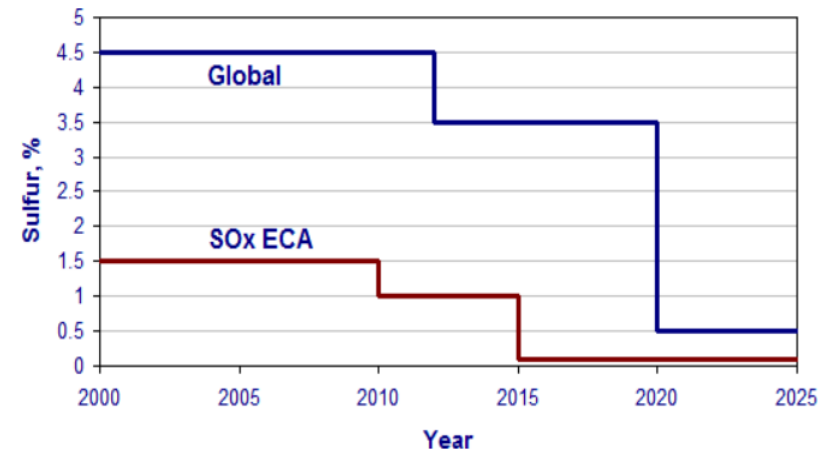


2019/20 – An oil product drama



SEB Commodities Research

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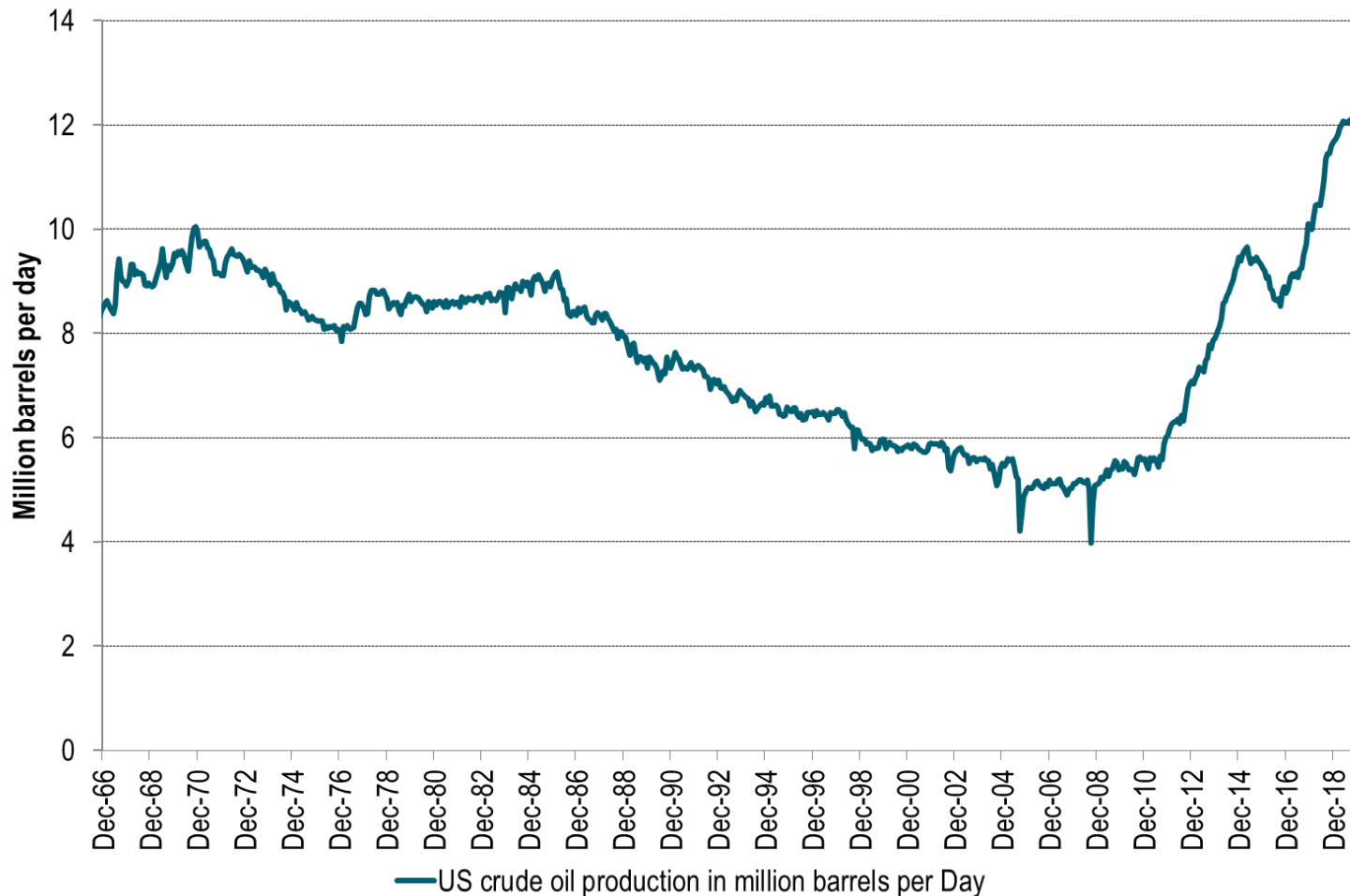
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Historical view of US crude production

An incredible production increase

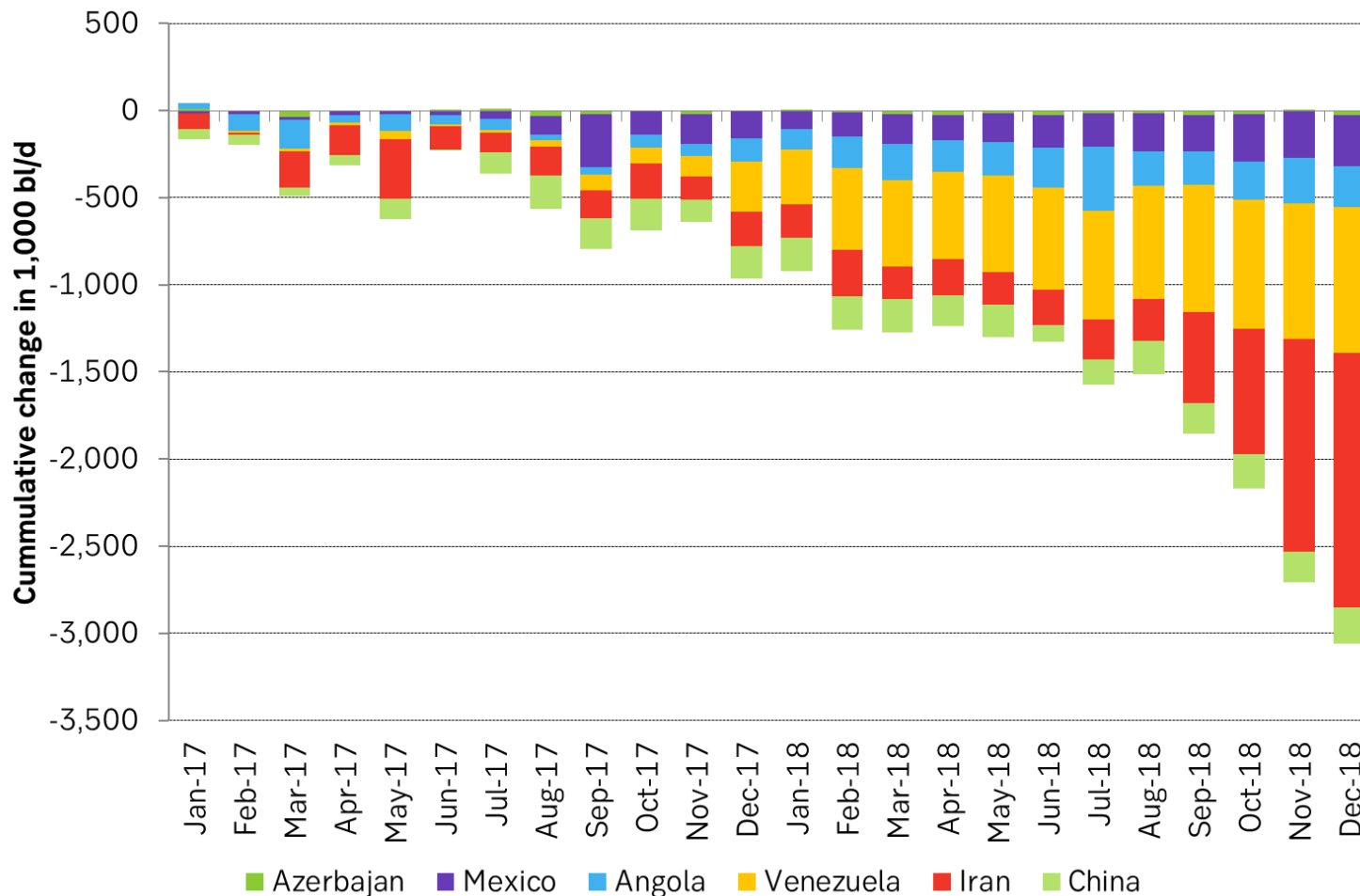
US crude oil production in m bl/d. NGL, bio and refinery gains not included



Large loss of supply in many places

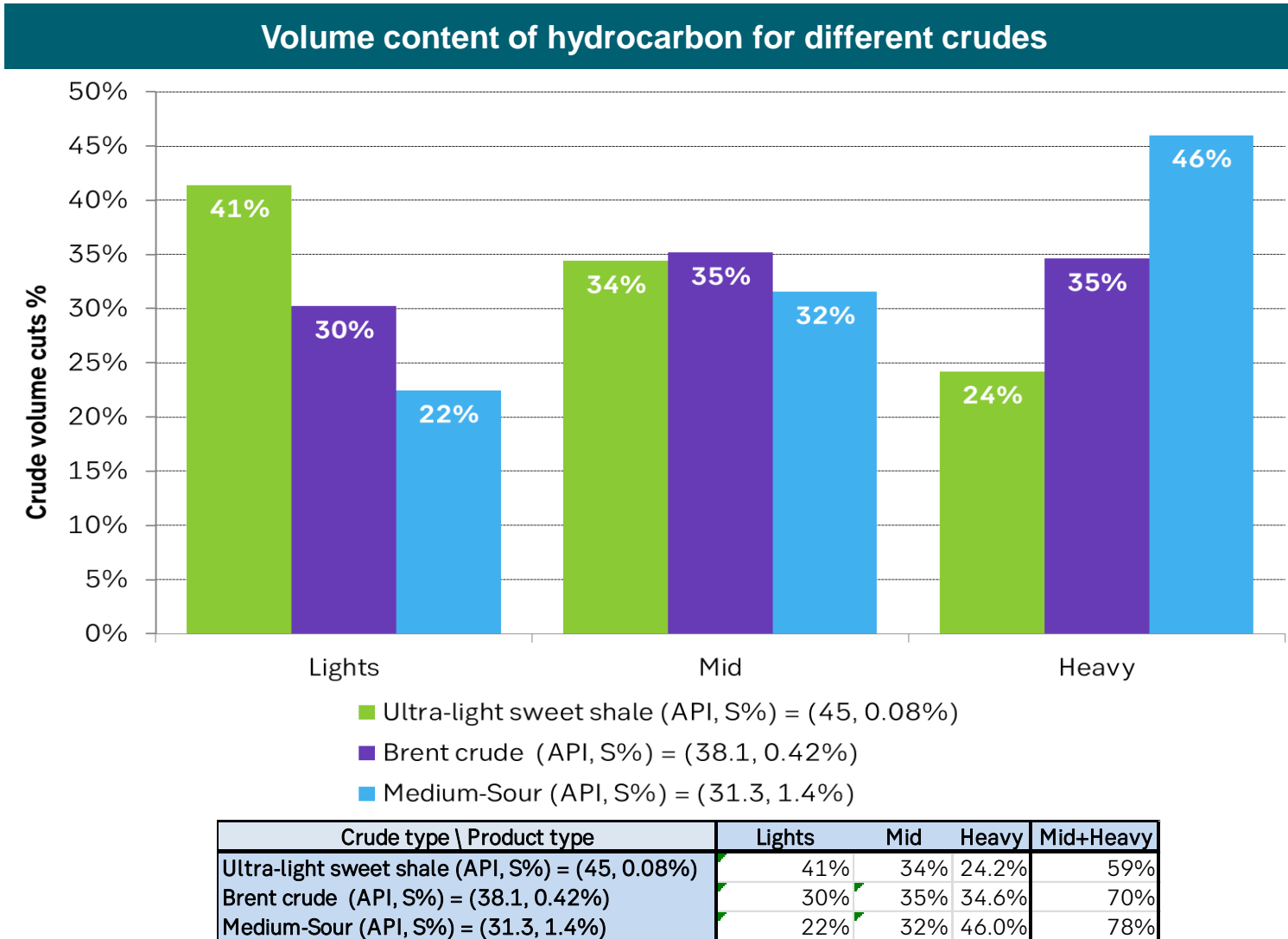
More than two million barrels of supply has been lost in different places

Cumulative loss of supply in selected countries since end of 2016 in 1,000 bl/d



Medium sour crude vs. Shale oil

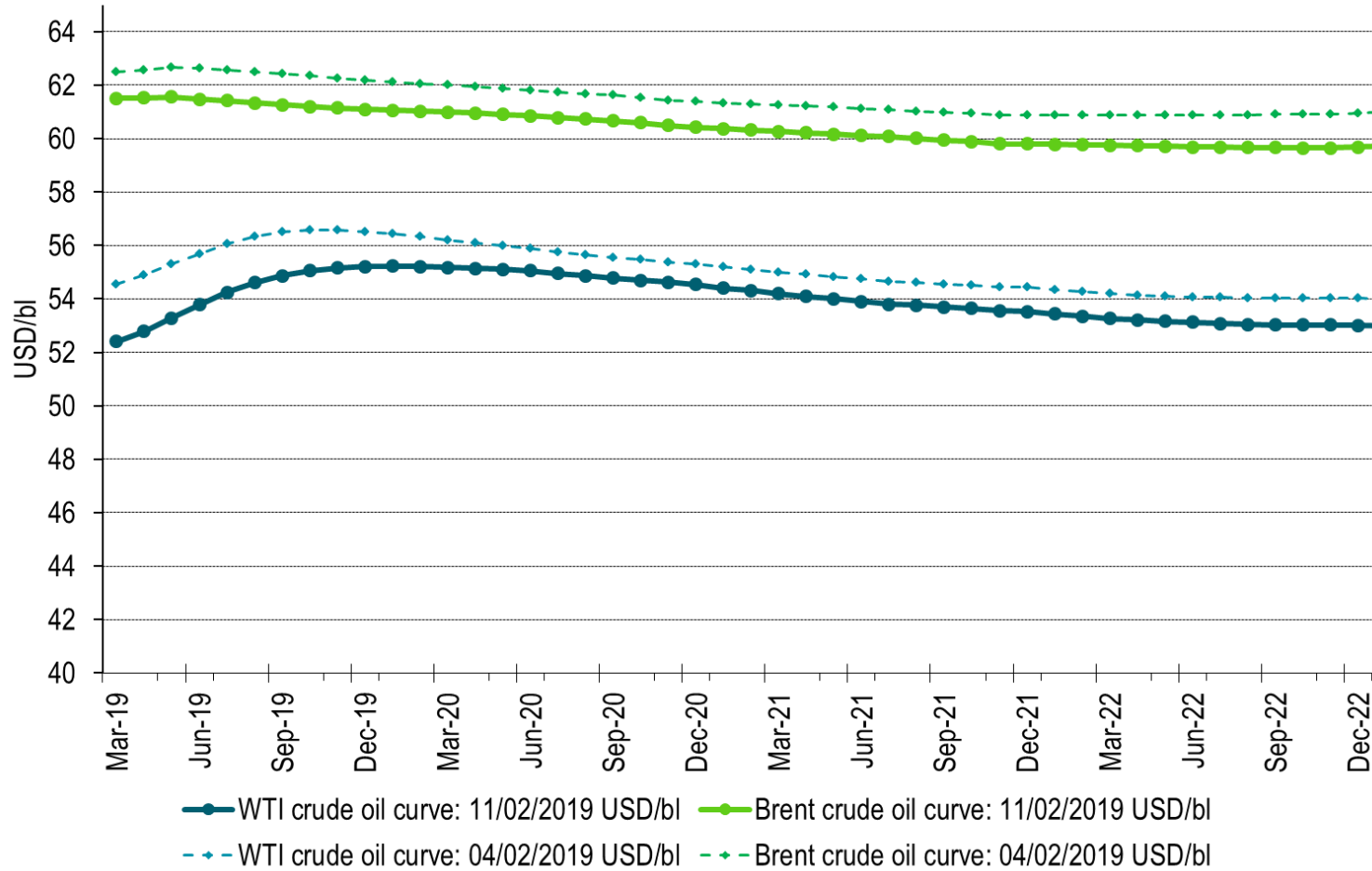
Medium sour crude has much more mid to heavy molecules



Crude curves now and one year ago

Longer term price anchor more or less unchanged around \$60/bl

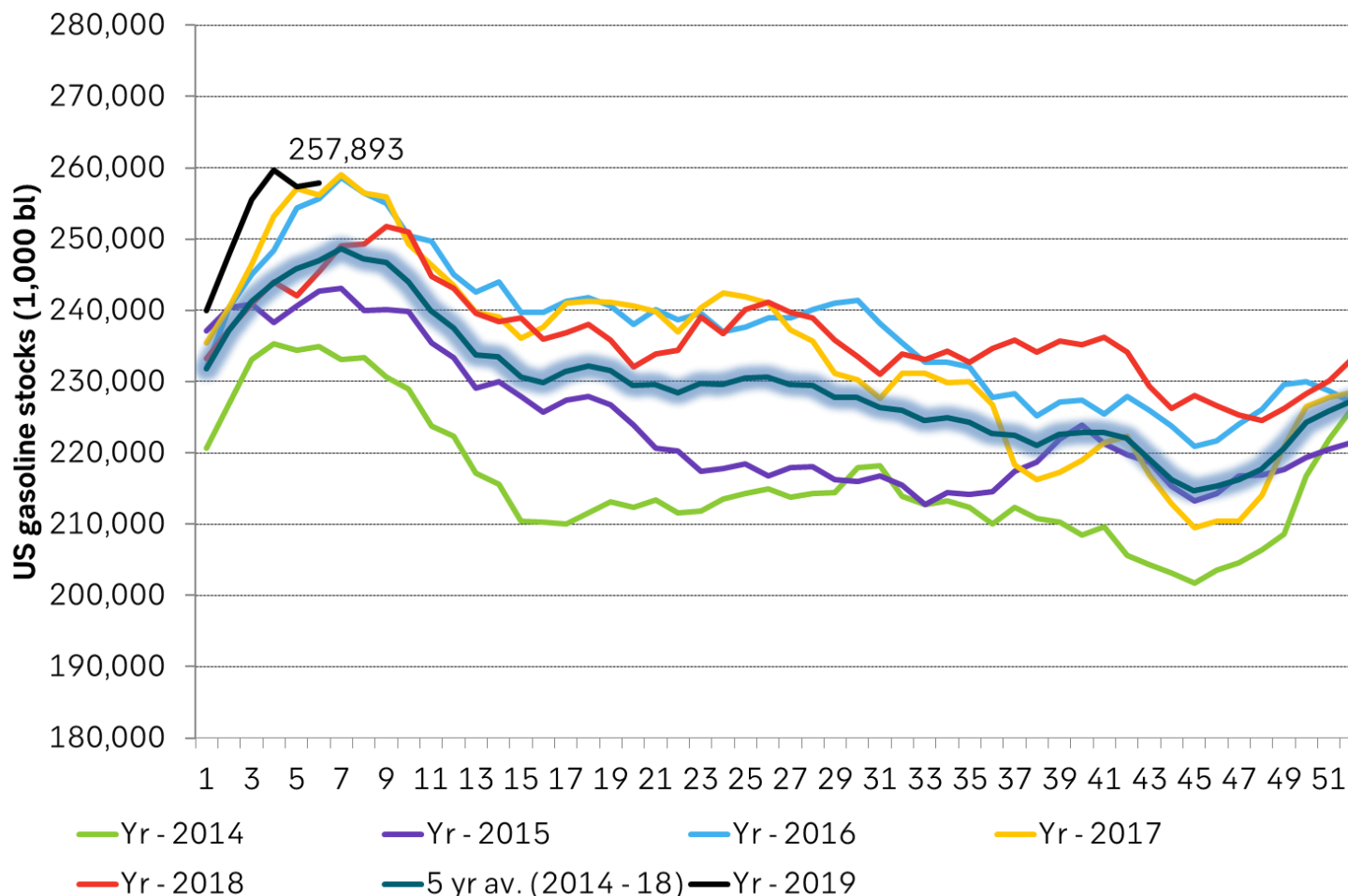
Forward crude curves end of 2017 vs. end of 2018



US gasoline stocks at record high

But the “normal” is high as well

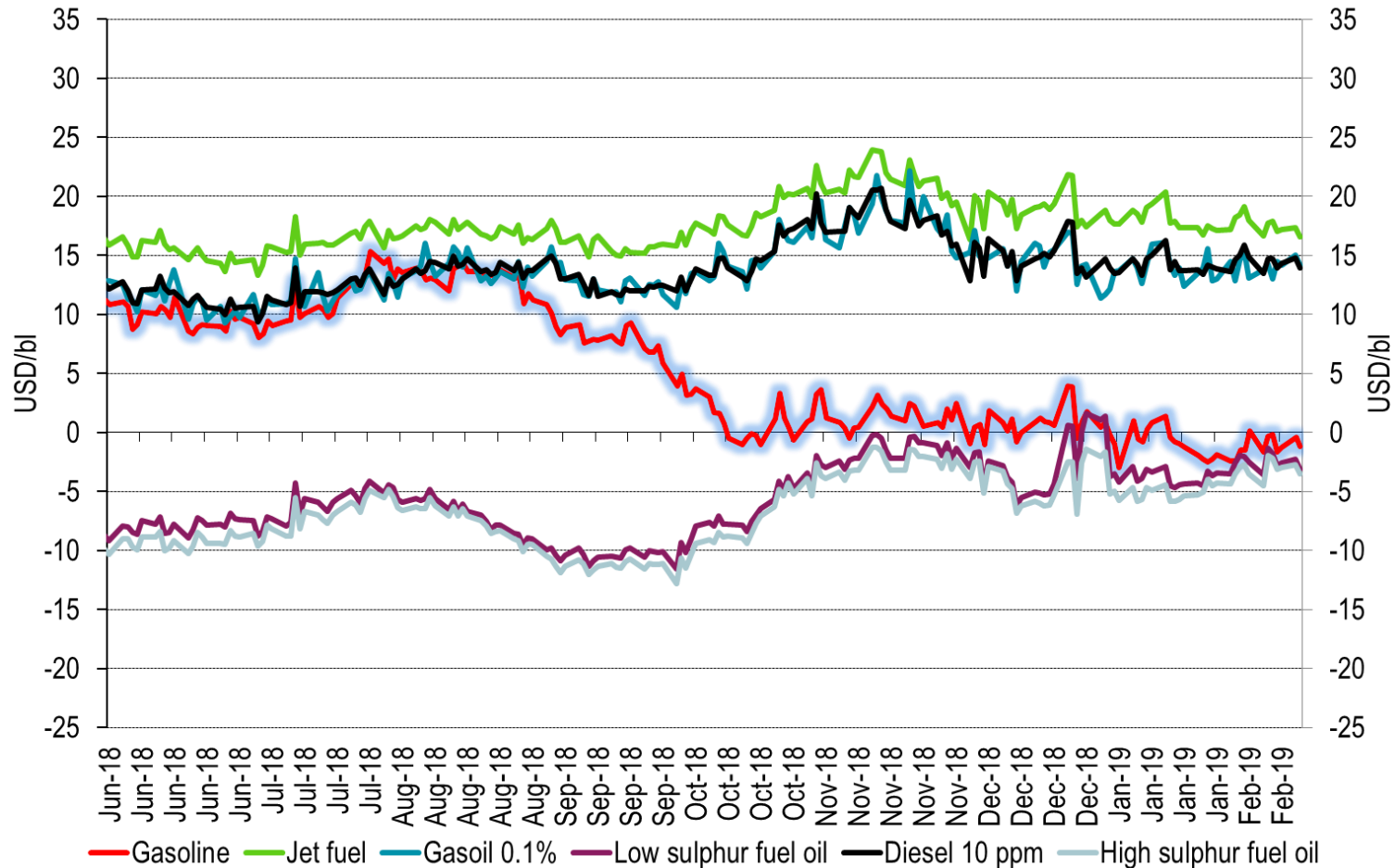
US Gasoline stocks in 1,000 barrels



Gasoline cracks have crashed

Gasoline – a premium product, no longer yields a profit

Oil product cracks in ARA (USD/bbl)



Shipping - the “graveyard for dirty oil” since the 70ies

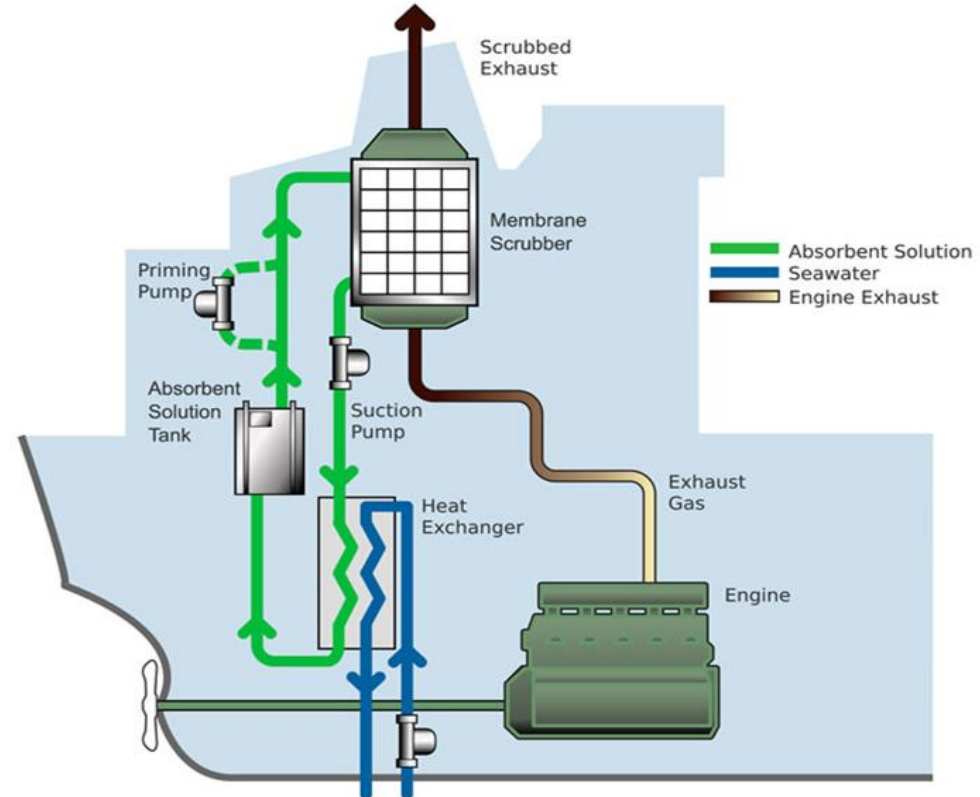
Now it has to stop says the International Maritime Organization (IMO)

In 2020 you'll need to run on cleaner fuel or have a scrubber

Ship burning high sulphur fuel oil



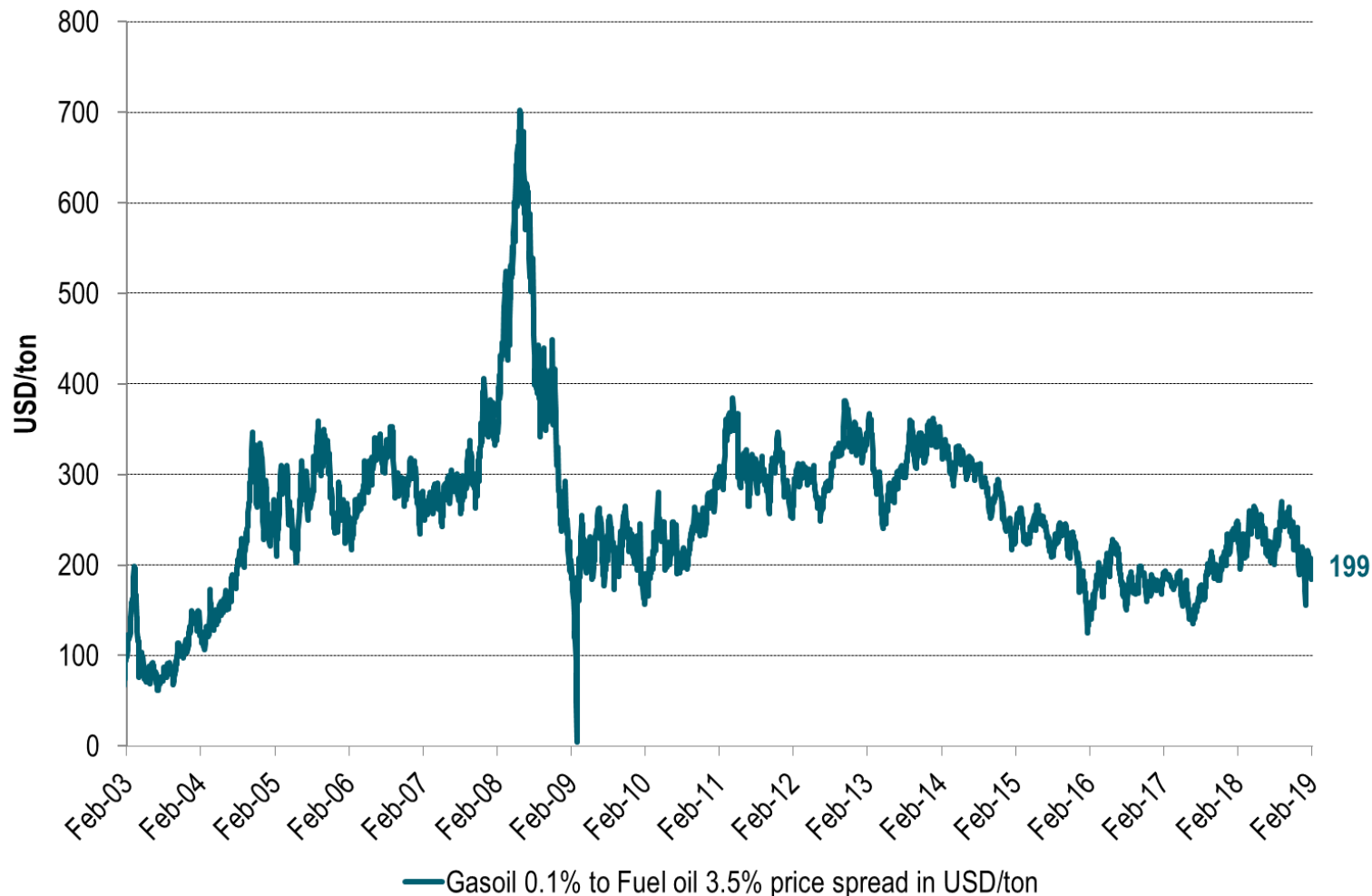
Ship exhaust scrubber



GOF0 peaked at \$700/ton in 2008

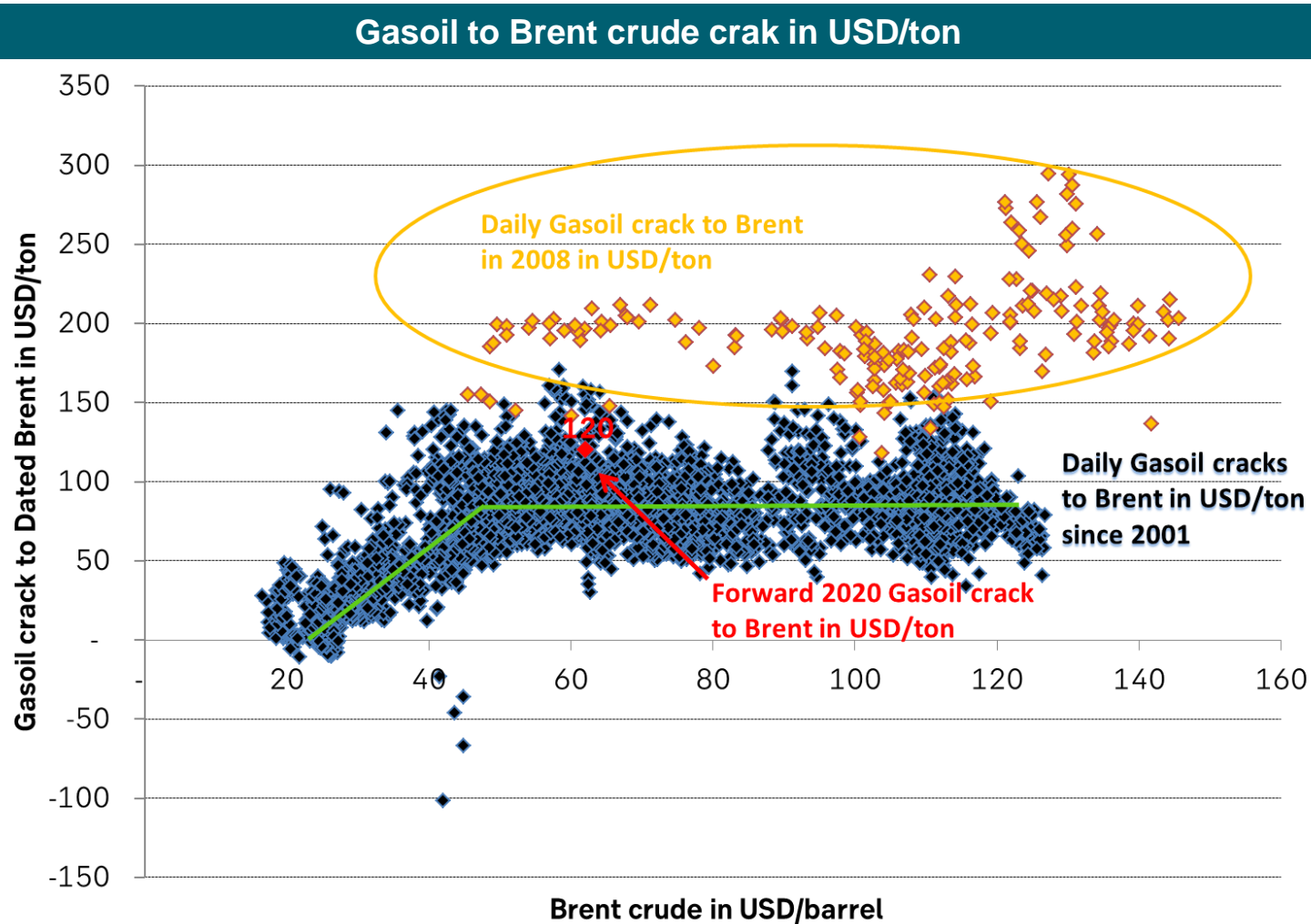
But then Brent crude rallied to \$148/bl

The Gasoil 0.1% to HFO 3.5% spread (USD/ton)



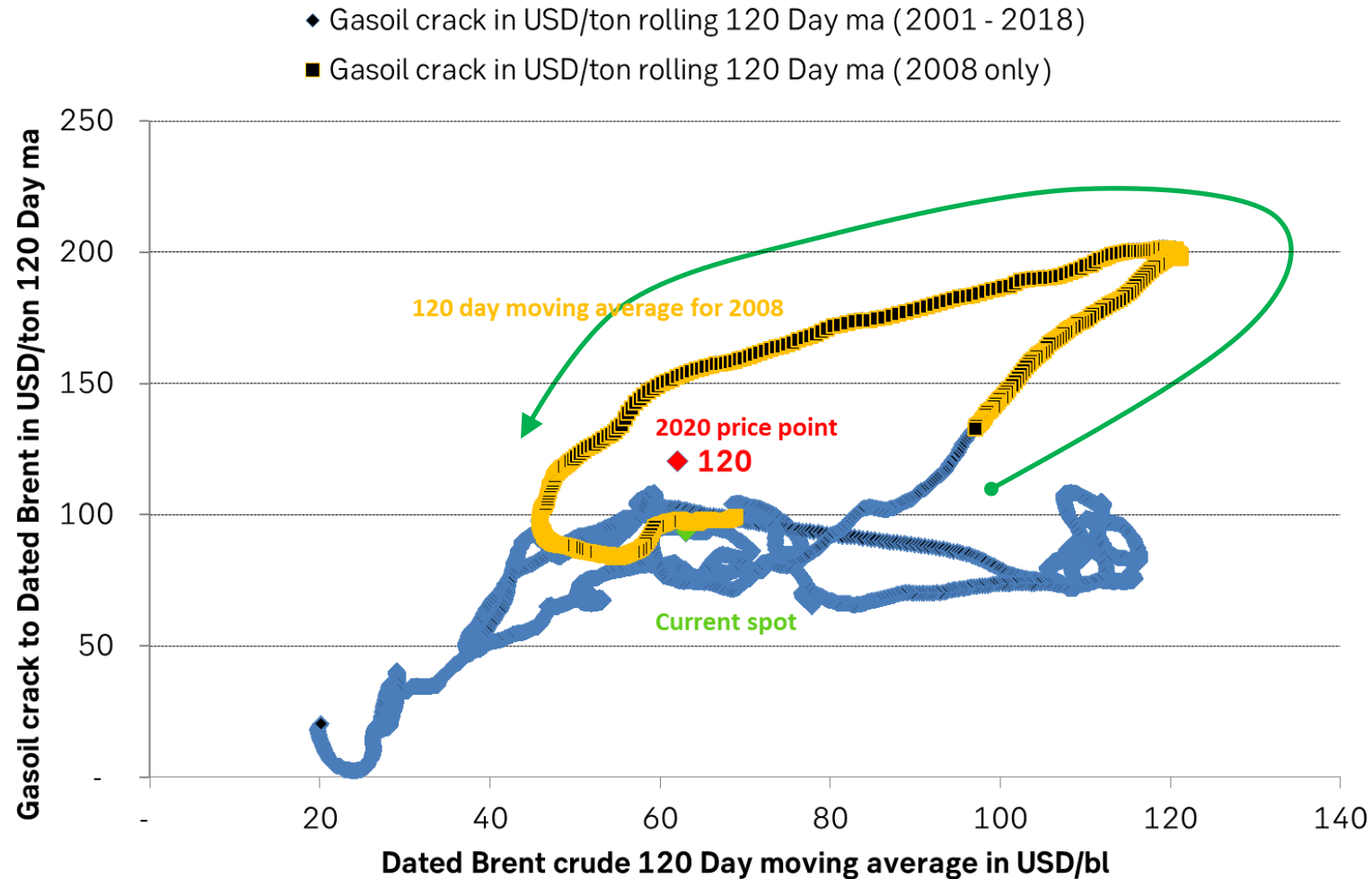
The 2008 Gasoil squeeze

The scatter points from 2008 really stands out from the crowd. The Gasoil crack over Brent crude in USD/ton is normally around \$85/ton



The 2008 Gasoil crack squeeze

In 2008 a tight Gasoil market led to an upwards spiral move between Gasoil and light sweet crude. Until the global economy fell apart

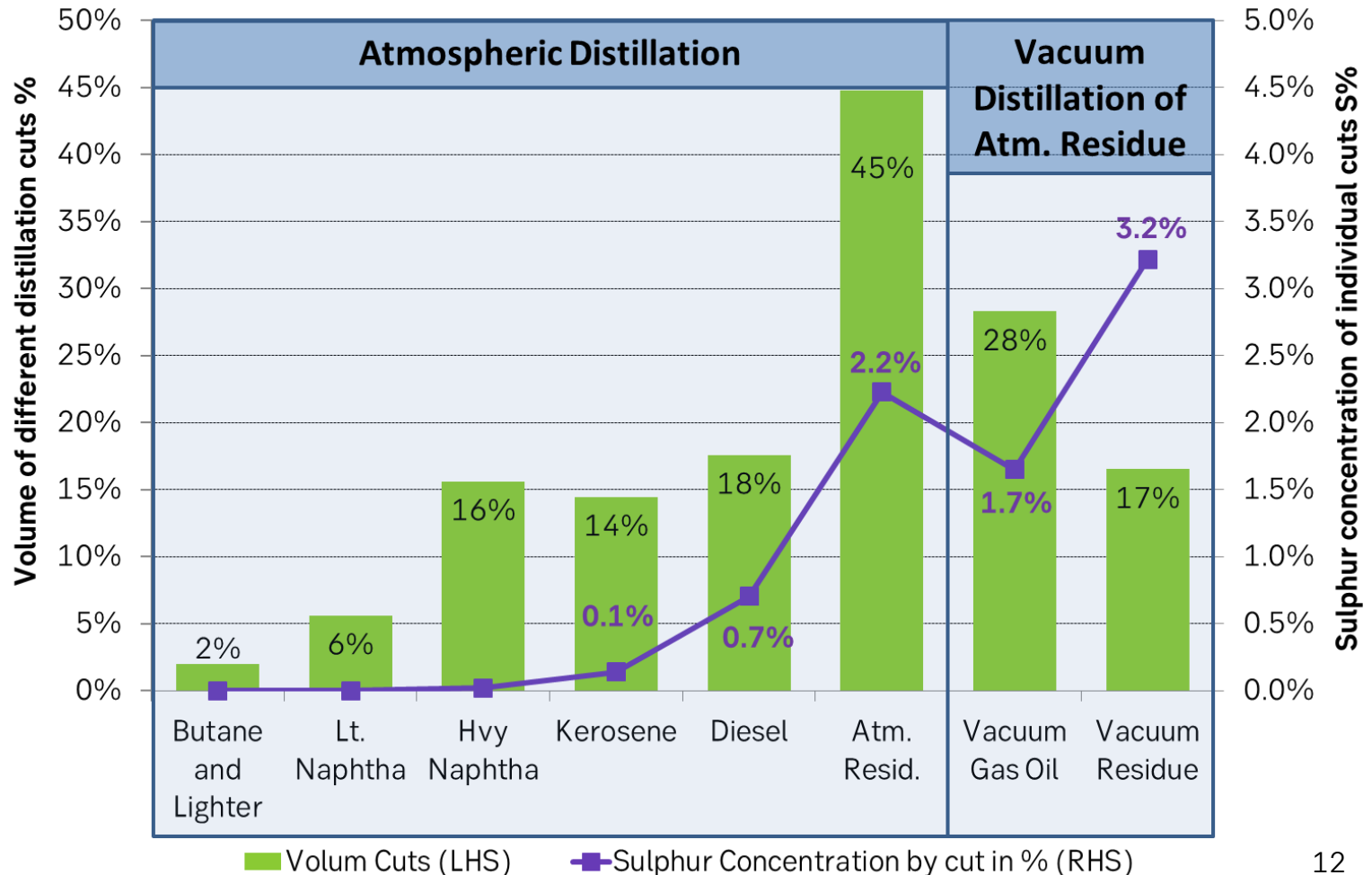


Refining: Atmospheric or Vacuum distillation?

Atmospheric Residue (AR) contains valuable Vacuum Gasoil (VGO) which is usually stripped out by vacuum distillation leaving only high sulphur, high density Vacuum Residue (VR). Done due to economics

Global barrel:
 API: 32
 S%: 1.3%
 AR S%: 2.2%
 VR S%: 3.2%
 VGO S%: 1.7%

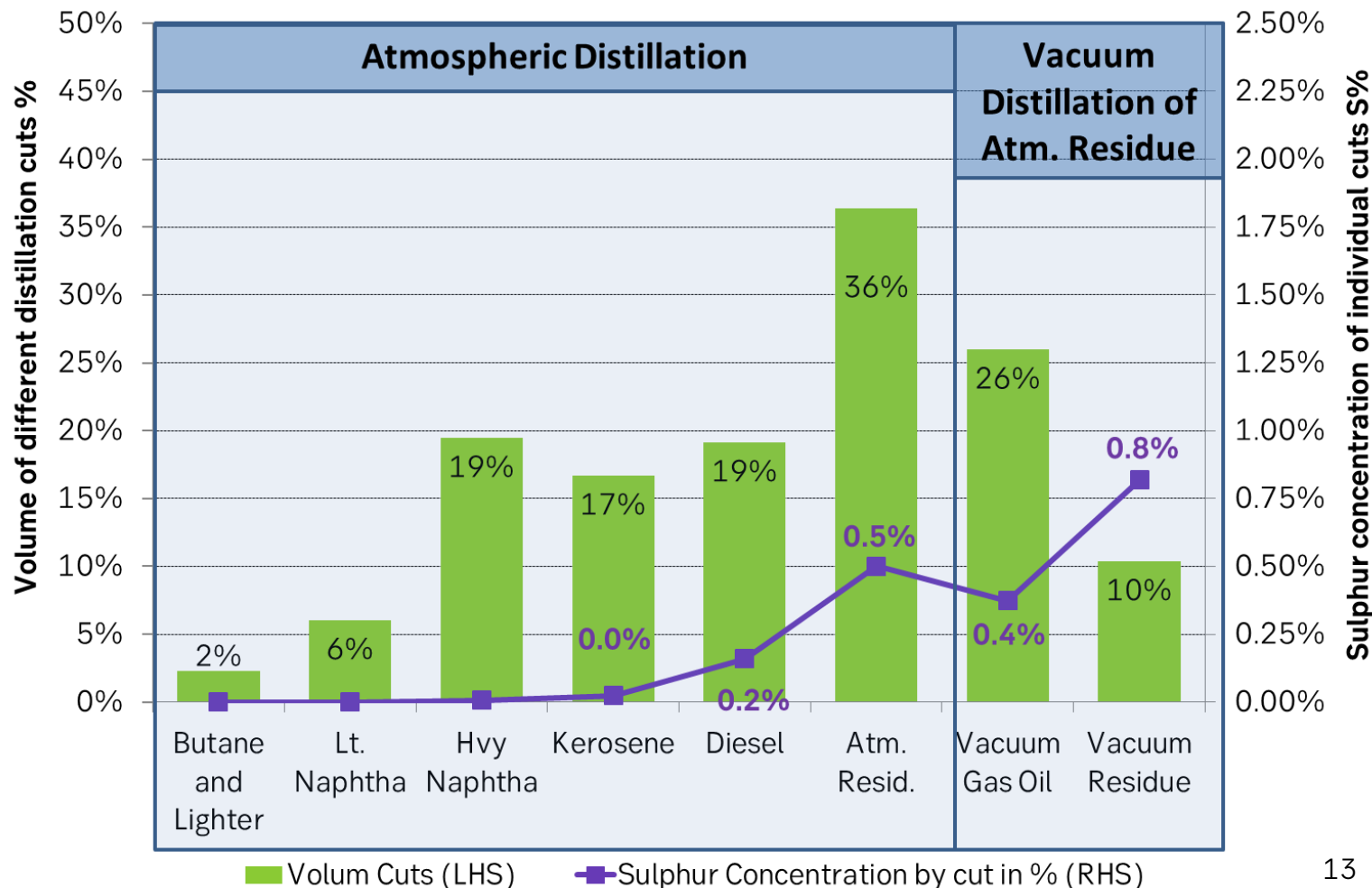
Simple and semi-simple refining of the Global crude oil barrel



Crude S% \leq 0.24% will do the IMO 2020 trick

It will yield an ARS% = 0.5%. If you also want the VRS% \leq 0.5% then the Crude S% needs to be below 0.14%. I.e. Bonny Light type of crude

Simple and semi-simple refining of crude with (API; S%) = (37; 0.24%)



Crude input type:
API: 37
S%: 0.24%

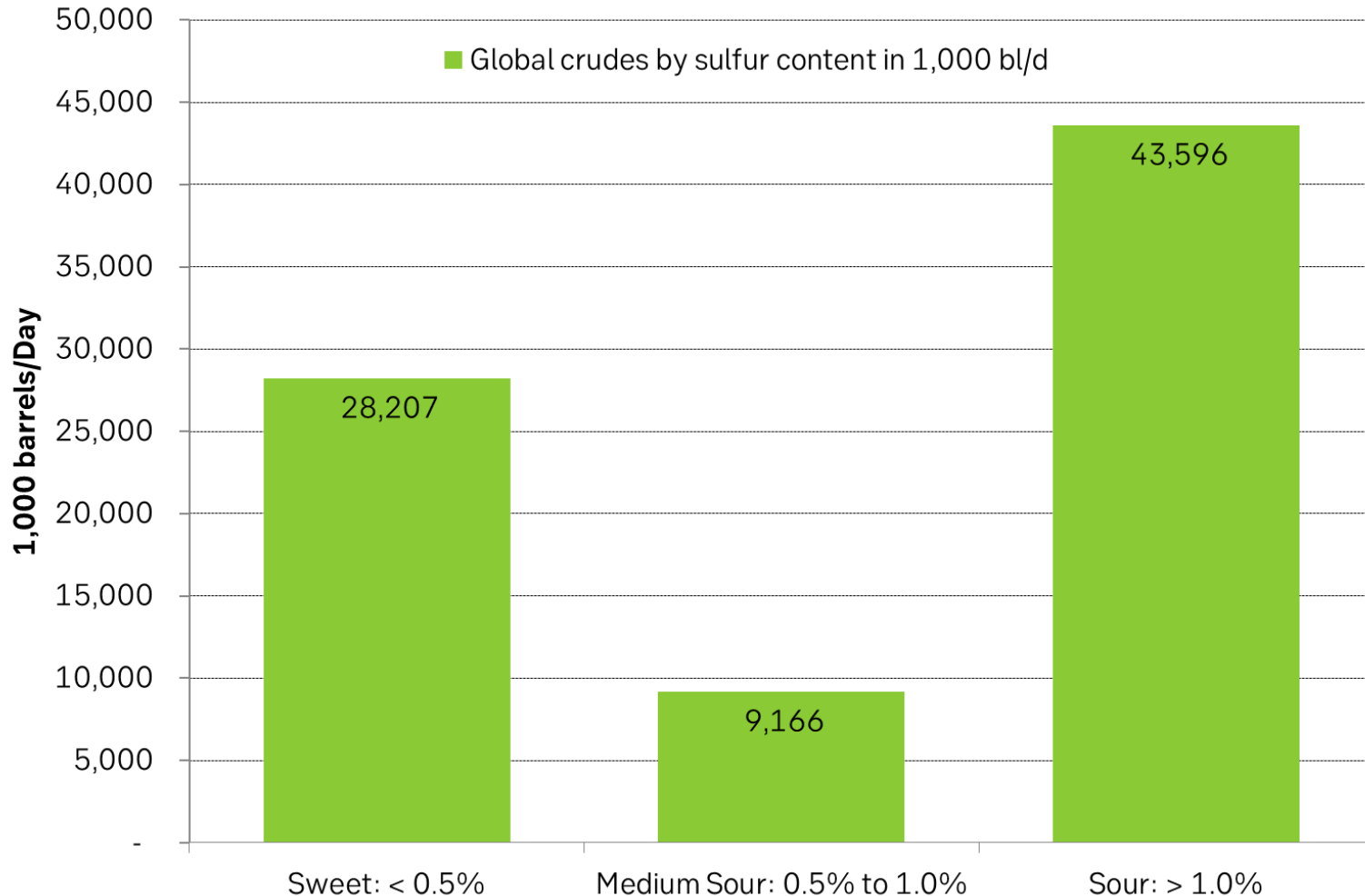
Refinery output:
AR S%: 0.5%
VR S%: 0.8%
VGO S%: 0.4%

Still almost 30 m bl/d of crude with S% <0.5%

But crude with S% = 0.5% is not enough.

Crude with S% = 0.5% will yield AR S% = 1.0% and VR S% = 1.6%

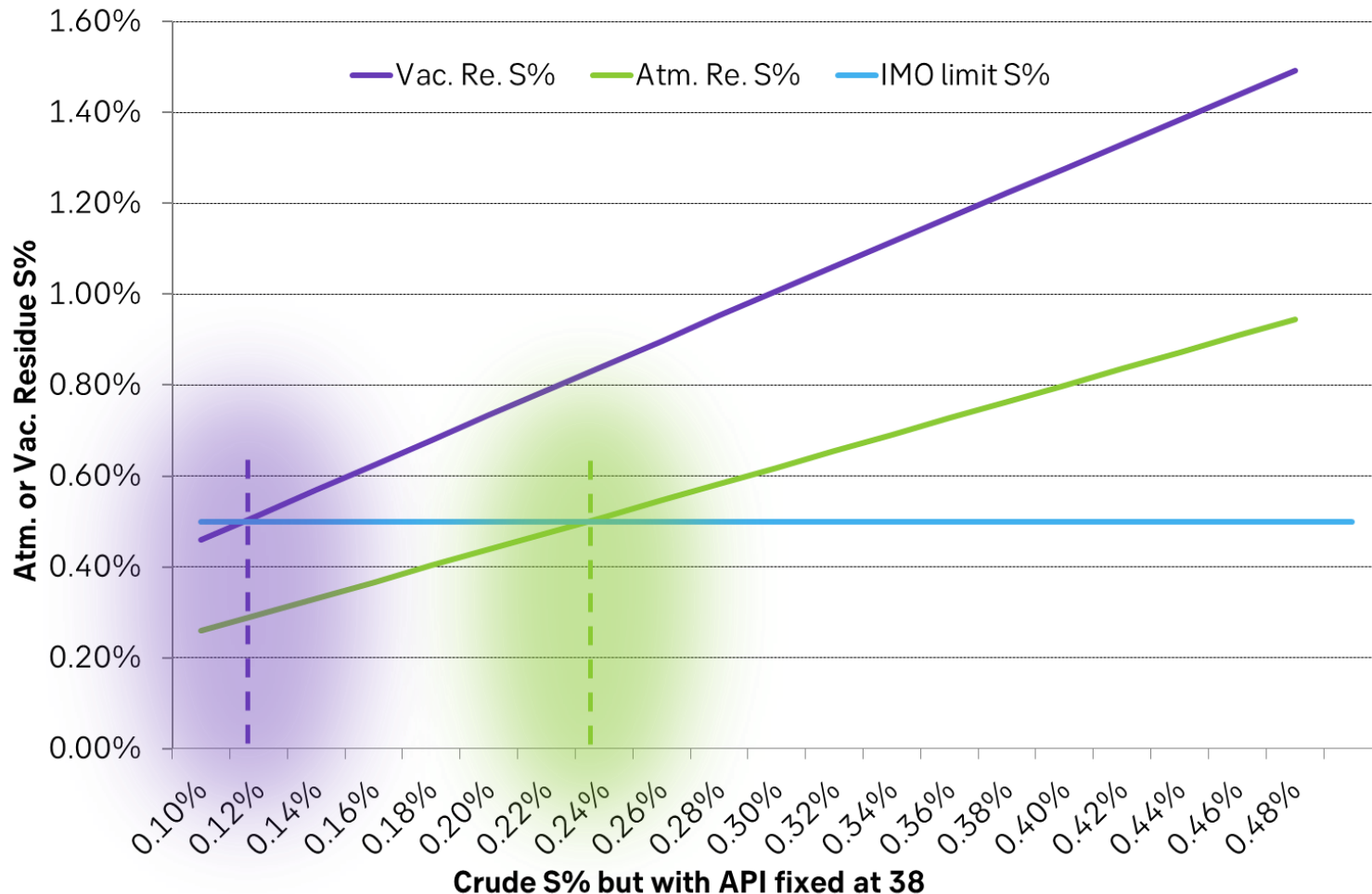
Global crude oil by sulphur concentration



Crude S% needs to be lower than 0.24%

In order to produce AR S% of 0.5% or lower. The Crude S% needs to be below 0.12% to produce VR S% below 0.5%

Crude sulphur % versus AR S% and VR S%. Assuming crude fixed at API = 38

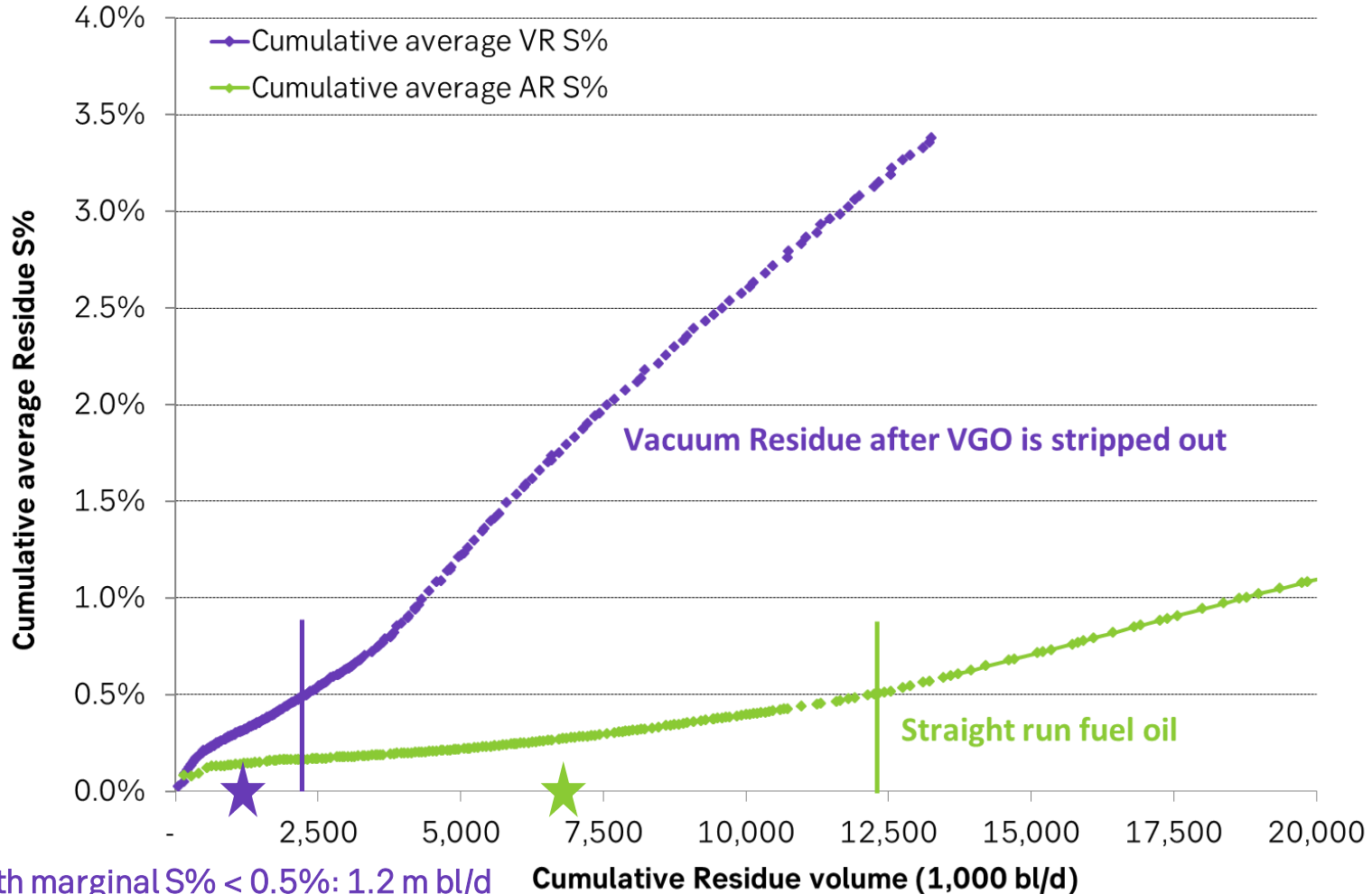


Plenty of straight run MFO 0.5% if VGO is not stripped out

The price of MFO 0.5% just needs to be high enough to incentivise refineries to leave the VGO in the residue. Leave it as straight run fuel oil. Leaving VGO in the fuel oil => a tighter Gasoil market.

So the MFO 0.5% price needs to be \geq than the Low Sulphur VGO price

Cumulative volume of Atmospheric Residue and Vacuum Residue vs. Sulphur %



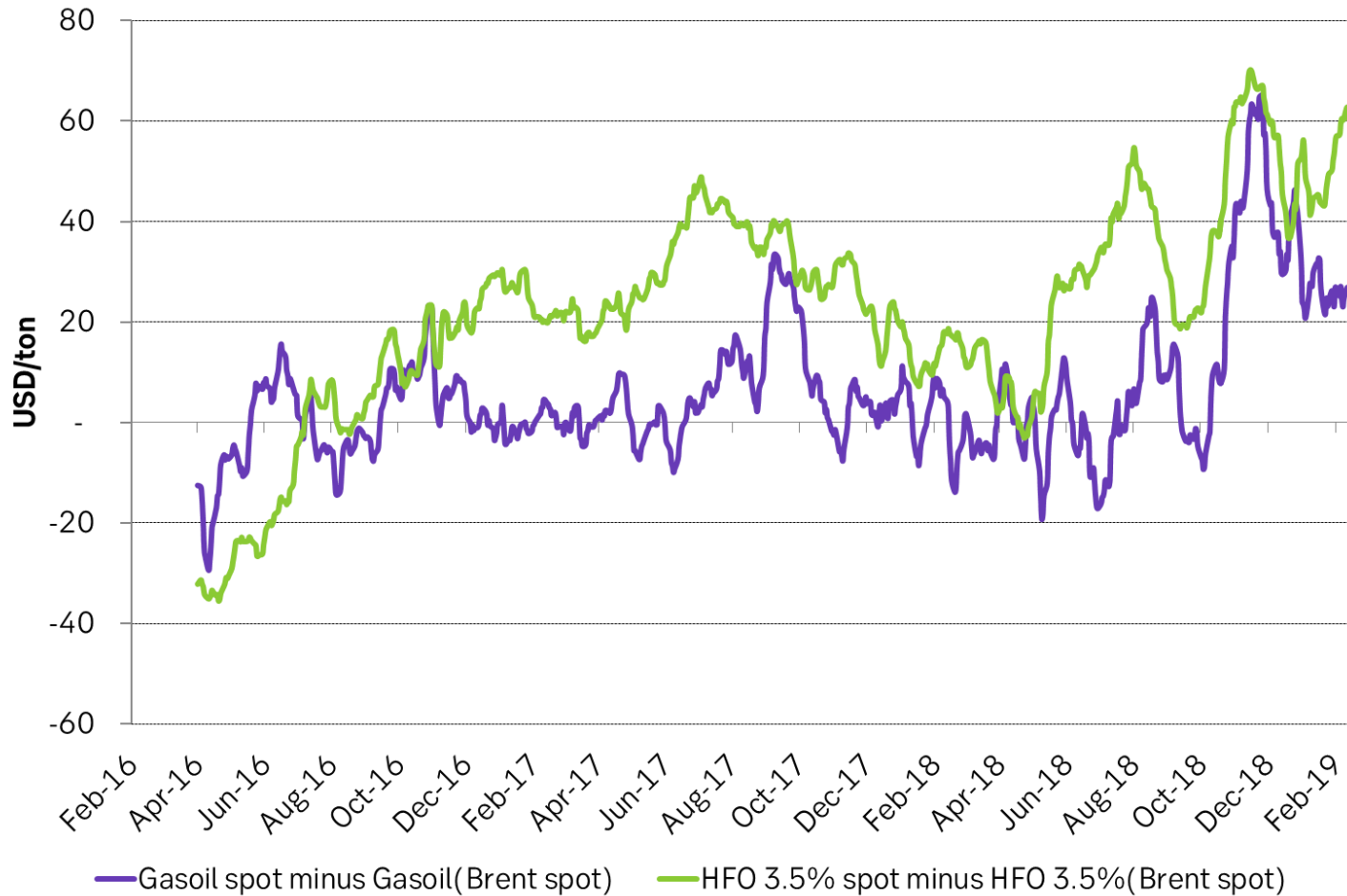
★ Total VR with marginal S% \leq 0.5%: 1.2 m bl/d

★ Total AR with marginal S% \leq 0.5%: 7.1 m bl/d

Spot: Both Gasoil and HFO expensive

In the spot market for the time being both Gasoil and HFO 3.5% are expensive versus their normal relationships to Brent crude oil

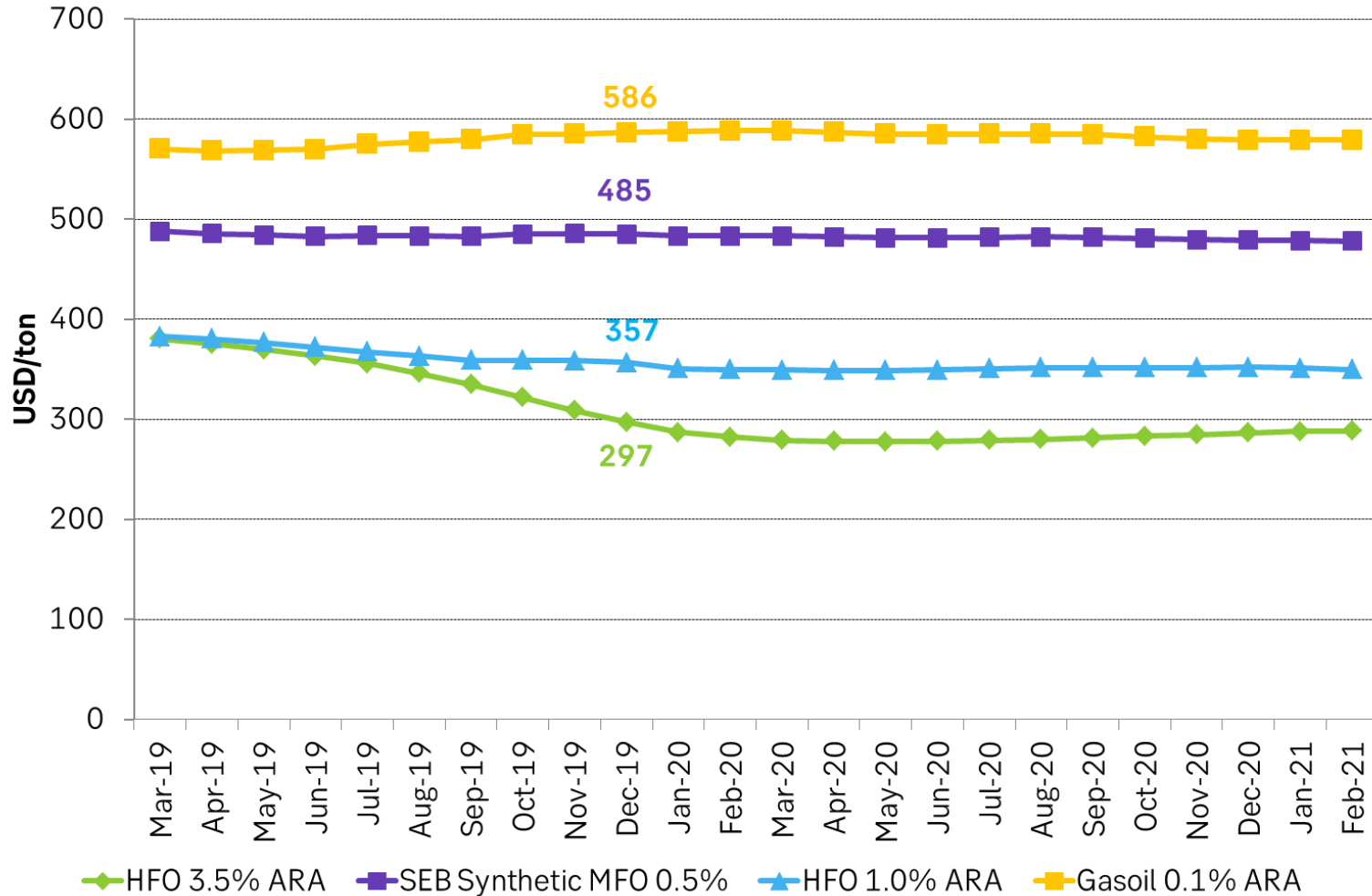
Spot prices for Gasoil 0.1% and HFO 3.5% less their normal price vs. Brent crude



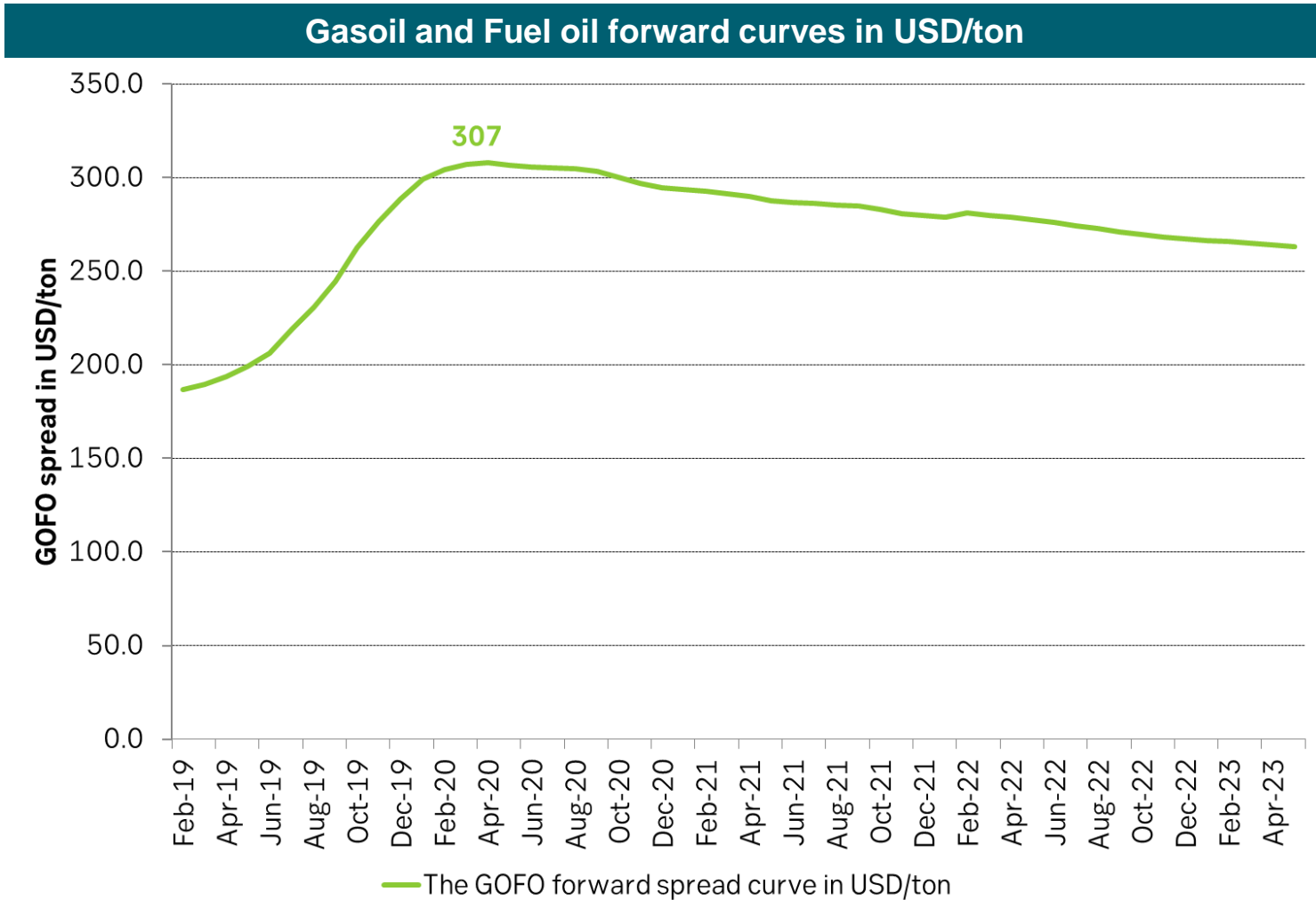
Forward product price curves

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Forward product price curves



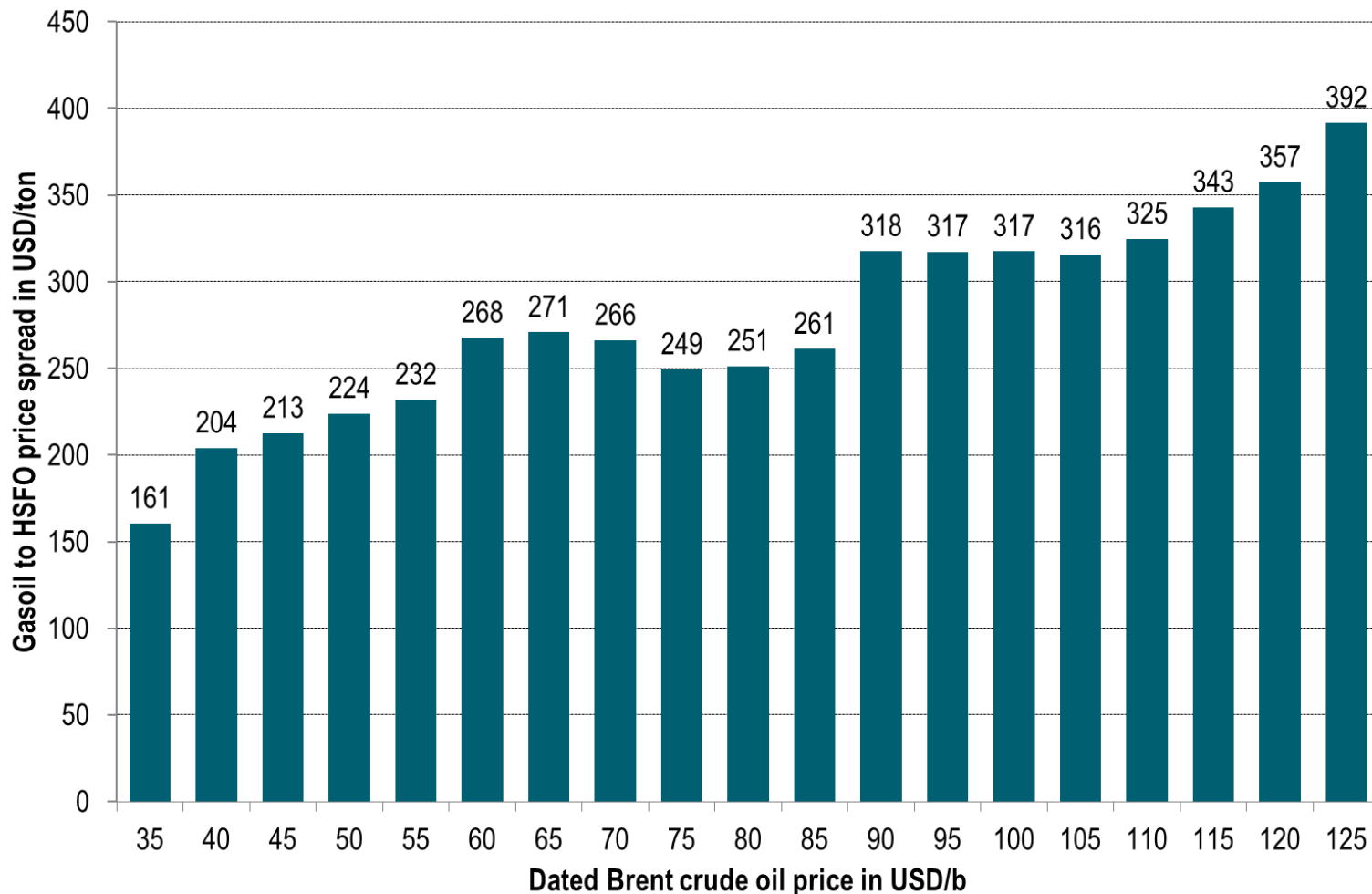
Gasoil to HSFO 3.5% forward spread



GOF0 vs historical crude oil prices

Spot spread today is just \$200/ton as HFO 3.5% is unusually tight

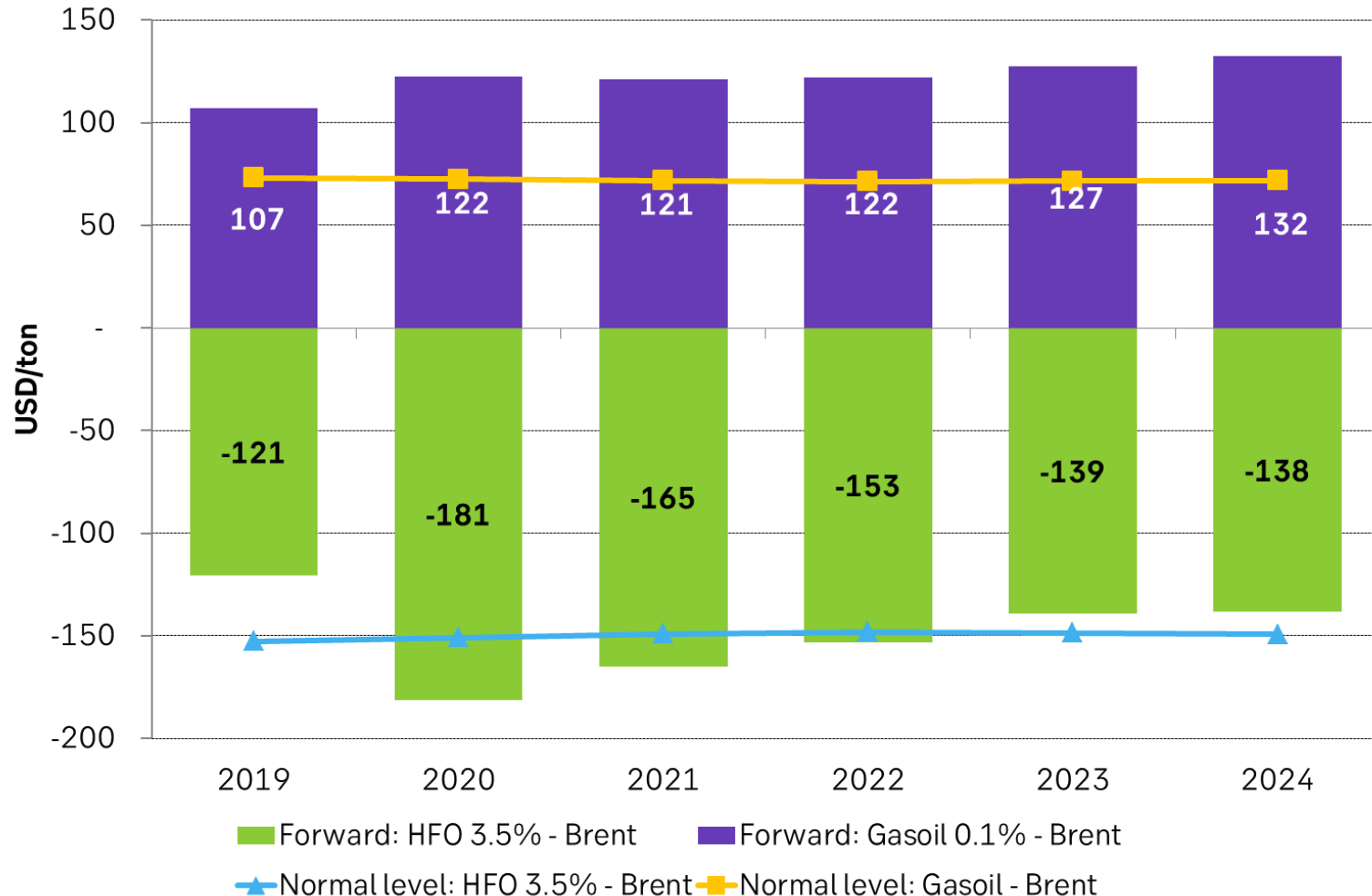
The Gasoil 0.1% to HFO 3.5% spread (USD/ton)



Very little HFO 3.5% discount versus norms

Market is pricing in a surplus and a depressed HFO 3.5% more or less only in 2020 before turning to more or less normal already in 2021/22

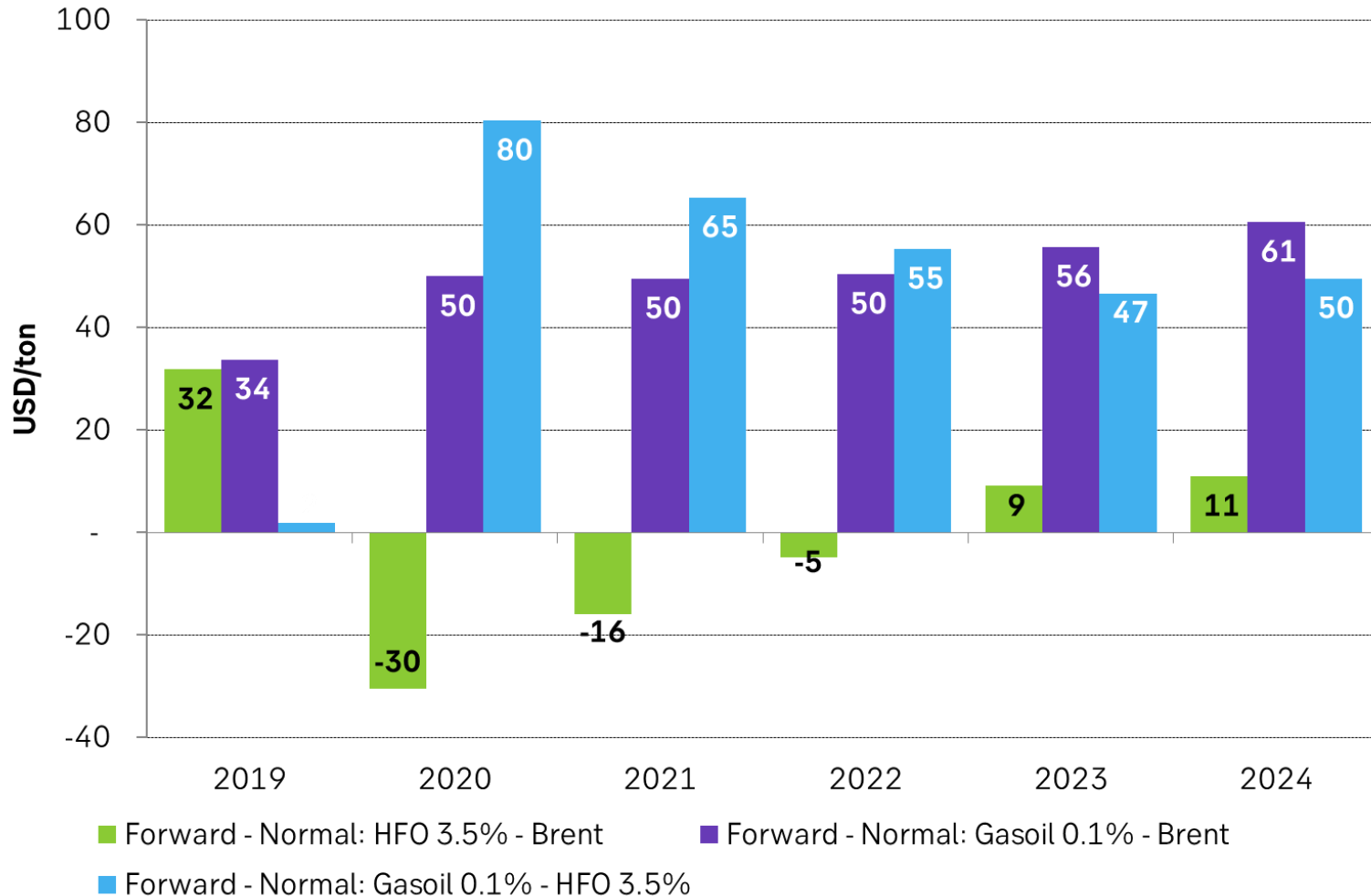
Gasoil and HFO forward prices minus Brent crude and versus historical norms



Very little HFO 3.5% discount versus norms

Market is pricing in strong refinery margins for both Gasoil and HFO versus historical norms

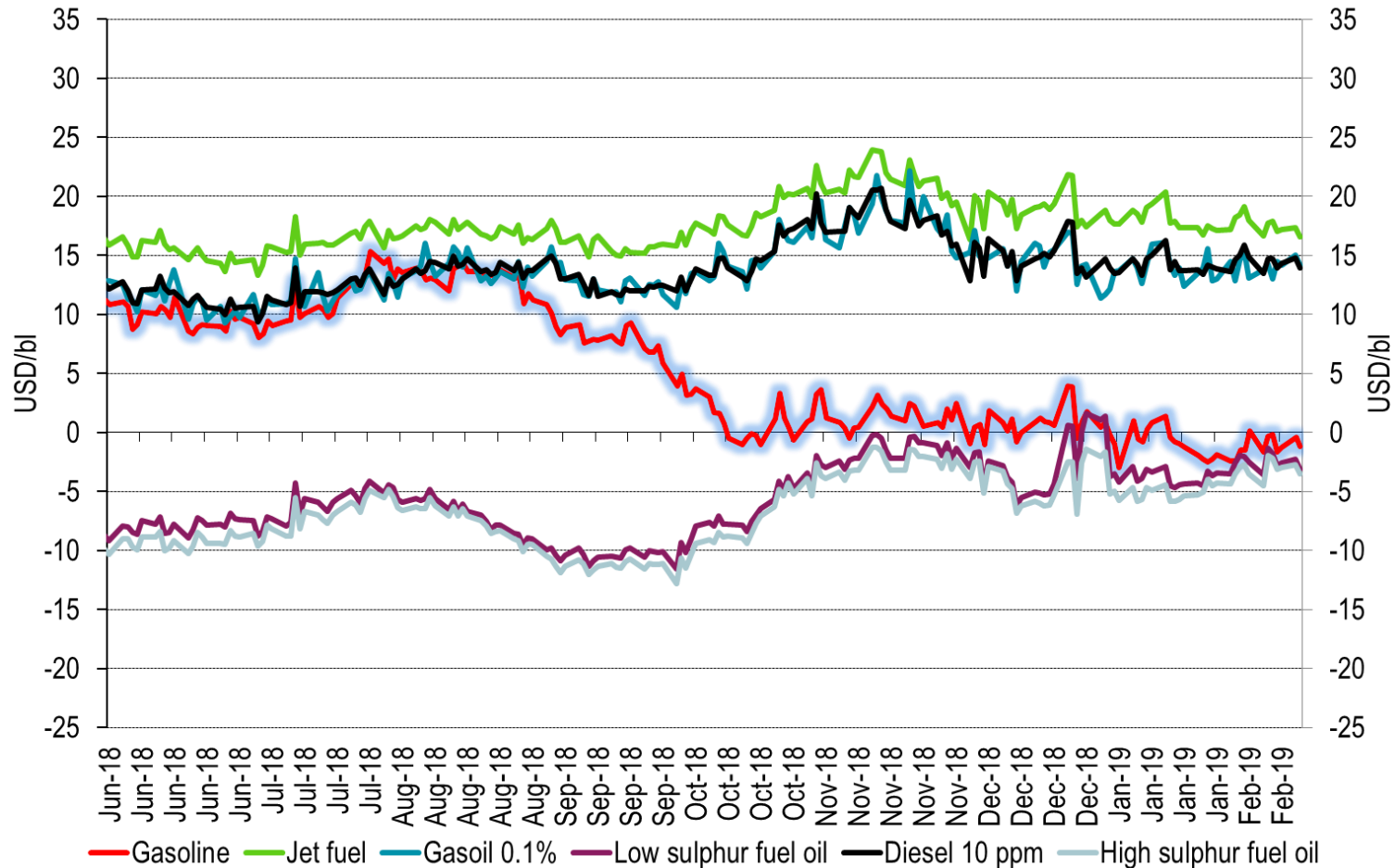
Gasoil and HFO forward prices minus Brent crude and minus historical norms



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