

Refining margins review

Northwest Europe

May 2026

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Introduction and disclaimer

The purpose of this document is to provide an analysis of certain aspects that are shaping European refining margins currently. The market is currently disrupted by the Hormuz crisis. As noted in some of the slides, market prices are currently being influenced by the expectation that the crisis will be resolved soon (as implied by the market for Brent futures) and by several temporary factors that in some cases are cushioning the impact of the Hormuz crises and in some others are distorting it. As such, the trajectory of prices and margins in the short and medium term is inherently unpredictable, since it can be modified by one or all of several factors. For example:

- The IEA has released crude oil and refined products from its emergency stocks. The IEA is able to release more stocks, but it is reasonable to think that its future strategy will be determined by the duration of the crisis. The purpose of emergency stocks is to guarantee supply during disruptions and not to manage the market. Planning for a long duration of the crisis, might include acceptance that higher prices are necessary to reduce demand.
- Refining margins will be affected by the IEA decision to release crude or products and by the crude/product ratio.
- China has reduced its import of crude oil and is processing crude oil from storage. Refining throughput has reduced. Product exports were initially banned, then resumed at lower rates. The Chinese Government controls product exports and its policies have often been erratic also in normal circumstances.
- Secondary sanctions on Russian and Iranian crude have been temporarily relaxed to allow an unprecedented volume of crude at sea to flow to refineries, thereby increasing availability of crude, mostly in Asia. This effect is clearly temporary.
- The petrochemicals industry was going through a period of low margins, with large overcapacity and Asia and expected rationalization forthcoming. The industry has reacted to the shortage of feed by reducing utilization.
- Several lower income Asian and African countries have taken action to curb demand, but the OECD countries have not acted yet.
- Inventories are being drawn at alarming rates, but the market continues to price oil on the assumption that the crisis will be resolved before too long.

Having regard for this, forward looking statements made in this analysis should not be taken as forecasts because of the high degree of uncertainty. There is no certainty that the market will move in any particular direction and, in any event, it is very unlikely that market trends will be linear.

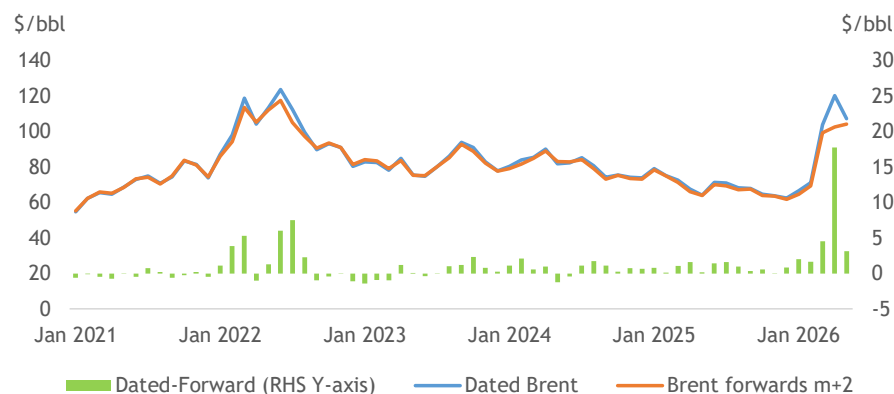
Forward looking statement regarding what may happen if the Strait of Hormuz remains closed for a long period of time are "what if" speculations and do not indicate any opinion that this might be the case.

In addition to the factors of uncertainty that are known and have been discussed above, forecasts are inherently uncertain because of events or combinations of events that cannot reasonably be foreseen including the actions of government, individuals, third parties and competitors. **No fitness for a particular purpose shall apply.**

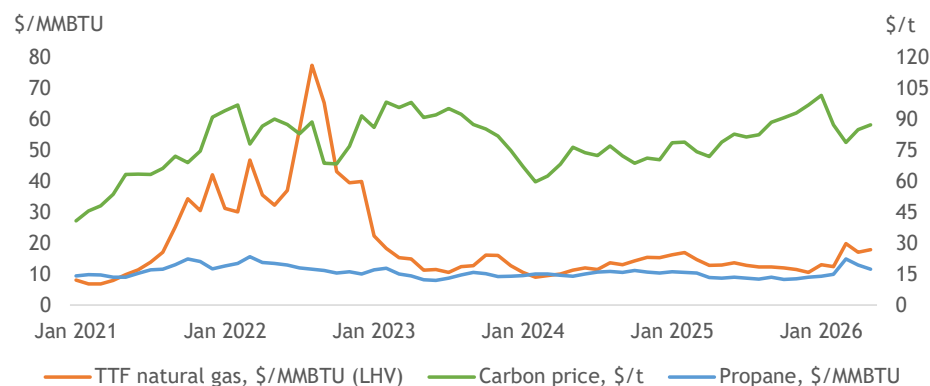
1. - Oil and energy prices

Brent, natural gas and carbon costs

Brent prices



Natural gas and emissions

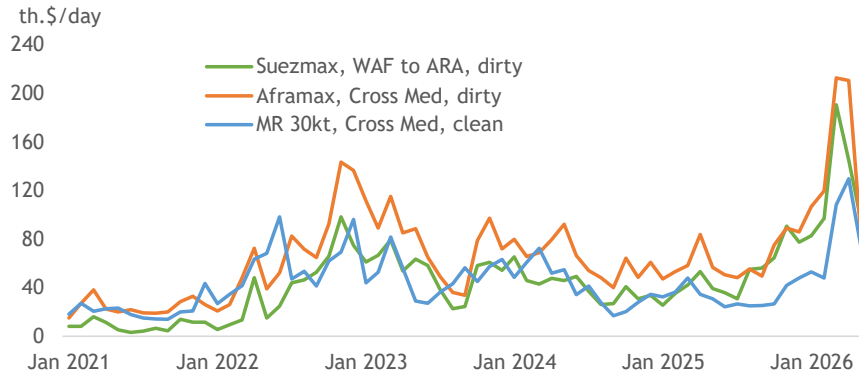


- Brent prices remain below what should normally be expected for a market that has lost over 10mn b/d of supply and is drawing inventories. Some demand has been removed in Asia as a result of supply shortages and because prices are already high for some developing economies. However, there is little evidence that demand is being affected in OECD countries. Without a reopening of the Strait of Hormuz, demand will eventually have to adapt to available supply, so in the absence of action by governments to reduce demand compulsorily, prices can be expected to move higher eventually. However, there is no certainty of this and the timing of such an outcome.
- The Brent market remains very backwardated with forwards and futures noticeably lower than Dated Brent. The backwardation was very steep in April, with crude differentials to Dated at levels that could no longer be explained by crude quality and that seemed instead related to backwardation. The current level of backwardation is still high by historical standards, but not unprecedented. Similar levels of backwardation were observed in 2022.
- Natural gas prices have increased by 44% vs February, but there is currently no sign they are about to climb to the levels of 2022. The general expectation was that in 2026 there was going to be an oversupply of LNG. Europe has expanded its ability to receive LNG, so it has better resilience relative to 2022. In 2022, gas prices reached levels whereby refineries would use propane as refinery fuel and LPG or naphtha to make hydrogen. The current increase of natural gas prices has not produced that situation yet.
- Carbon prices are stable at \$87/tonne. High gas prices have a tendency to pull carbon prices higher to stop coal from becoming too competitive as a fuel for power generation.
- At the May 2026 prices, carbon costs account for \$1.91/bbl of the variable operating costs of the Forties FCC benchmark refineries (or \$0.67/bbl of the cash costs, making the assumption the refinery receives 65% of its needs as free allocations).

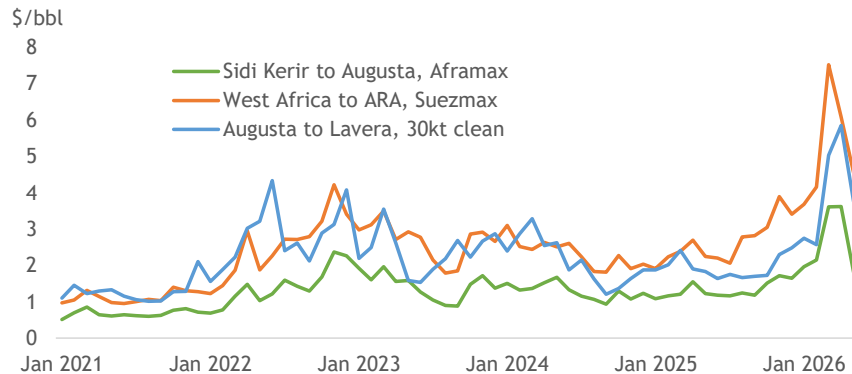
2. - Freight rates

Representative Time Charter Equivalents and voyage costs

Time Charter Equivalent at 13knots



Voyage costs

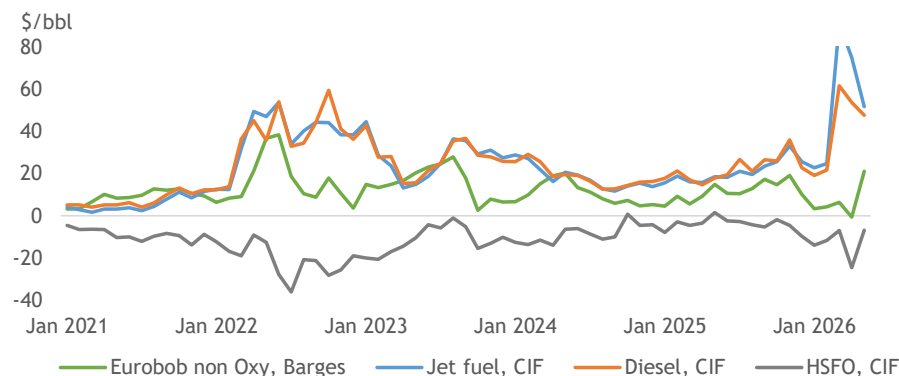


- Freight rates as measured through the TCE of some representative tankers reached unprecedented levels in March and April. A large number of tankers was trapped inside the Strait of Hormuz, while several others that remained blocked outside needed to be redeployed to different regions. There was also a higher call by Asia on barrels from the Atlantic region.
- Voyage costs correspondingly reached unprecedented levels. The cost of delivery of Suezmax borne crude from West Africa to Europe doubled from \$3.7/bbl in January 2026 to \$7.5/bbl in March 2026. In absolute terms, the impact was much steeper for Asian refiners, with the cost of a Suezmax voyage from West Africa to Singapore estimated at \$12.3/bbl in March. The cost of voyages to North Asia would have been even higher.
- Spot tanker rates are currently falling. In May they had returned to levels that are still very high by historical norms, but can no longer be considered abnormal. It is important to observe that tanker rates between 2022 and 2025 have been significantly higher than the 2010-19 average, so the fact that rates in May appear fairly normal relative to recent history, does not mean they are low.
- In the long term, a continued closure of the Strait is more likely to bring overcapacity because of the impact of demand destruction on the tonne-miles to be sailed. The Ukrainian crisis brought permanently higher freight rates because it did not remove barrels from the market and caused long-haul trade to increase.
- Thus, the long term implications of a continued closure of the Strait of Hormuz could be very different, but there is no certainty of the timing of such a development. For example, a release of crude from strategic stocks in the US to supply Asia will cause a temporary increase of tonne-miles to be sailed. Similarly, a reduction of refining throughput in Europe would cause Asia to rebalance supply and demand by taking more crude from the Atlantic region. Some of the naphtha and LPG supply lost by Asian petrochemicals will eventually be replaced with feedstocks from the US or Algeria.

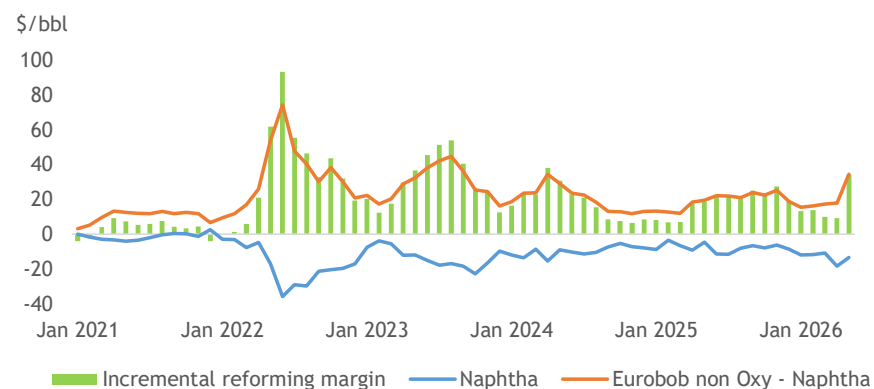
3. - Product prices

Price differentials relative to Forties delivered to Rotterdam

Price differentials to Forties in Northwest Europe



Naphtha prices and reforming margins

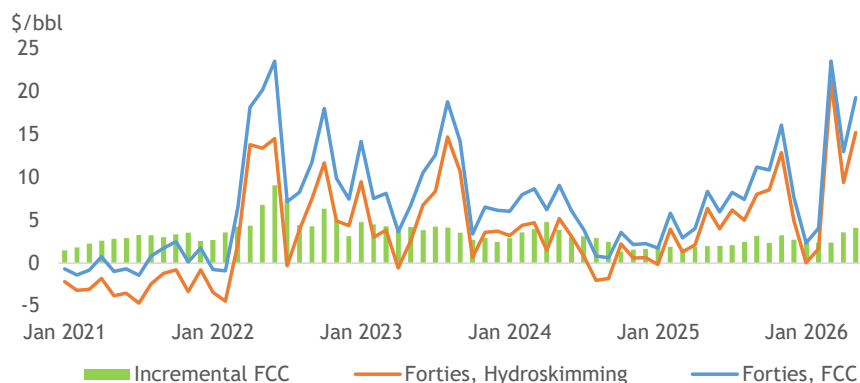


- The year had started with weak gasoline prices at Rotterdam. The differential to Forties of Eurobob non-oxy averaged \$3.8/bbl in January/ February, vs a 2025 annual average of \$11.6/bbl and average winter values above \$6/bbl in prior years. The Hormuz crisis did not lift the gasoline differentials, which initially fell because of higher crude oil prices.
- The impact on Hormuz was mostly on middle distillates. This was expected considering the large amount of middle distillate export trapped inside the Strait and the importance of this export for the European market.
- Jet fuel is the product for which Europe has the largest reliance of export from Hormuz. Jet fuel prices disconnected temporarily from diesel and spiked. In March/ April, the price differential to diesel was \$20-30/bbl. Refineries reacted to this, quite predictably, by diverting some kerosene from diesel to jet fuel. The two prices have now nearly converged again. However, whereas it would be normal for the long term average price of jet fuel to be marginally lower than diesel, in the current environment the opposite is more likely.
- Export of High Sulphur Fuel Oil from Hormuz is much more limited. However, lower supply of medium gravity crude from the Arabian Gulf to the global market directionally reduces HSFO supply. Fuel oil prices have been strong relative to crude in recent years and the differential has not been affected much by the Hormuz crisis.
- The Arabian Gulf exports large quantities of naphtha and LPG to supply households and petrochemicals plants in Asia. It would have been reasonable to expect naphtha prices to spike in Europe, as more volume would be drawn from the Atlantic region to Asia. However, Asia has developed a large amount of petrochemicals overcapacity and so far is offsetting the lower availability of feedstocks by cutting operating rates. It is reasonable to think that naphtha prices will eventually see some upward pressure once the market for petrochemicals has tightened again, but the timing is very uncertain.
- Between January and April, naphtha-to-gasoline reforming margins were aligned to the winter levels of recent years. In May, gasoline prices and reforming margins spiked, but not yet to the levels reached between 2022 and 2024.

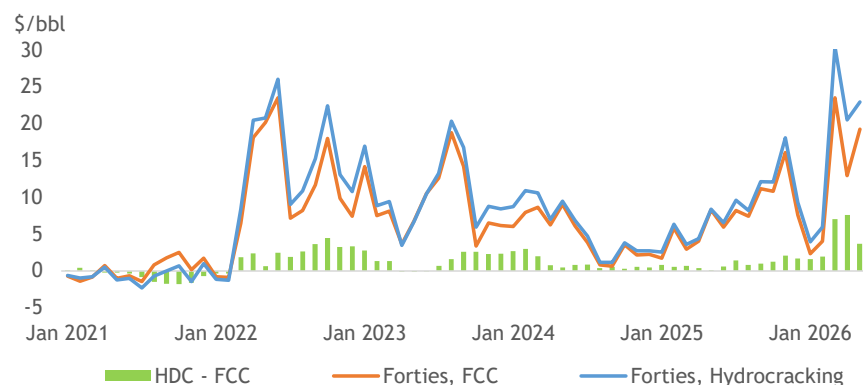
4. - Refining margins

Refining margins at Rotterdam with Forties crude oil

Refining margins at Rotterdam after variable costs



Refining margins at Rotterdam after variable costs



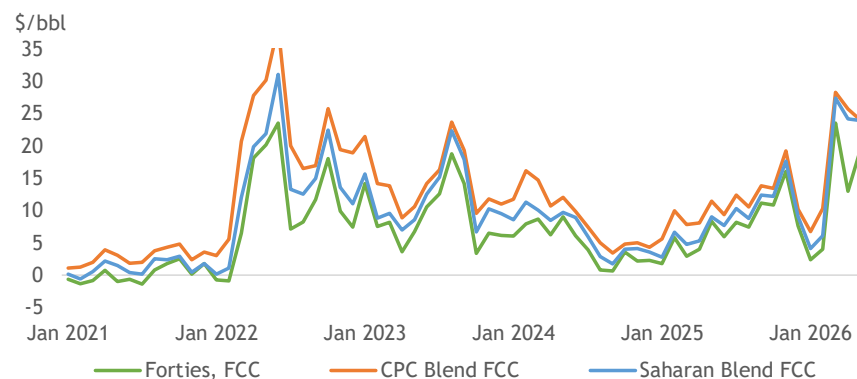
Carbon costs are included on the basis of 65% free allocations

- With the Ukrainian crisis, European refining fundamentals have seen a structural change. In 2021, simple FCC capacity was marginal and hydroskimming margins were negative. Since 2022, incremental hydroskimming of light crudes has been needed to supply the market, so hydroskimming margins have been positive. When they hit zero, typically in winter months, they find support and rebound. Before 2020, it was normal to see simple FCC capacity hitting zero in winter and rebound, but this has not happened recently.
- Historically, hydroskimming margins would be close to zero or negative. In periods of market tightness, high refining margins would be the result of strong incremental cracking. The resulting increase of refinery utilization would create oversupply in the fuel oil market and would keep hydroskimming in check. This has not been observed recently and is another aspect that makes the margin cycle that started in 2022 different. High refining margins have been the result of strong hydroskimming. Fuel oil prices have remained strong and incremental cracking margins have been average except for in 2022.
- Refining margins have now been pushed higher by the Hormuz crisis. They have been mostly stimulated by high middle distillate prices. The gap between Hydrocracking and FCC margins reached historic highs in March and April because of the very high price differentials between middle distillates and gasoline.
- We are currently in a disrupted transition phase with prices and margins that are inherently unpredictable. Export orientated refining capacity located within the Strait of Hormuz has been removed from the market, at a net loss of refining capacity. This is surely a structural change. However, other developments are altering the supply/demand balance on a temporary basis. The OECD countries have released emergency stocks of crude and products. China drawing crude oil from stocks, has reduced crude imports and cut product exports. Secondary sanctions on Russian and Iranian crude have been relaxed to allow processing of crude stuck at sea.
- A continuation of the closure will keep the market disrupted, but given time demand destruction could become the prevailing factor, resulting in global over-capacity.

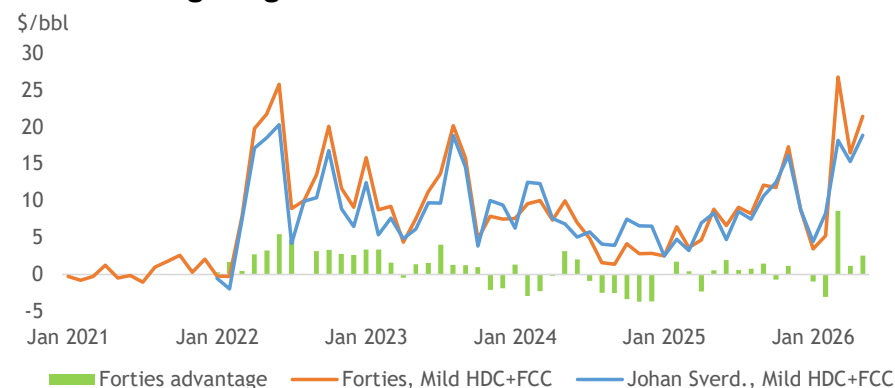
4. - Refining margins

Refining margins at Rotterdam with lighter and heavier crude oils

Refining margins at Rotterdam after variable costs



Refining margins at Rotterdam after variable costs



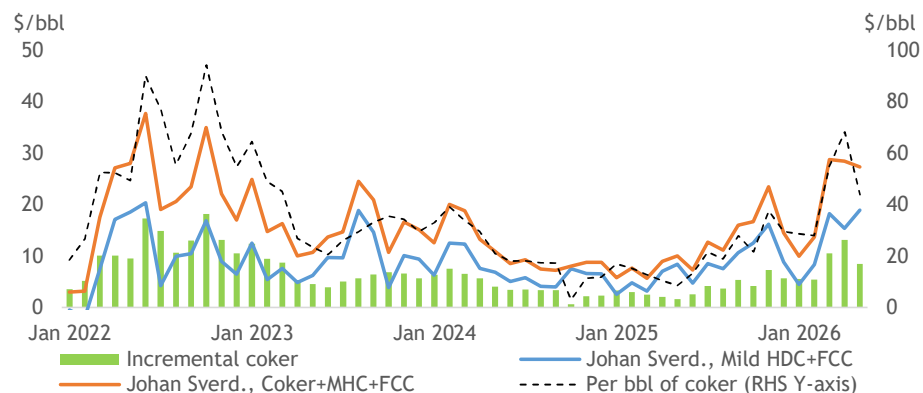
Carbon costs are included on the basis of 65% free allocations

- In the European market there has been for quite some time an advantage in processing lighter crudes at simpler refineries. The origin of this situation is oversupply of light crudes in the Mediterranean, which has made the prices of crudes such as Saharan Blend and CPC Blend very attractive also in North Europe. More recently, the loss of supply of Russian crude has produced scarcity of supply of medium gravity crude.
- The significant increase of freight costs after the Hormuz crisis has not changed the relative merit of processing very light Mediterranean crude in North Europe. In April, the prices of Saharan Blend FOB and CPC Blend CIF Med fell relative to Forties, but also to BTC Blend CIF Med. One reason for this could be that Saharan Blend and CPC Blend are frequently arbitrated to Asia because of their high yield of naphtha (BTC Blend is not), so their prices needed to fall to keep the arbitrage open with higher freight costs.
- Johan Sverdrup is the North Sea crude that can be considered the most direct substitute of Urals. Johan Sverdrup margins in simple refineries are normally lower than Forties. In a somewhat more complex refinery, such as the Mild Hydrocracker+FCC benchmark, Forties still has higher margins than Johan Sverdrup on average, but the gap is lower (\$0.90/bbl avg since January 2022).
- This comparison simplifies the problem for not taking into account the fact that one barrel of Forties requires 0.21bbl of VGO cracking capacity to achieve this margin, whereas one barrel of Johan Sverdrup requires 0.29bbls. A refinery that elected to process Forties would find itself with spare conversion capacity that could be used to crack other feed. Provided that such feed can be procured, Forties would be found to be the more attractive option by most refinery planners and the prices of Johan Sverdrup would be found to be too high.
- Historically, availability of Russian crude, Russian SRFO and Russian VGO had allowed to fill up conversion capacity, a factor that would reduce the market value of heavier crudes such as Johan Sverdrup.

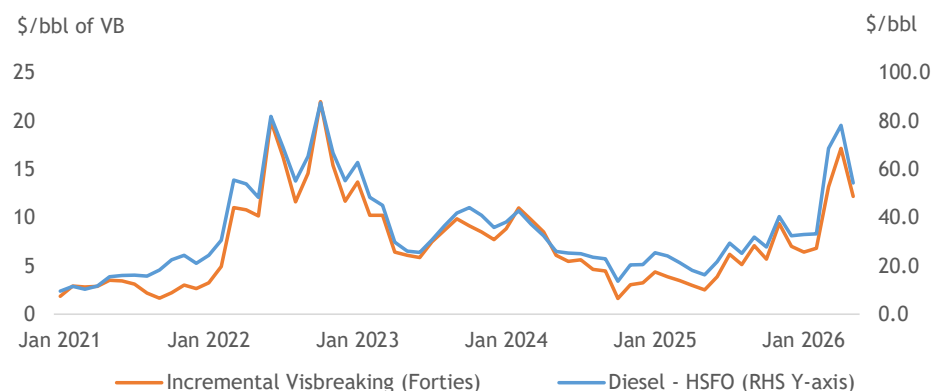
4. - Refining margins

Residue conversion margins

Incremental coking after variable costs, Johan Sverdrup



Incremental Visbreaking after variable costs, Forties

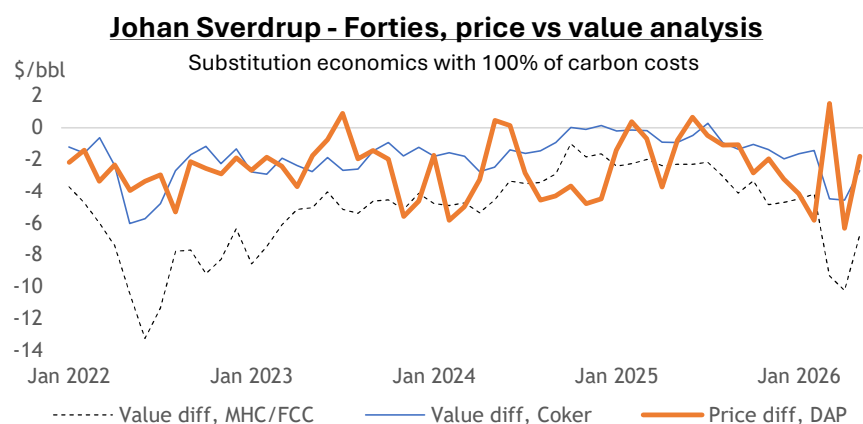


Carbon costs are included on the basis of 65% free allocations

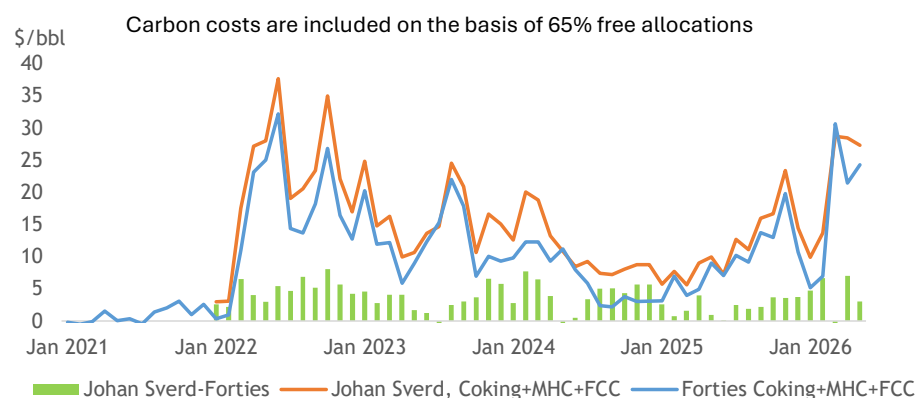
- Incremental coking and visbreaking margins are specific to the crude oil that is being processed because without the coker or the visbreaker the refinery would blend vacuum residue to fuel oil and because the cracking yields are different with feed of different quality.
- Incremental coking and visbreaking margins are very directly correlated to the price differential between middle distillates and fuel oil, as evidenced by the figure in the lower half of the slide.
- Between January 2023 and December 2025, coking Johan Sverdrup residue would have added \$4.8/bbl to the margin of the Mild Hydrocracking+FCC benchmark, which is equivalent to \$25.1/bbl of coker capacity utilized. This is below historical norms, when adjusted for inflation. This is the consequence of high fuel oil prices and high hydroskimming margins.
- By contrast, peaks of \$90-95/bbl as recorded in 2022 should be considered abnormal, since at that level a coker would pay back in about 1 year. The Hormuz crisis has brought the incremental coker margin back above \$50/bbl, but the trend currently is down to lower levels. The incremental visbreaking margin has also spiked to reach \$17/bbl of visbreaking capacity in April and has subsequently reduced.
- The future direction is very uncertain. In the short term, the market could be affected by temporary factors, such as Chinese export, the release of strategic stocks and the expectation that the crisis will be resolved. In the medium term, a continued closure should push middle distillate prices higher, but further releases of strategic stocks and/or initiatives to reduce demand would also have an impact. In the long term, there is a downside risk related to the impact of demand destruction.
- The Ukrainian crisis required a rearrangement of global trade flows on a vast scale, but did not remove much oil or refining capacity from the global market. In principle, Hormuz is a much larger crisis, so without a quick resolution there is more to come.

5. - Crude oil price differentials

Johan Sverdrup - Forties price differential



Johan Sverdrup vs Forties coking margins after variable costs



- Crude oils derive their value from the refined products that are made from them. The price differentials between any two crudes reflect the differentials that refineries are willing to pay to substitute one crude for another, while maintaining an equal margin. These considerations shape the bidding activities of refineries every day and influence price differentials.
- The economics of substituting a cargo for another plays out based on the marginal capacity of each refinery. The economics of substituting a light crude for another light crude are better explained with hydroskimming economics or simple FCC economics. However, with heavy crudes getting scarcer, the price differentials between light and heavy crudes align with the hypothesis that refineries need heavy crude to fill up conversion capacity.
- The value differential between Johan Sverdrup and Forties is calculated based on what would make indifferent a refinery with Mild Hydrocracker and FCC or a refinery with a coker. The price of Johan Sverdrup is normally found in the range between these two. It is more often aligned to the economics of the coking refinery, probably reflecting a desire by these refineries to secure heavier crude.
- Occasionally, the price of Johan Sverdrup has been higher than what could be deemed with coking economics. For example, a price differential of zero on a delivered basis implies that no value is given to the API gravity difference between the crudes. This shows in the bottom chart as Forties having occasionally higher coking margins than Johan Sverdrup.

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