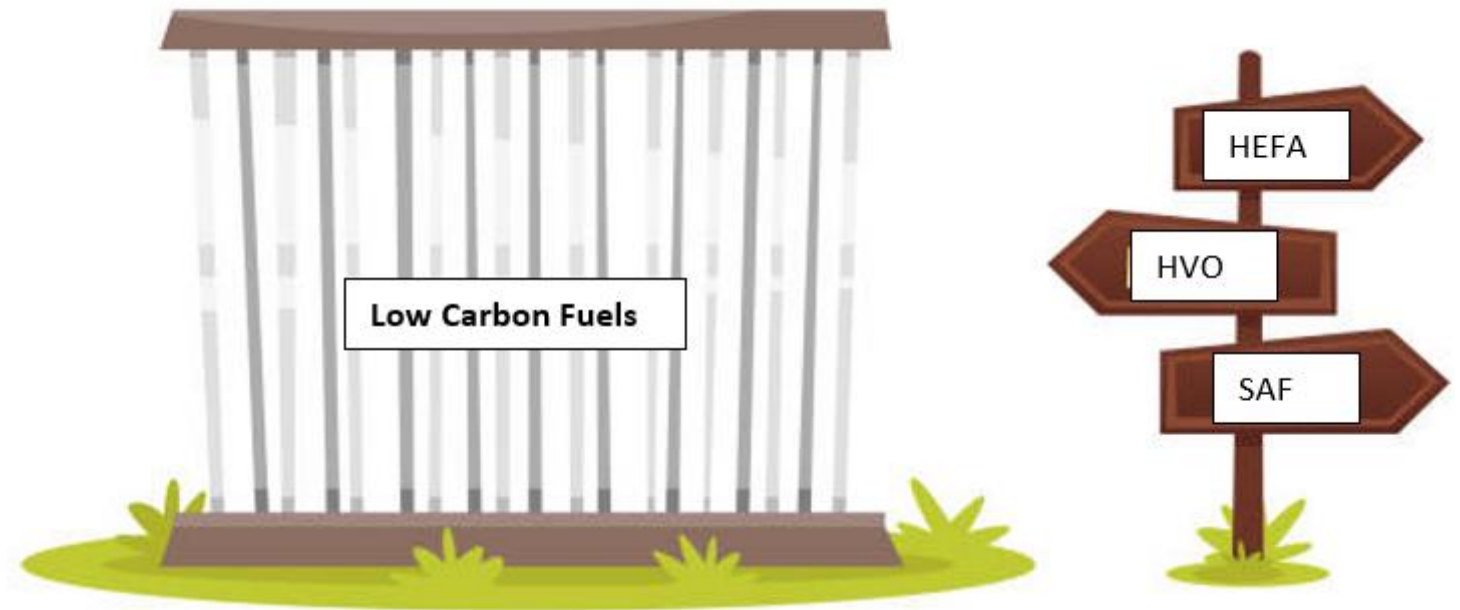
<u>Factor</u>	<u>2022</u>	<u>2023</u>	<u>Increase</u>
Damodaran Equity Risk Premia	6.01%	7.72%	1.71%
Risk Free Rate (20 year Treasury)	1.94%	4.14%	2.20%
Average Corp Bond Rate	3.27%	6.01%	2.74%

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# The Low Carbon Zoo

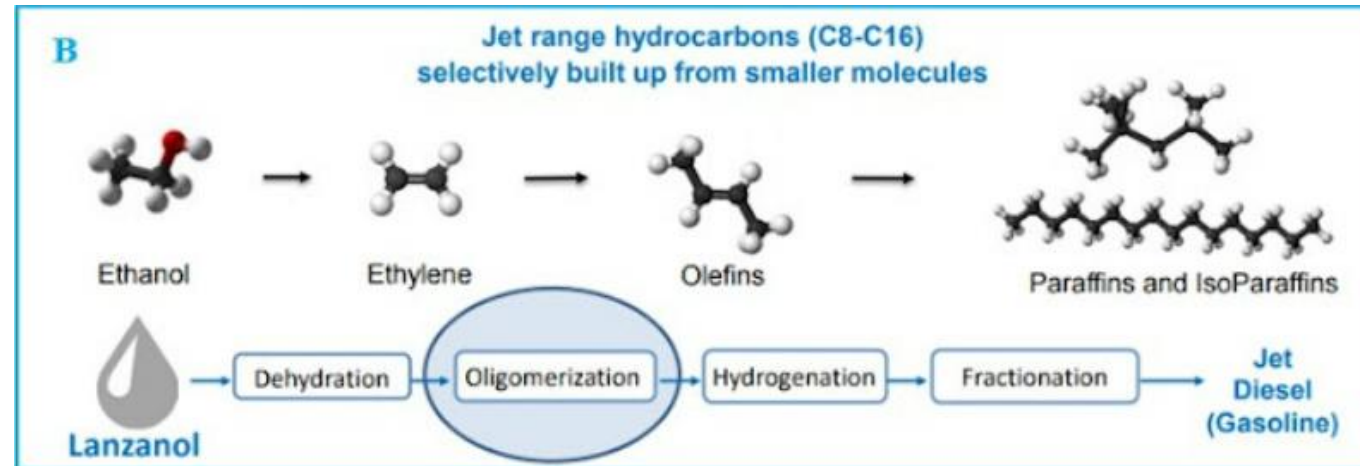
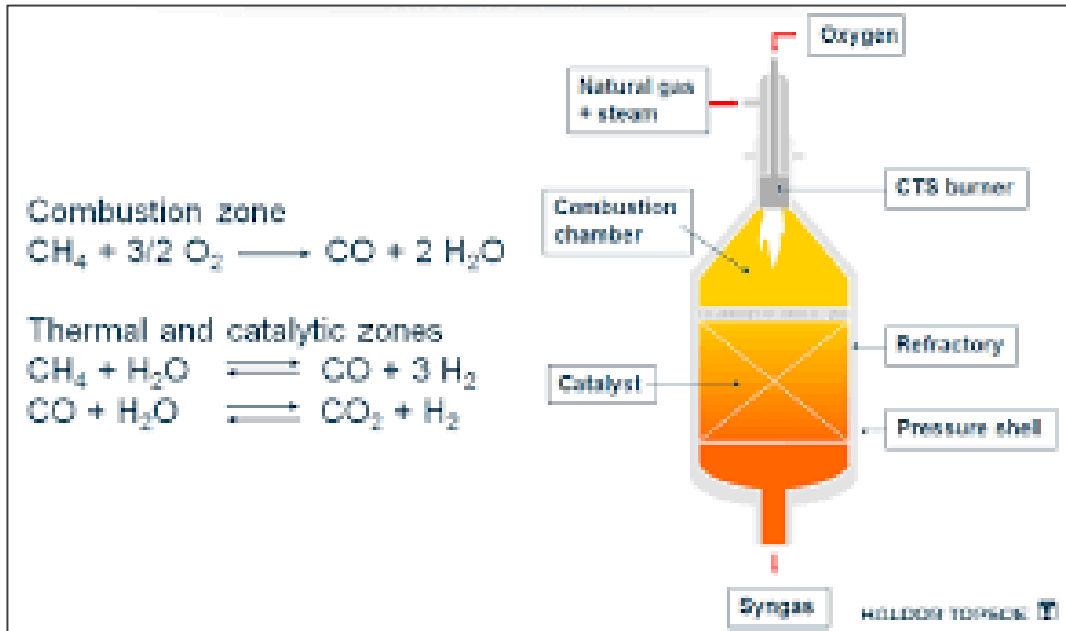
# The Low Carbon Fuels menagerie (#1)

- **HEFA** – Hydroprocessed Esters and Fatty Acids (vegetable oils, plant oils, animal processing by-products)
- **HVO** – Hydrotreated Vegetable Oils (rapeseed oil, sunflower oil, soybean oil, corn oil, palm oil, waste cooking oil, animal fats)
- **SAF** – Sustainable Aviation Fuel



# The Low Carbon Fuels menagerie (#2)

- FT – Fischer-Tropsch (CO, H<sub>2</sub> syngas) – Partial Oxidation (POX), Gasification, Flexicoking™
- ETJ – Ethanol to Jet
- Co-Pro – Co-processing bio feeds into existing refinery units (FCCU, ULSD Hydrotreater)



# What color is my hydrogen?

<p><b>GREEN</b></p> <p>Hydrogen produced by electrolysis of water, using electricity from renewable sources like hydropower, wind, and solar. Zero carbon emissions are produced.</p>	<p><b>TURQUOISE</b></p> <p>Hydrogen produced by the thermal splitting of methane (methane pyrolysis). Instead of CO<sub>2</sub>, solid carbon is produced.</p>	<p><b>PINK/PURPLE/RED</b></p> <p>Hydrogen produced by electrolysis using nuclear power.</p>
<p><b>BLACK/GRAY</b></p> <p>Hydrogen extracted from natural gas using steam-methane reforming.</p>	<p><b>YELLOW</b></p> <p>Hydrogen produced by electrolysis using grid electricity.</p>	<p><b>BLUE</b></p> <p>Grey or brown hydrogen with its CO<sub>2</sub> sequestered or repurposed.</p>
<p><b>WHITE</b></p> <p>Hydrogen produced as a byproduct of industrial processes.</p>		<p><b>BROWN</b></p> <p>Hydrogen extracted from fossil fuels, usually coal, using gasification.</p>

# Clean Energy Credits

- **Extended and modified credits**
  - Section 45 Clean Energy Production Tax Credit (PTC)
  - Section 48 Clean Energy Investment Tax Credit (ITC)
  - **Section 45Q Carbon Sequestration Credit**
  - Section 30C Alternative Fuel Vehicle Refueling Property Credit
- **New credit opportunities**
  - Section 48E Clean Electricity ITC
  - Section 45Y Clean Electricity PTC
  - **Section 45V Clean Hydrogen PTC**
  - Section 45X Advanced Manufacturing PTC
- *Remember there's math and then there's government math<sup>1</sup>*

## Recap on Refining

- 2022 was unusual year for U.S. refining
  - Longer-term, refiners could face loss of major markets within 15 years
  - Buy/Sell market for traditional US refining assets seems limited
  - New investment (outside of refinery) in is renewables, low carbon fuels, net zero emission projects
  - Rest of the world is still investing in traditional refining
- *... We're going to need oil for at least another decade"*
  - *"And beyond that. We're going to need it."*

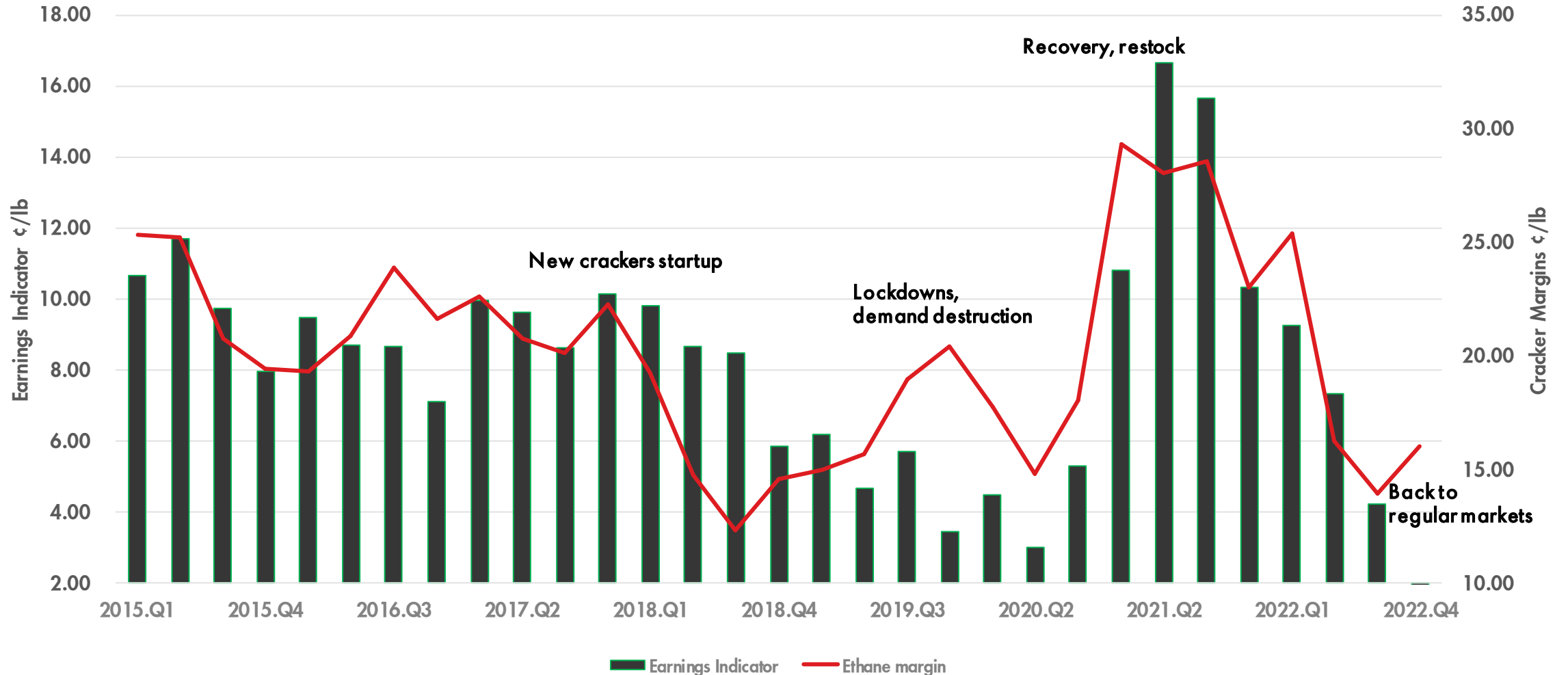


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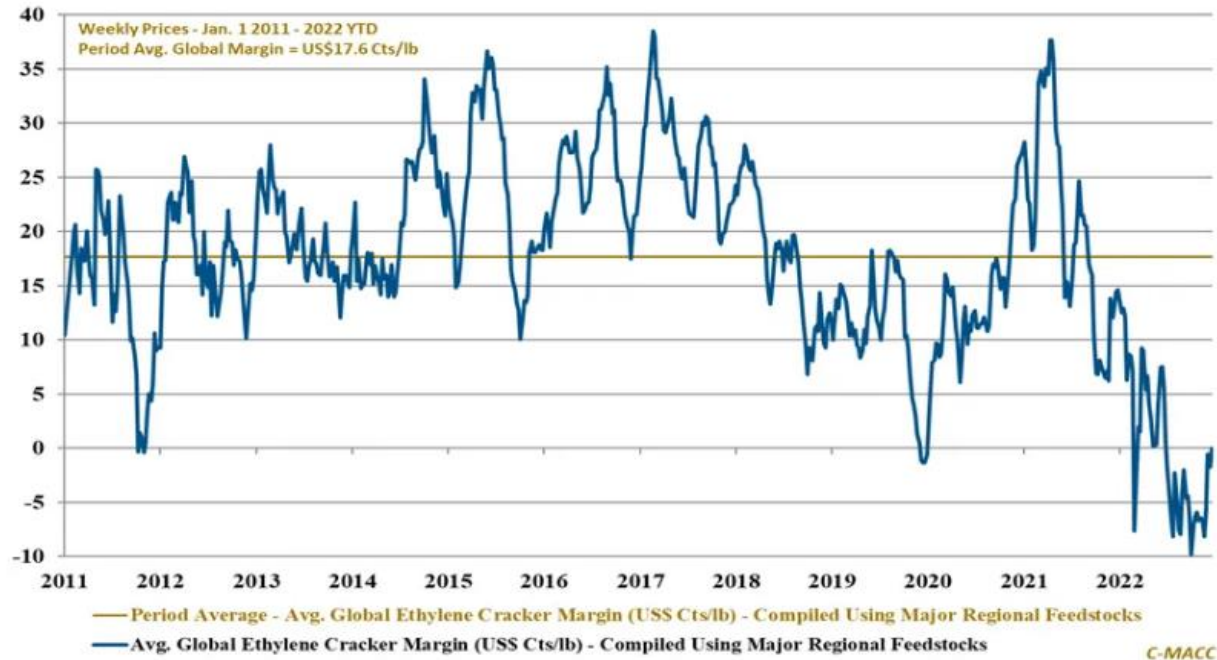
# Key Petrochemical Industry Considerations



# Petchems peaked early 2021, downward slide ever since



# Ethylene, chemicals outlooks



2023 – In The Frying Pan – But Heading Into The Fire, Maybe!

by C-MACC Research | Jan 2, 2023 | Sunday Thematic & Weekly Recap

## OUTLOOK '23: Global downturn will drag US chem exports

By Al Greenwood

03-Jan-23 12:00

# Value drop continues down the product chain

- Approximately 60% of North American PE has breakeven or negative integrated margins for 2023

## | Viewpoint: US 2023 PE prices under pressure

**Published date: 22 December 2022** With more than 2.675mn t/yr of new North American polyethylene (PE) capacity set to ramp up in the first half of 2023, US PE prices could come under further pressure as producers struggle to export the additional resin.

Share:





## Recap on Petrochemical Industry

- Petrochemical facing toughest market in decades
- Working down new capacity additions (global)
- Higher feedstock costs due to natural gas supply & demand balance
- Margins/earnings continue to drop toward breakeven or worse

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# Questions and Answers

Q&A