

India

Underweight (no change)

Highlighted Companies

HEG Limited

ADD, TP Rs2462, Rs1728 close

HEG is likely to register a 6% volume CAGR over FY24F-26F, and in the meantime its RoE is expected to rise from 8.6% in FY23 to 12.2% in FY25F. We have assigned an ADD rating to the stock with a target price of Rs2,462.

Camlin Fine Sciences

ADD, TP Rs300, Rs157 close

We have baked in vanillin benefits in our FY24F estimates to arrive at an EPS of Rs15.1 for FY24F and Rs21.8 for FY25F. Camlin Fine Sciences is likely to post a 193% EPS CAGR over FY23-25F.

Deepak Nitrite Ltd

REDUCE, TP Rs1514, Rs2054 close

We have retained REDUCE rating on the stock with a lower target price of Rs1,514. Further supply chain disruption because of any reason can lead to extraordinary margins.

Summary Valuation Metrics

P/E (x)	Mar22-A	Mar23-A	Mar24-F
HEG Limited	12.45	19.25	15.97
Camlin Fine Sciences	37.01	25.22	10.43
Deepak Nitrite Ltd	26.27	32.88	35.74

P/BV (x)	Mar22-A	Mar23-A	Mar24-F
HEG Limited	1.77	1.56	1.34
Camlin Fine Sciences	3.3	2.61	1.92
Deepak Nitrite Ltd	8.39	6.85	5.84

Dividend Yield	Mar22-A	Mar23-A	Mar24-F
HEG Limited	0.18%	2.31%	1.8%
Camlin Fine Sciences	0.25%	0.4%	0.96%
Deepak Nitrite Ltd	0.41%	0.29%	0.29%

Analyst(s)



Satish KUMAR

T (91) 22 4161 1562
E satish.kumar@incredcapital.com

Abbas PUNJANI

T (91) 22 4161 1598
E abbas.punjani@incredcapital.com

Chemicals - Overall

Demand declines, RM cost pressure will follow

- The ongoing rally in crude oil prices is in its initial phase and is expected to continue, while we anticipate gas prices to decline soon.
- Escalation in crude oil prices will trigger a rise in naphtha prices, leading to an increase in raw material prices for chemical companies.
- We like Camlin Fine Sciences in our chemical coverage universe. In the oil and gas space, Reliance Industries and Indraprastha Gas are our top picks.

Prices of crude oil to rise & that of LNG as a % of crude oil to fall

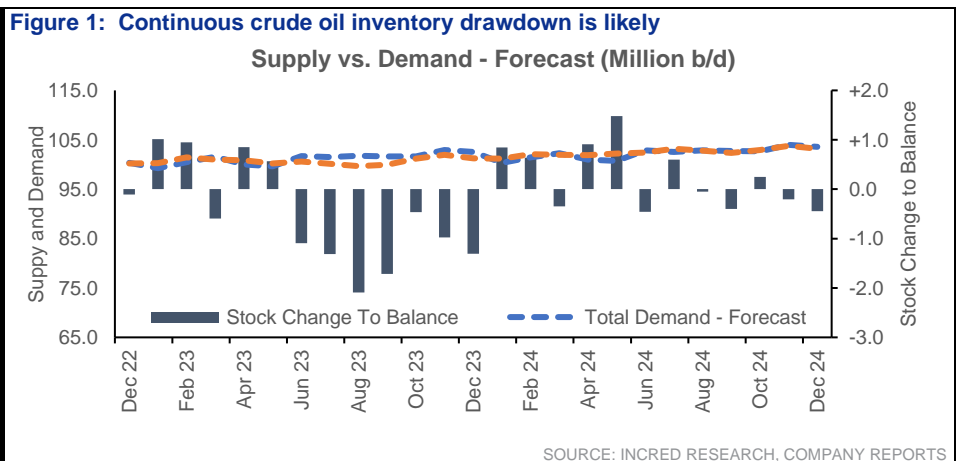
The rally in crude oil prices is still at a very nascent stage. However, it appears that they will sustain but at the same time, LNG prices may decline. Europe is managing its gas demand in an exemplary manner and at the same time, we are witnessing a significant liquefaction capacity addition across the world. The US alone has 100bcm of excess dry natural gas which, once it starts flowing to the global market (via LNG), will raise Henry Hub prices but depress global LNG prices. We expect this to start happening from 2025F and in the interim (2023-2024F) demand will be well managed by lower Chinese imports and lower European demand (please click: [IN: Gas Transmission & Dist - Volume growth concerns are behind us](#)). Crude oil and refining are facing a classic myopic policy-making, which is leading to low investment in drilling and even lower investment in refining. While clean energy will eventually take a lion's share, in the interim, demand recovery will lead to a sharp rise in crude oil prices. The OPEC also knows the inevitability of clean energy and hence, it has no incentive to keep crude oil prices at a level which can make clean energy non-economical. Moreover, the huge investment projects of Saudi Arabia and continuous higher outward remittances from OPEC nations means a higher crude oil price of ~US\$90+/bbl is needed for fiscal & current account stability (particularly for Saudi Arabia).

Oil price rise to fuel naphtha rally, ergo rise in RM prices of chemicals

The surge in crude oil will have pass through impact on naphtha. Naphtha is the main raw material for key components such as ethylene, propylene, benzene and multiple other petrochemicals. Ethylene spreads over naphtha have touched a historic low, mirroring the trend in propylene, which also witnesses a price hike due to rising cost of naphtha. A mean reversion in propylene spreads over naphtha is on the cards which, coupled with the rise in crude oil prices, can exert pressure on the raw material side. Currently, chemicals are facing demand problems and raw material inflation is likely to follow in the coming quarters.

Graphite electrode companies not impacted by the rise in oil prices

HEG and Graphite India use needle coke to make graphite electrodes. Needle coke is a highly crystalline carbon material produced from the thermal decomposition of aromatic petroleum or coal tar heavy residue (waste product of refinery). We have shown in this report that needle coke prices move with a lag vs. graphite electrode prices. We expect an upcycle in graphite electrodes, and so needle coke prices will rise irrespective of crude oil prices.



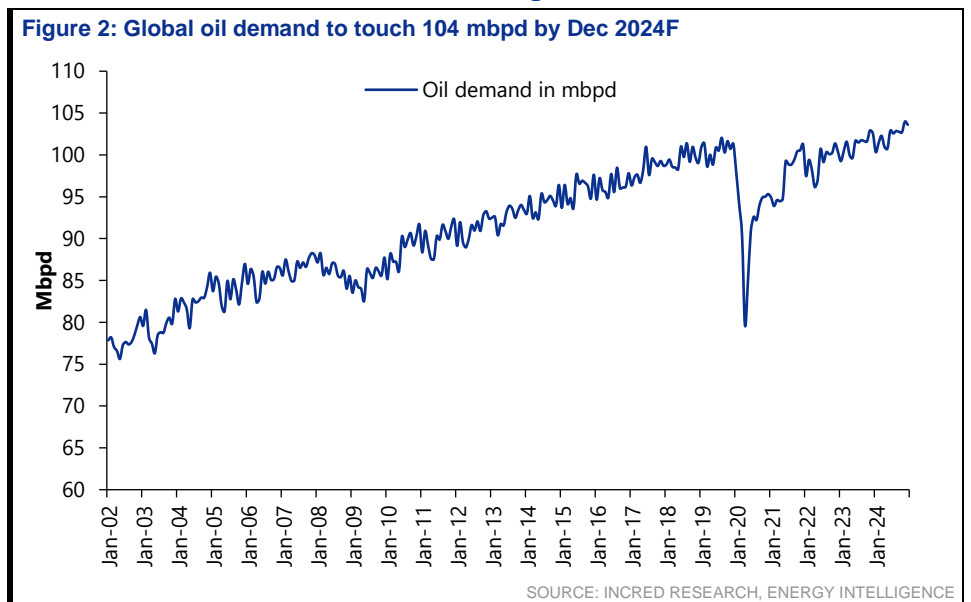
Demand declines, RM cost pressure will follow

The future of most Indian chemical majors will be driven by three factors: 1) Oil prices, which drive the prices of most raw materials for Indian chemical companies. 2) The global channel destocking in agrochemicals and electric vehicle chemicals. 3) The regulatory changes around the world, particularly for fluoropolymers and refrigerants. We don't think it's the right time to do bottom-fishing in the sector because the bottom is still far away.

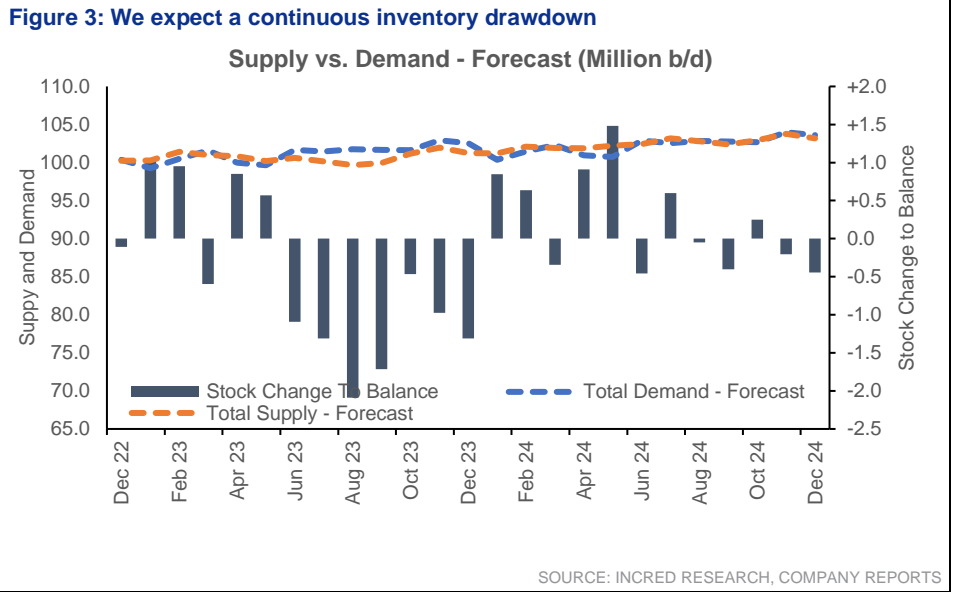
The rally in crude oil prices is likely to sustain

The rally in crude oil prices is still at a very nascent stage but it appears that it will sustain. However, gas prices are likely to go down. Europe is managing its gas demand in an exemplary manner, and we are witnessing significant liquefaction capacity addition that will drive down LNG prices. Please note that the US has enough excess natural gas available which, once it starts flowing in the global market (via LNG) will increase Henry Hub prices but depress global LNG prices. Among all chemicals, ammonia is the only chemical whose prices can remain depressed as natural gas is the principal input material for manufacturing it.

Global oil demand to remain strong ➤



The oil demand-supply balance indicates a continuous inventory drawdown ➤



The world is not investing enough in upstream capacity ➤

Figure 4: Aramco says the world is not investing enough, even to maintain the current production rate

Global oil capital spending³

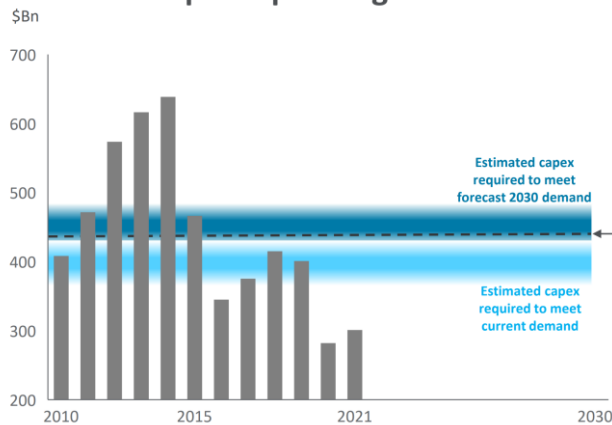
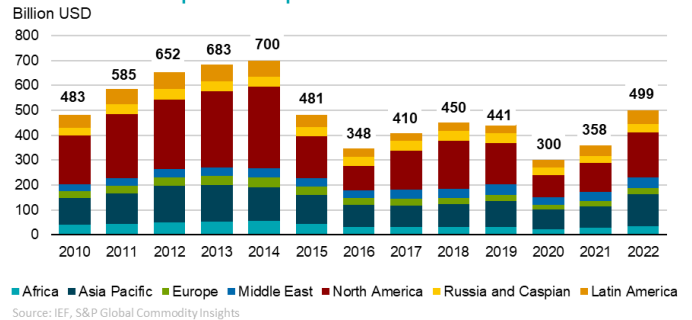


Figure 5: The S&P global upstream capex data corroborates the same

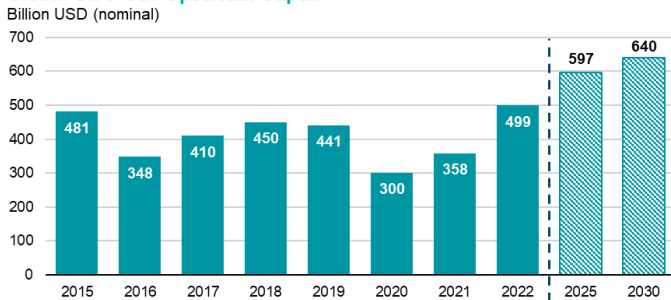
Global Oil & Gas Upstream Capex



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 6: As of now, projected numbers till 2030F paint a very grim picture about upstream oil capex

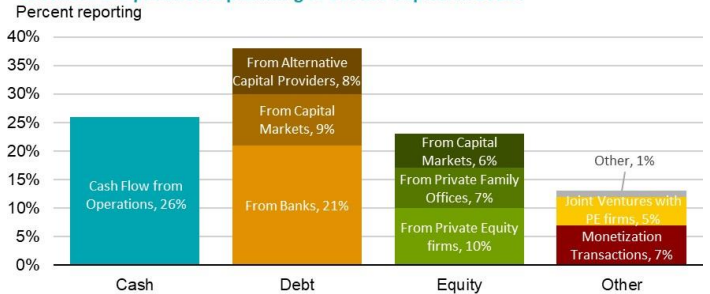
Global Oil & Gas Upstream Capex



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 7: Upstream capex is also contingent upon banks relaxing ESG norms while lending

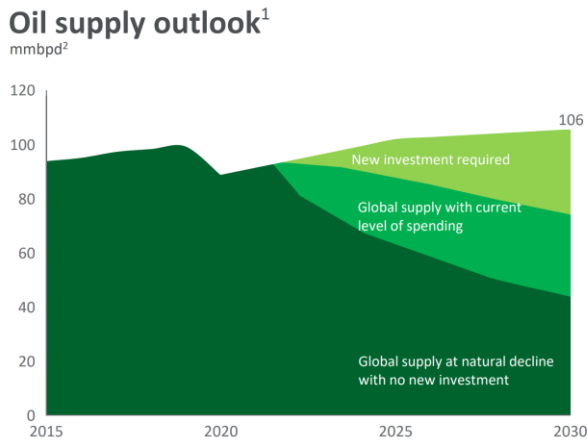
Q: Where are producers planning to secure capital in 2023?



SOURCE: INCRED RESEARCH, COMPANY REPORTS

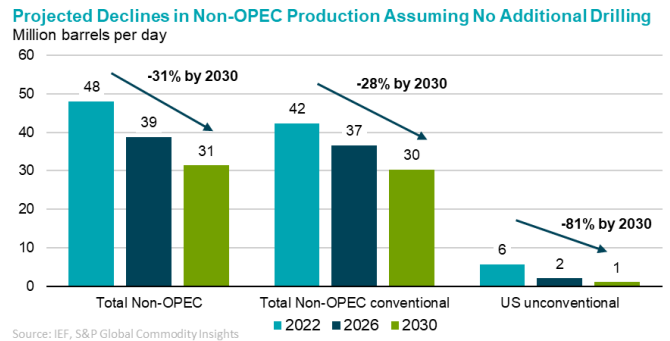
In all probability, oil production may decline in the near term ▶

Figure 8: Aramco projects that based on the current level of upstream investment, oil production will start declining from 2024F



SOURCE: INCRED RESEARCH, COMPANY REPORTS

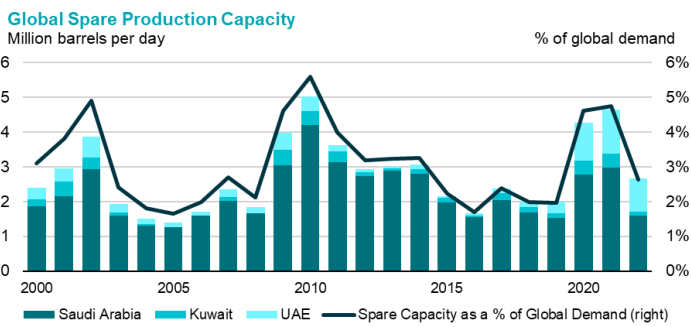
Figure 9: S&P commodity insights paints an even grim picture



Source: IEF, S&P Global Commodity Insights

SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 10: A major portion of the global spare capacity is in the Middle East countries



Source: IEF, S&P Global Commodity Insights

SOURCE: INCRED RESEARCH, COMPANY REPORTS

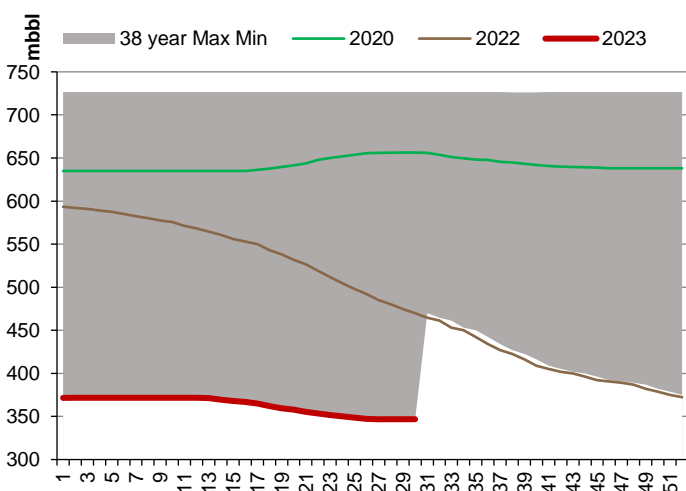
Figure 11: The Biden government's proclamation of climate fight can lead to a decline in US oil production from 2025F



SOURCE: INCRED RESEARCH, COMPANY REPORTS

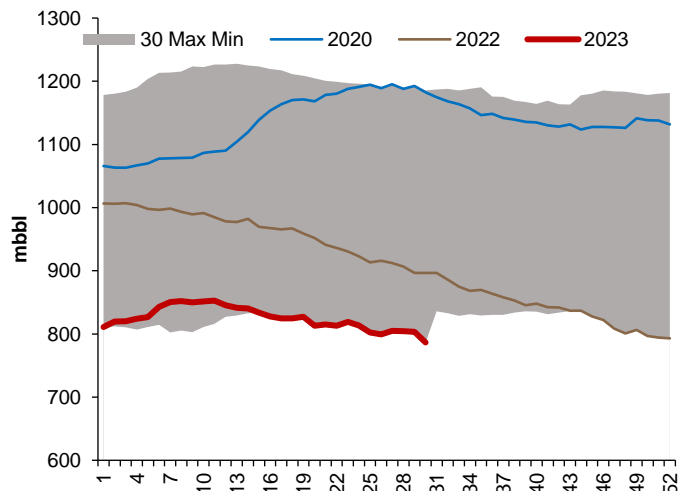
US oil inventory position is precarious and it can dwindle further in the coming days ▶

Figure 12: Current SPR (heavy crude oil) is good for 22 days (40% of SPR comprises heavy crude oil)



SOURCE: INCRED RESEARCH, COMPANY REPORTS

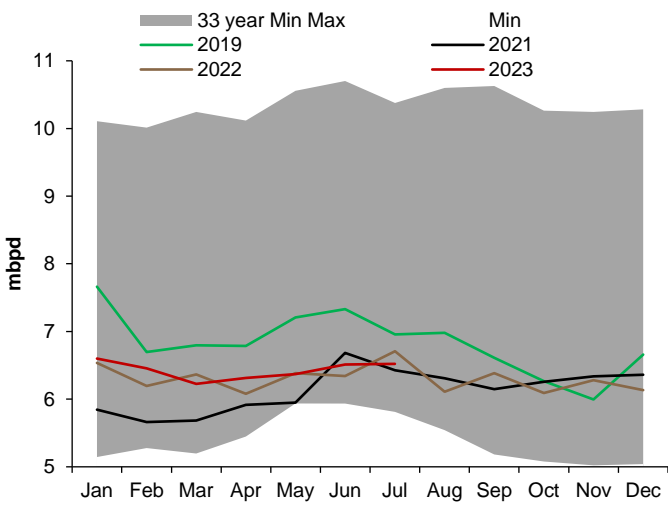
Figure 13: Overall commercial inventory is near a 40-year low



SOURCE: INCRED RESEARCH, COMPANY REPORTS

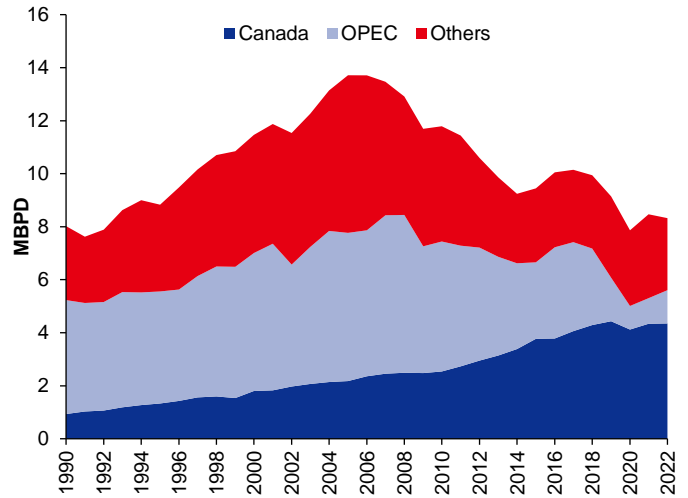
America still imports heavy oil as it has old refineries and hence, its dependence on OPEC is not going to reduce ▶

Figure 14: Even in 2023, the US, on an average, imports oil heavily



SOURCE: INCRED RESEARCH, COMPANY REPORTS

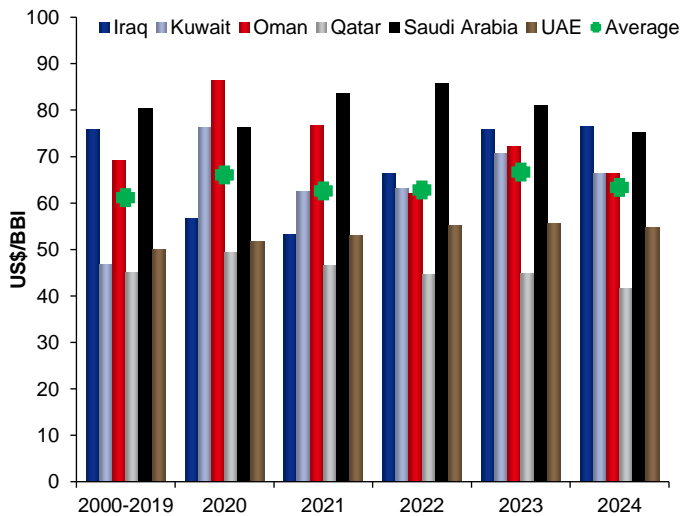
Figure 15: Over a period, the US has de-risked its imports but the Persian Gulf still exports ~2mbpd



SOURCE: INCRED RESEARCH, COMPANY REPORTS

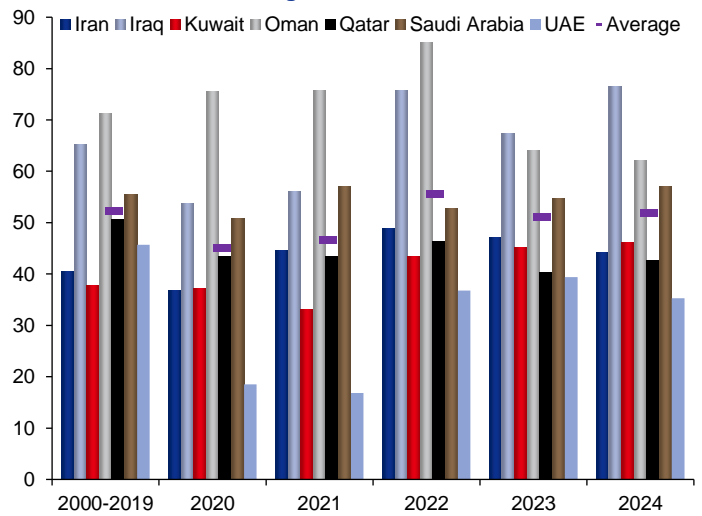
OPEC has a vested interest in keeping oil prices up as its finances have become precarious at low prices ▶

Figure 16: The fiscal breakeven price of oil for Saudi Arabia is US\$80/bbl



SOURCES: INCRED RESEARCH, COMPANY REPORTS

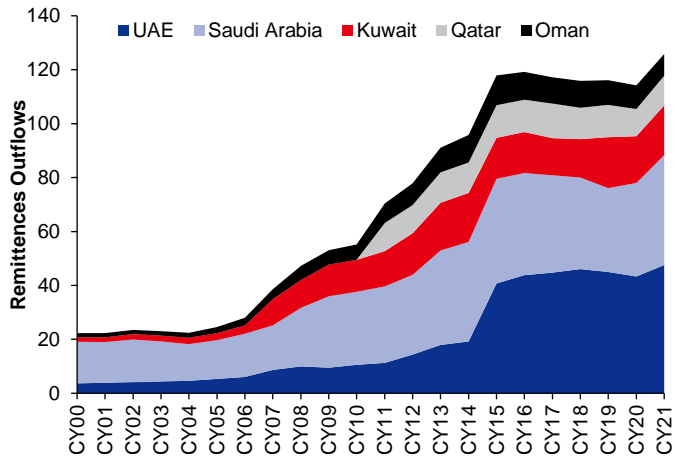
Figure 17: Even the current account breakeven oil price for OPEC countries is nearing US\$60/bbl



SOURCES: INCRED RESEARCH, COMPANY REPORTS

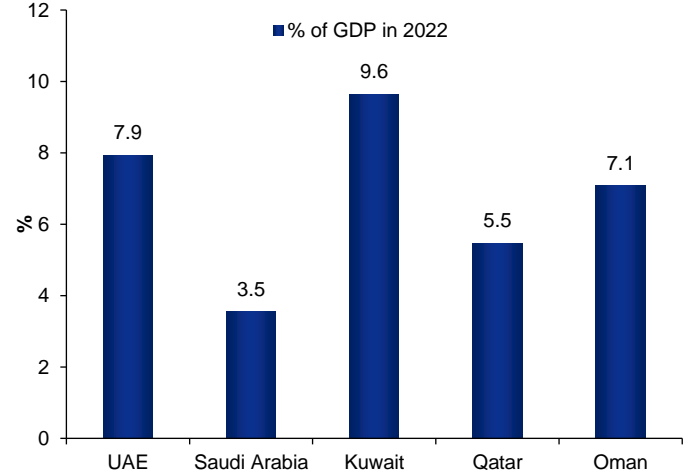
Countries in the Middle East are investing heavily in asset building, which will increase their fiscal & current account deficit or CAD breakeven ➤

Figure 18: The UAE and Saudi Arabia have the highest outward remittances...



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 19: ...as % of GDP, its 7.9% for the UAE and 3.5% for Saudi Arabia

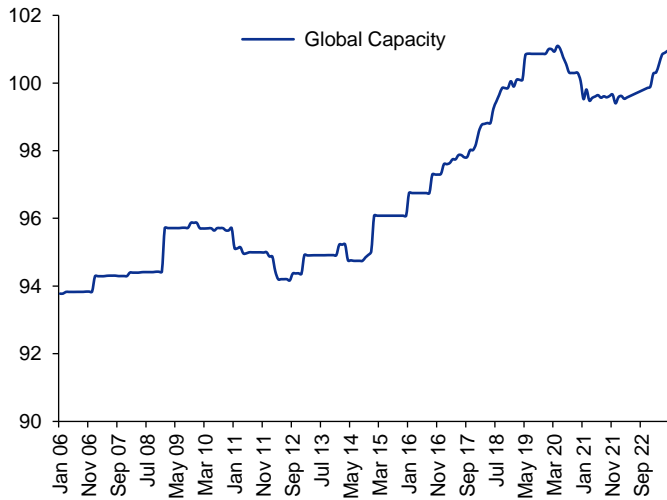


SOURCE: INCRED RESEARCH, COMPANY REPORTS

1. Saudi Arabia has the oil balancing power with 12.5mbpd of declared capacity in the hands of its state-owned entity, Aramco. The government can ask its oil production tap to shut the flow at full capacity, at its discretion.
2. Saudi Arabia is investing in the US dollar-based projects. All these projects entail investments running into multi-billion USD and mostly will have to be funded by the state. For example, if the Line must see the light of the day in the form of what its website envisages, then at least US\$1tr investment is needed. Even after assuming a debt-equity ratio of 1:2, Saudi Arabia will have to invest US\$350bn over the next eight years.
 - a. **The Line – potential investment of US\$1tr: This will mean that to invest in the equity portion, Saudi Arabia (with everything else remaining the same) needs US\$9/bbl more realization in oil prices.**
 - b. Amala
 - c. The Red Sea Project
 - d. Diriyah Gate
3. Please note that apart from the fiscal issue, it will also mean an increase in remittance outflow (as many foreign workers will come to work on these projects), which will exert extra pressure on the current account deficit or CAD and thereby, more pressure on oil prices to go up.

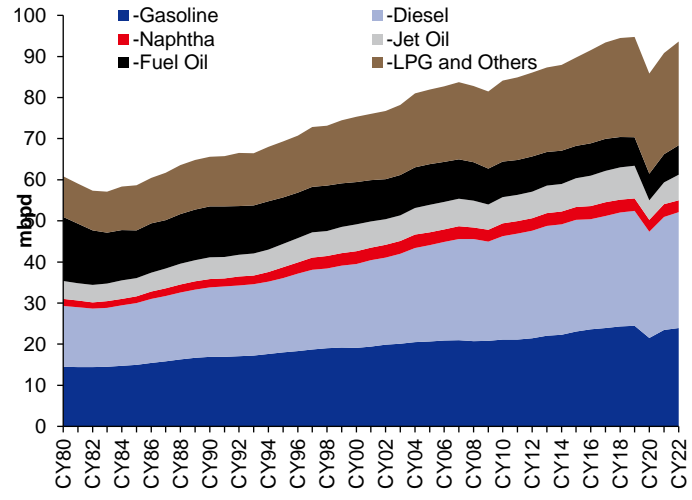
Even refineries are facing underinvestment ➤

Figure 20: Global refining capacity is stagnant at around 101mbpd



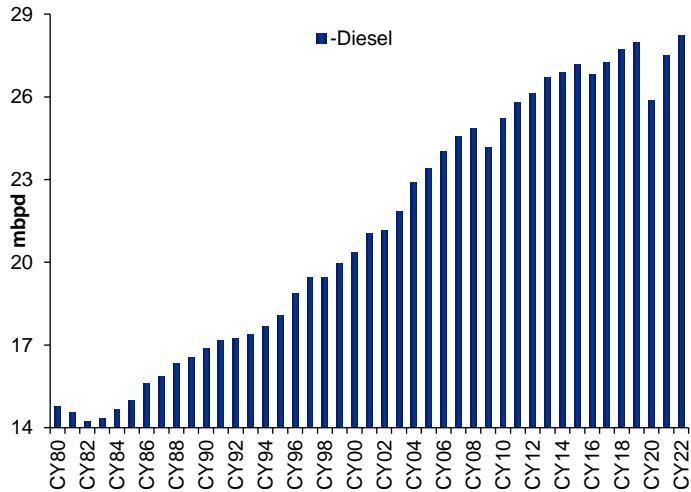
SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 21: However, demand for refined oil products is on the rise



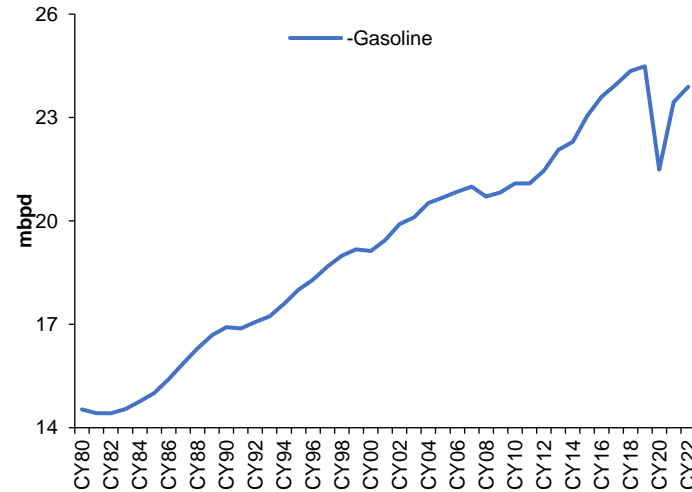
SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 22: Despite the global slowdown and the recent Covid-19 pandemic, diesel demand has remained strong and is going up



SOURCE: INCRED RESEARCH, COMPANY REPORTS

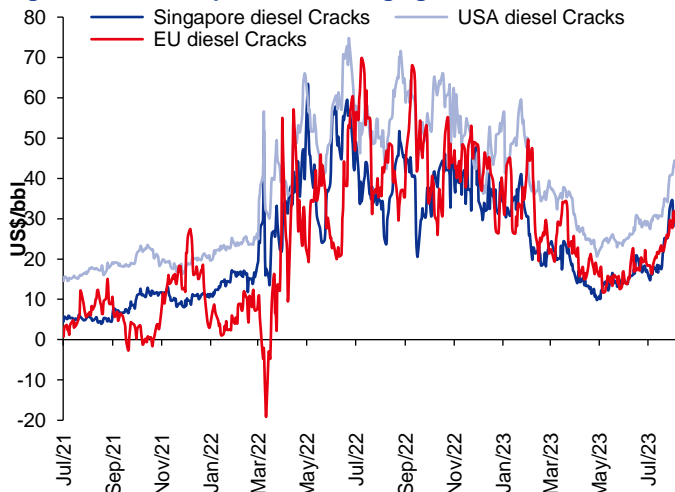
Figure 23: However, gasoline has a different fate because gasoline is mostly used in the developed countries



SOURCE: INCRED RESEARCH, COMPANY REPORTS

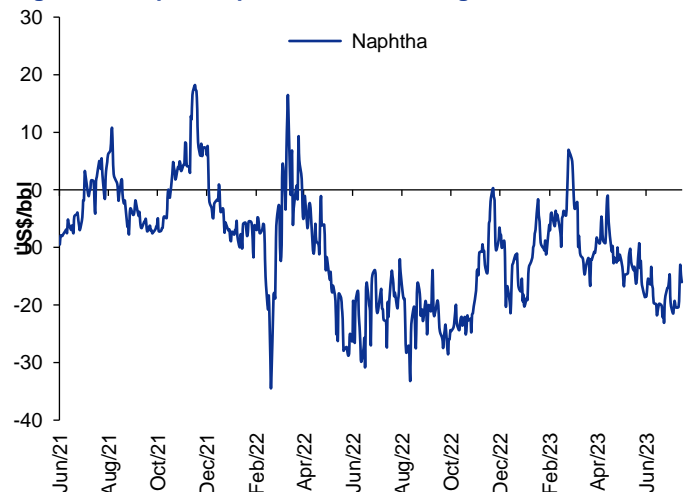
As a result, product spreads over crude oil are rising for diesel, gasoline and even naphtha ➤

Figure 24: Diesel spreads are rising again



SOURCE: INCRED RESEARCH, COMPANY REPORTS

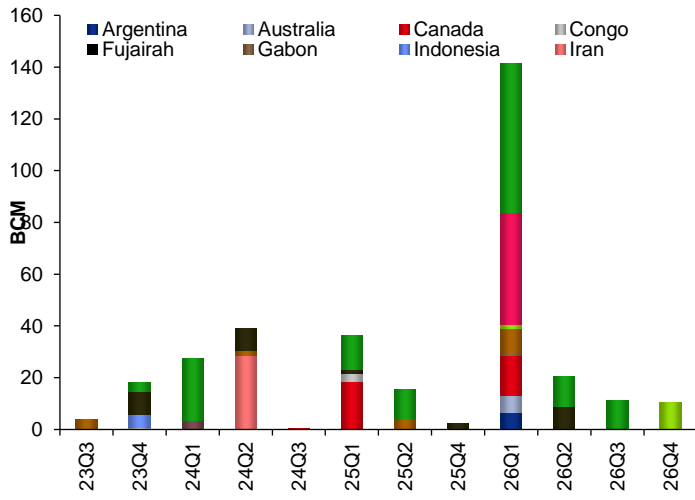
Figure 25: Naphtha spreads are also rising



SOURCE: INCRED RESEARCH, COMPANY REPORTS

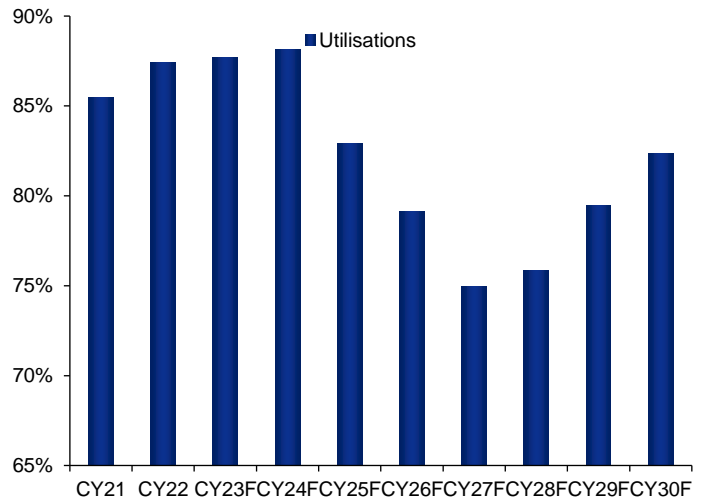
On the other hand, LNG prices are likely to fal ▶

Figure 26: Multiple new LNG liquefaction capacities are being set up...



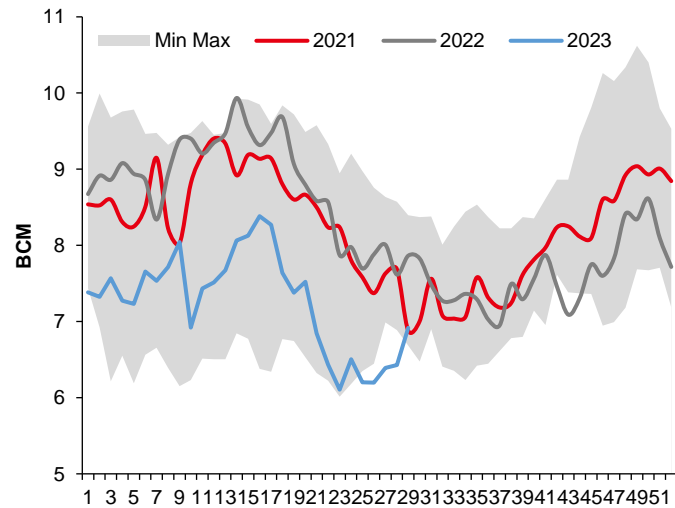
SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 27: ...as a result, the overall utilization rate is falling



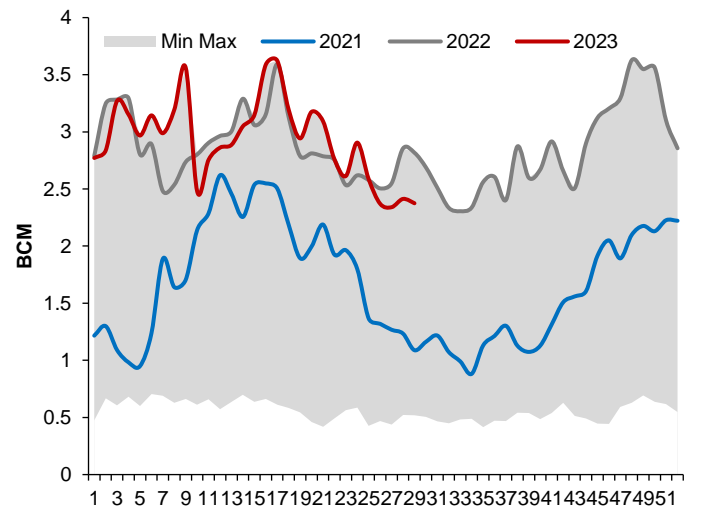
SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 28: Overall European gas imports are touching an all-time low...



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 29: ...and LNG imports are also down YoY

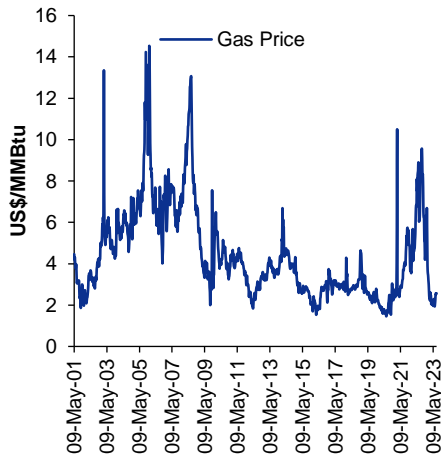


SOURCE: INCRED RESEARCH, COMPANY REPORTS

In the US, new LNG capacity can make a 50% ROCE, even at LNG prices at US\$8/mmBtu ▶

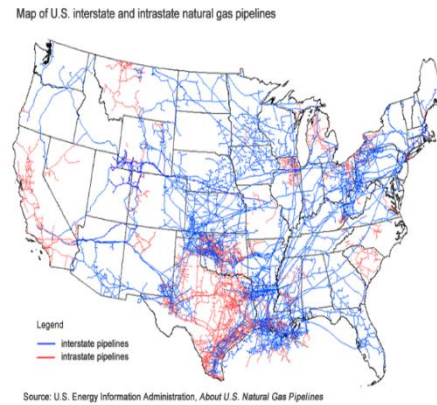
- The cost of liquefied natural gas (LNG) varies depending on several factors, including the size and complexity of the liquefaction plant, the location of the plant, the cost of natural gas, and the cost of energy. The average cost of liquefied natural gas is around US\$2-3/mmBtu.
- The operational cost of LNG varies depending on several factors, including the size of the liquefaction plant, the technology used, and the location of the plant. However, in general, the operational cost of LNG production is estimated to be between US\$0.5-\$1/mmBtu.
- The natural gas surplus in the US is currently around 100bcm and hence, until 2027F, LNG companies are in for super-normal profits at a 70% RoCE with LNG prices at US\$8/mmBtu.
- Hence, if oil prices top US\$100/bbl (which is likely) then the LNG slope vis-à-vis crude oil will fall below 11%.

Figure 30: Henry Hub gas prices are well below US\$3/mmBtu



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 31: The US has a big pipeline network



Source: U.S. Energy Information Administration, About U.S. Natural Gas Pipelines

SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 32: The capital cost of a liquefaction plant indicates we can get 50%+ ROCE even at US\$8/mmBtu

Table 3: Indicative Liquefaction Plant Cost in \$/tpa US\$ 2018 and \$/mmBtu US\$ 2018

Liquefaction Project Location	MTPA Capacity	\$/tpa US\$ 2018	\$/mmBtu*
All Locations	490	946	\$3.31
Remote / High Cost Locations	280	1,226	\$4.29
Qatar	76	462	\$1.69
USA Lower 48	61	690	\$2.31
West Africa	31	1,084	\$3.79
Russia / Arctic	33	1,292	\$4.52
Australia	89	1,789	\$6.26
Australia (excl Gorgon, Ichthys, Wheatstone, Prelude)	52	1,273	\$4.46
FLNG	12	1,975	\$6.91
FLNG (excl Prelude)	9	1,432	\$5.01

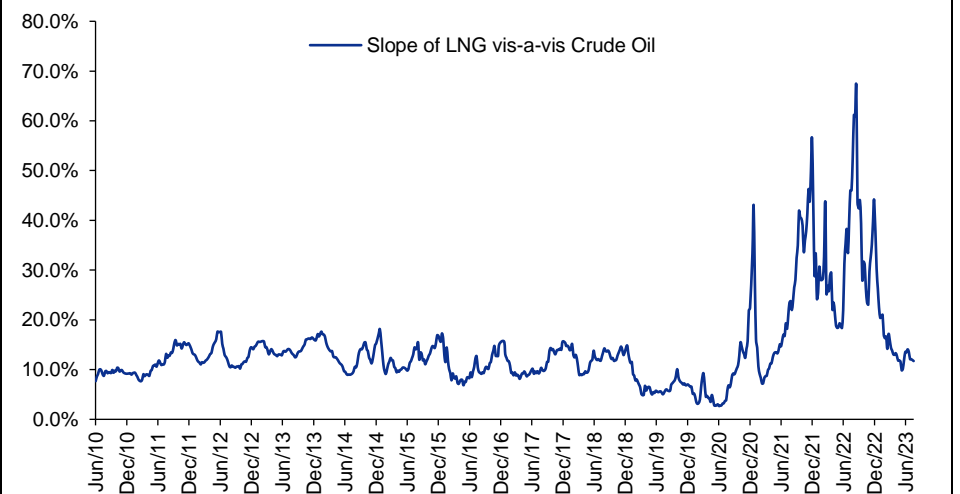
Note: (*) Indicative \$/mmBtu based on \$3.50/mmBtu per \$1000/tpa. Source: LNG Canada FID presentation.

SOURCE: INCRED RESEARCH, COMPANY REPORTS

As a result, LNG slope is likely to fall in the coming years ➤

In the coming days, LNG slope vis-à-vis, crude oil is likely to fall as crude oil prices are likely to go up and LNG prices are slated to decline.

Figure 33: Spot LNG rates can go below the long-term support level of 10%; term rates to come down in the coming quarters



SOURCE: INCRED RESEARCH, COMPANY REPORTS

High crude oil prices are negative for the cost of raw material that go into the manufacture of chemicals ➤

High crude oil prices will result in higher ethylene, naphtha and benzene prices which will result in a price rise for most raw materials used by chemical companies.

Ethylene, propylene and benzene prices to rise

Rising crude oil prices will lead to a rise in naphtha prices which, in turn, will lead to rise in all base commodity prices.

Rise in naphtha prices means rising cost of ethylene, propylene as well as other chemicals ➤

Naphtha is the base chemical for most refineries, and it is cracked to make various chemicals.

Figure 34: Ethylene spreads over naphtha are at historical lows, even without assuming that a mean reversal rise in crude oil prices will lift naphtha and ethylene prices

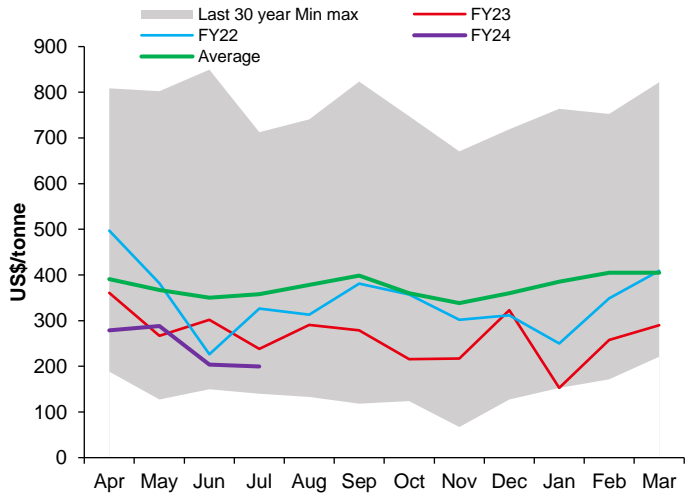


Figure 35: Like ethylene, propylene prices also rise with rising naphtha prices; a reversal to historical spreads can mean a significant hike in prices

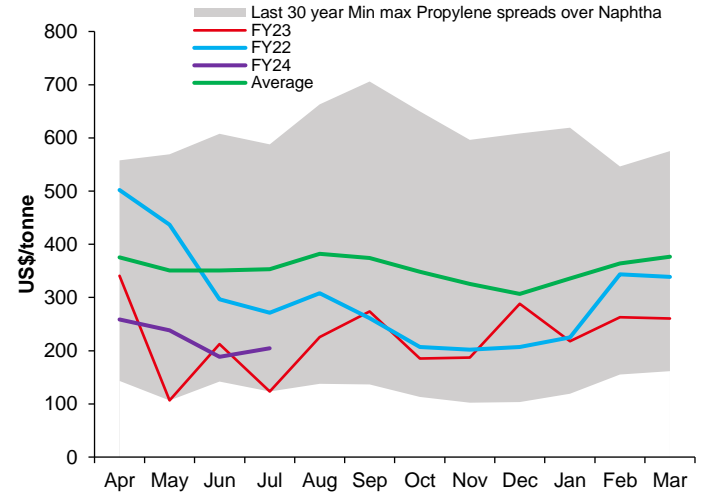


Figure 36: Only benzene is doing relatively better than its historical average

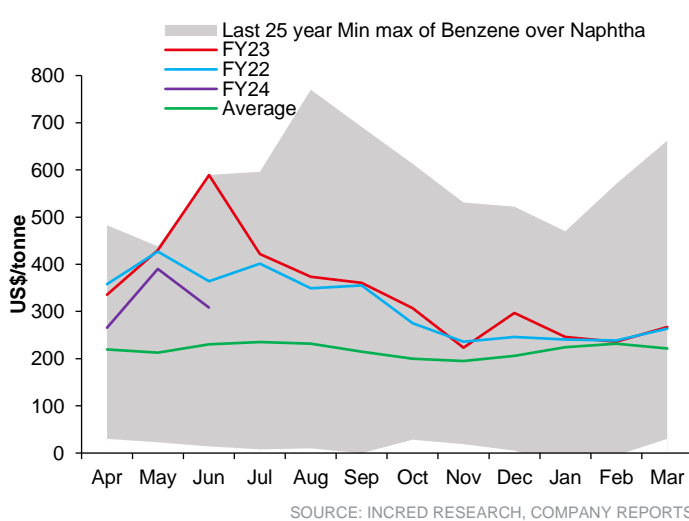
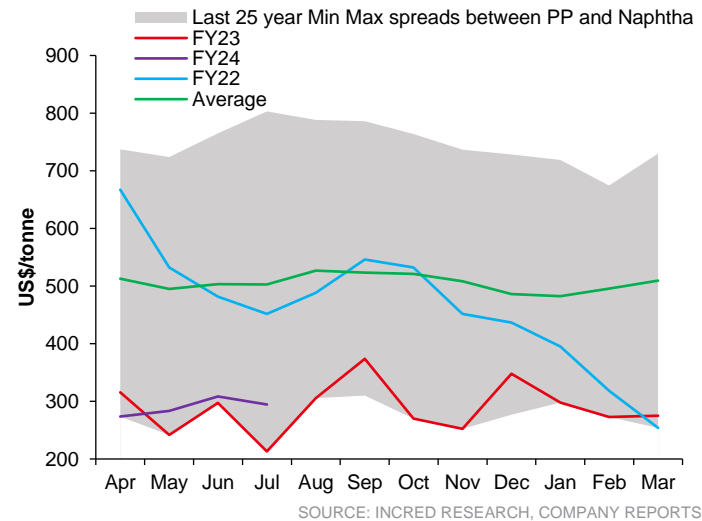
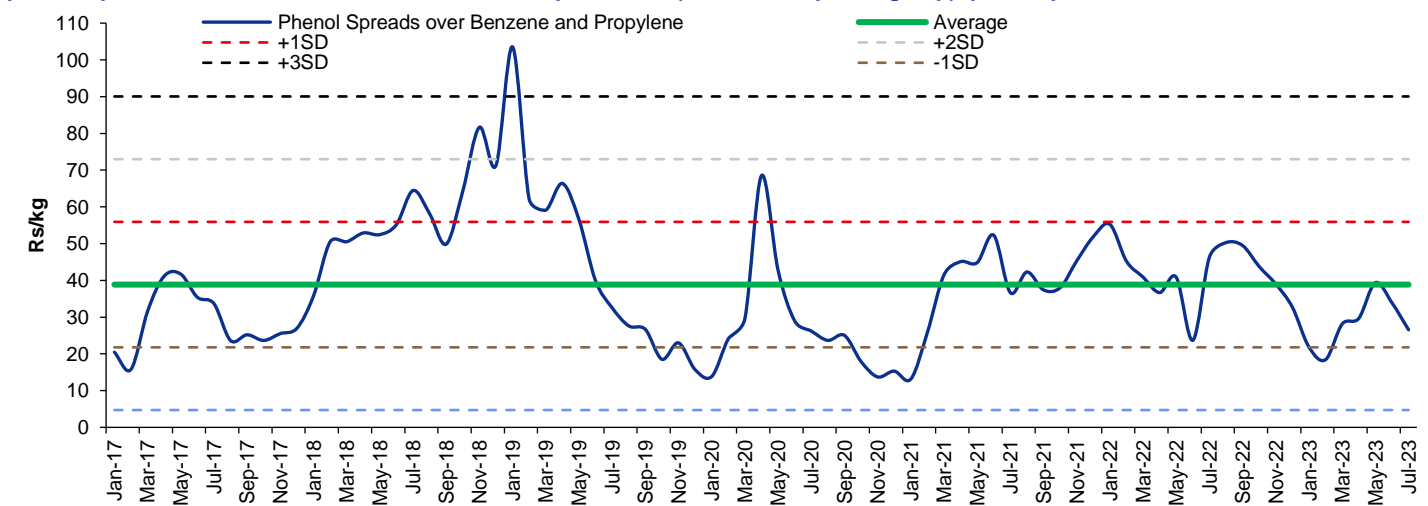


Figure 37: Polypropylene over naphtha spreads are also near their 25-year low



Rise in naphtha prices means rising cost of ethylene, propylene as well as other chemicals ➤

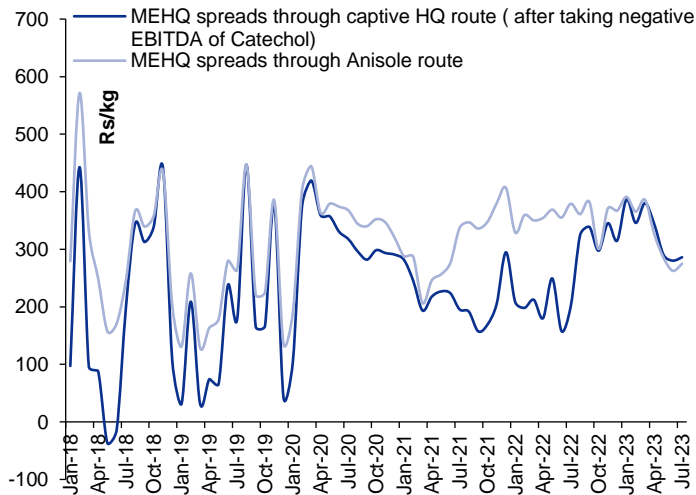
Figure 38: Domestic phenol spreads over propylene and benzene are near their long-term average; we don't see a big downside in phenol spreads as such and hence, if raw material prices rise (as crude oil prices go up), phenol prices will also rise



Phenol users, like MEHQ makers, will feel the pinch

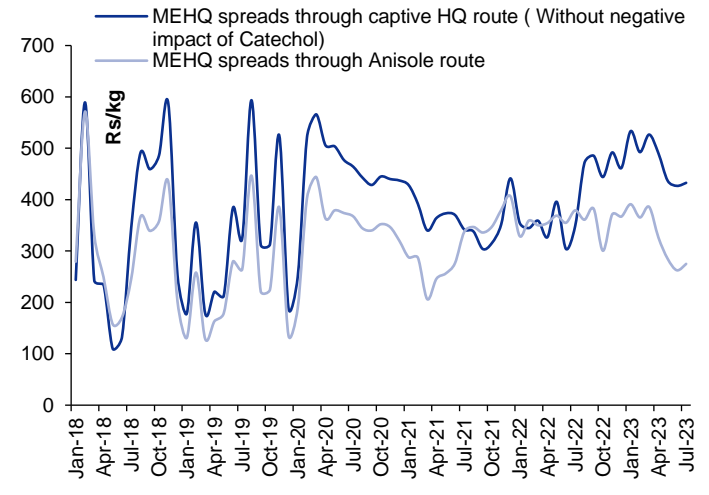
Users of phenol, like MEHQ makers (Clean Science and Technology) will feel the pinch because 1) competition becoming intense in the space with Camlin Fine Sciences restarting its capacity (with captive hydroquinone), and 2) the demand slowdown leading to volume decline and a fall in prices.

Figure 39: Camlin Fine Sciences' HQ route is equally profitable to Clean Science and Technology's anisole route, despite the negative impact of catechol



SOURCE: INCRED RESEARCH, COMPANY REPORTS

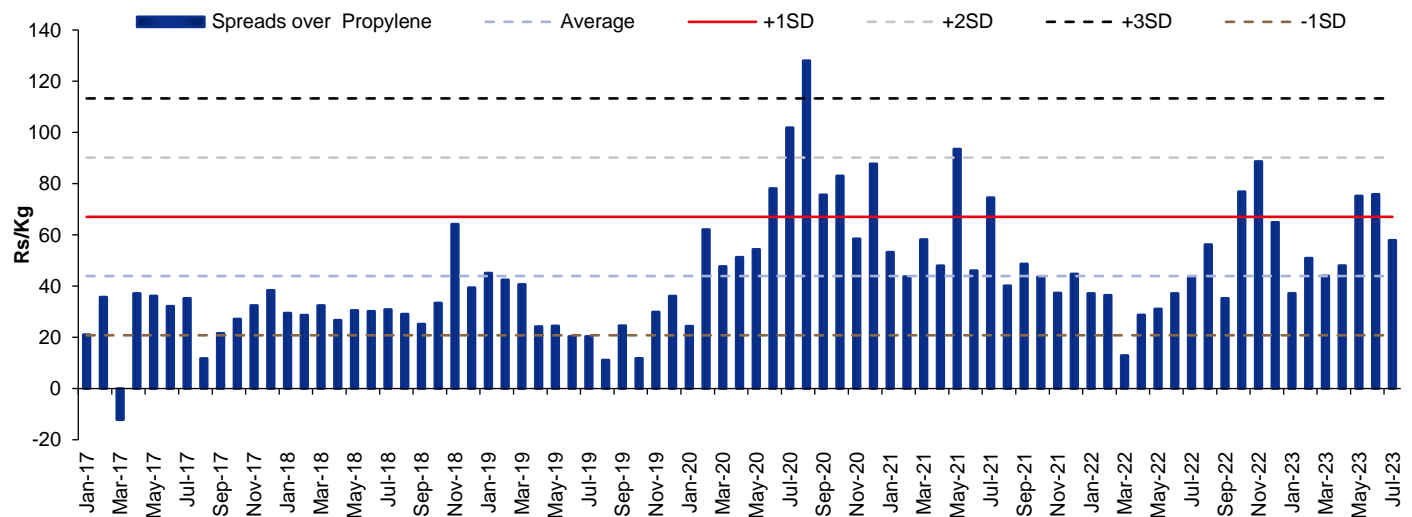
Figure 40: However, if we account for catechol usage in manufacturing vanillin, then Camlin Fine Sciences is a lot more profitable than Clean Science and Technology



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Iso propyl alcohol (IPA) made through the propylene route will cease to be remunerative

Figure 41: Deepak Fertilisers makes Iso propyl alcohol through the propylene route; as propylene prices rise and the Covid-19 pandemic-led demand for IPA wanes, the spreads of IPA over propylene will fall; Deepak Fertilisers has doubled its IPA capacity recently and hence, it will feel the pinch

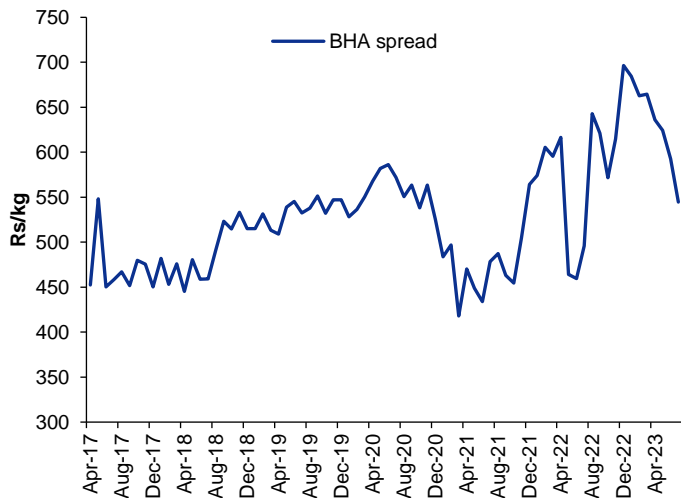


SOURCE: INCRED RESEARCH, COMPANY REPORTS

Butylated hydroxy anisole (BHA) is another derivative of phenol that will also see margin compression

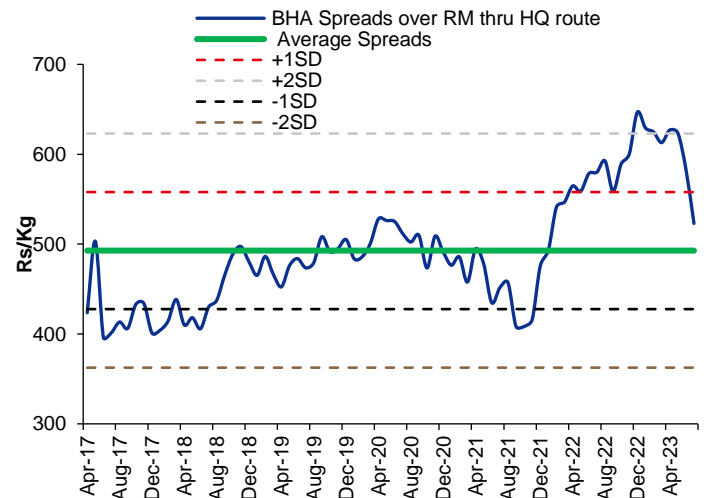
BHA is a relatively small market (US\$185m globally). Indian companies like Camlin Fine Sciences and Clean Science and Technology make this product. The margins (gross spreads over raw material) for both the hydroquinone and anisole routes will trend downwards in the coming quarters.

Figure 42: Clean Science and Technology's BHA spreads are declining as the cost of production is rising



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 43: For Camlin Fine Sciences, captive HQ production will be a saviour and hence, it can still be better than Clean Science and Technology

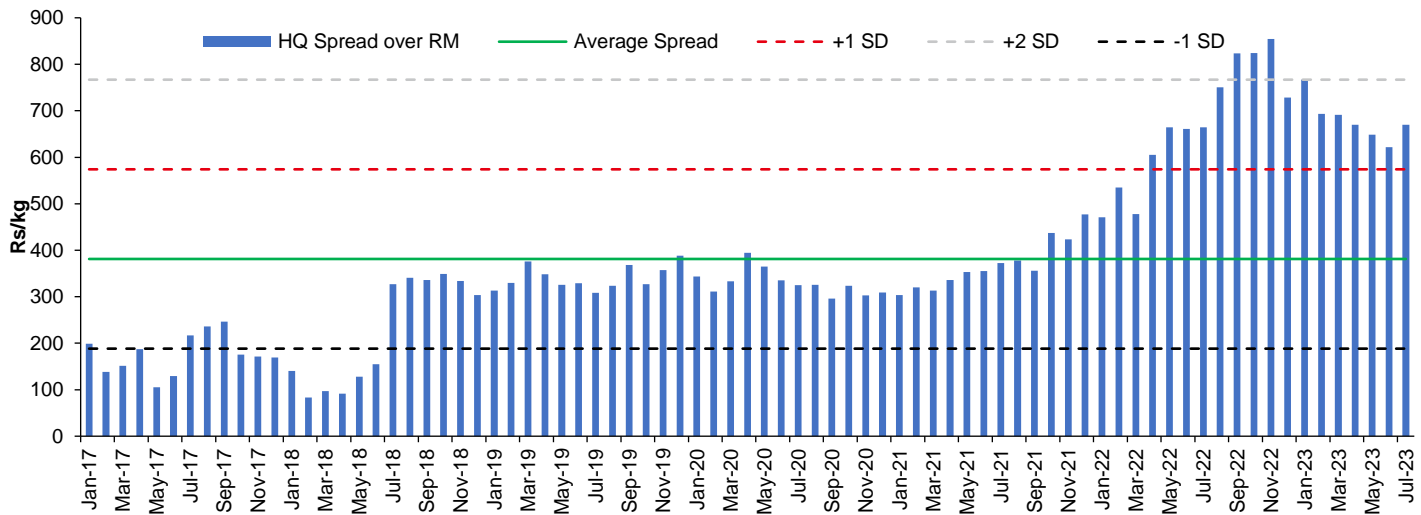


SOURCE: INCRED RESEARCH, COMPANY REPORTS

Even hydroquinone costs are slated to go up but given the HQ shortage, prices will follow suit ➤

Hydroquinone is an important chemical for the industry whose costs depend on the cost of phenol. As benzene and propylene prices rise, there will be an upward pressure on the prices of phenol, but we don't believe that there will be a significant margin compression in HQ as it's in short supply in the global market.

Figure 44: HQ margins have been recovering and given the global shortage, we believe that despite the rise in phenol prices, HQ margins can expand further

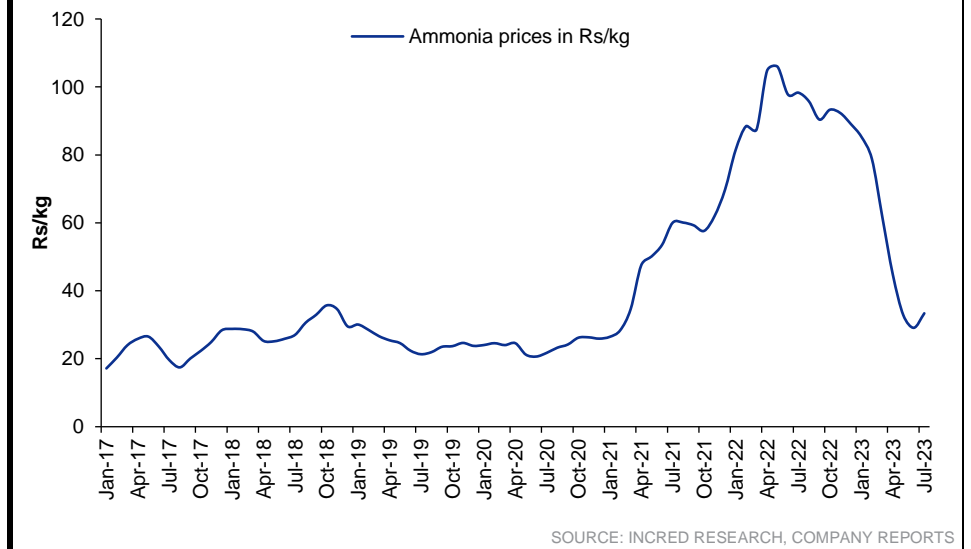


SOURCE: COMPANY REPORTS, INCRED RESEARCH

Ammonia prices can come down as LNG will become cheaper ▶

As LNG prices correct, ammonia prices can come down. Some signs of the same are already visible as ammonia prices have fallen.

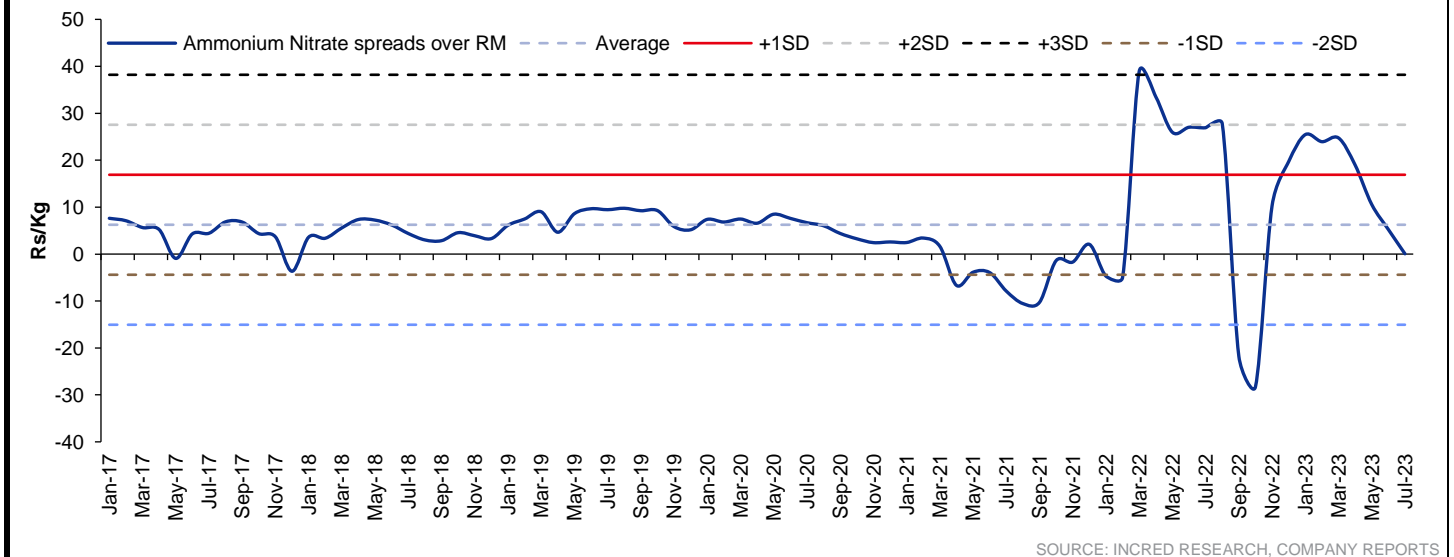
Figure 45: Ammonia prices are already falling and as LNG becomes cheaper, they can fall further; the fall in ammonia prices is good for Indian fertilizer manufacturers



However, we don't expect a big respite for ammonium nitrate manufacturers ▶

The rise in ammonium nitrate prices was a supply-chain related issue arising out of the Russia-Ukraine war. As the ongoing war has become a new normal, the supply chain has normalized, and the spreads of ammonium nitrate have gone back to their historical mean level. We had written about the same in our earlier note: [IN: Chemicals - Overall - Ammonium nitrate & IPA – bubble has burst](#)

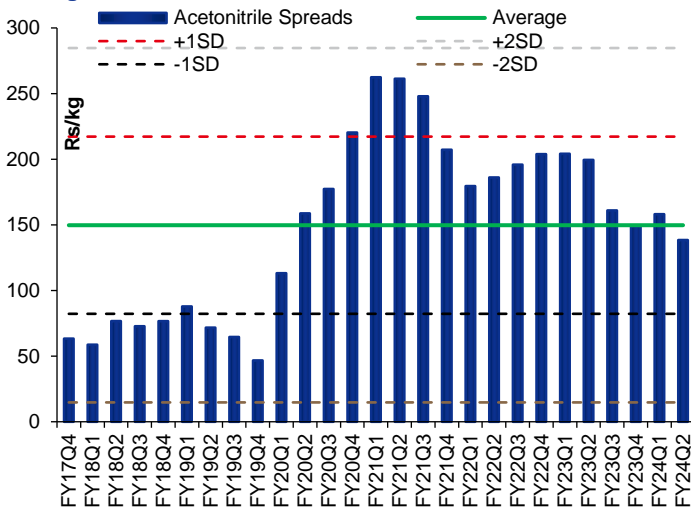
Figure 46: Ammonium nitrate spreads over nitric acid and ammonia have become 0 in Jul 2023



Demand is weak and so it's unlikely that amine manufacturers can get the advantage of lower ammonia prices ▶

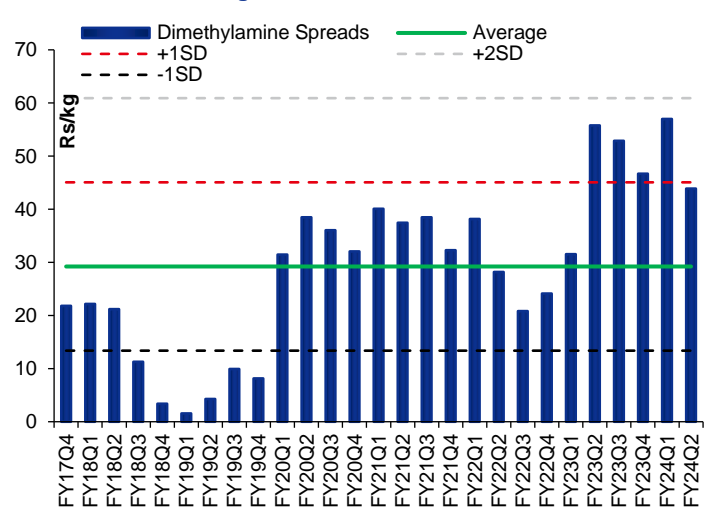
Some of the products manufactured by using ammonia are acetonitrile and dimethylamine. 1kg of acetonitrile requires 340gm of ammonia and 1kg of dimethylamine needs 450kg of ammonia.

Figure 47: Acetonitrile spreads are just near their historical average level



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 48: Dimethylamine spreads are still much higher than their historical average



SOURCE: INCRED RESEARCH, COMPANY REPORTS

The rise in crude oil prices will be positive for ATBS and hence, acrylonitrile ➤

ATBS (acrylamide tertiary butyl sulfonic acid) is a unique vinyl monomer that has a sulfonic acid group. Its polymer form is used in many applications such as:

Textiles: ATBS polymers are used as flocculants and dispersants in textile manufacturing. They help to prevent the formation of flocs (agglomerations of fibres) and to disperse dyes and other additives evenly in the textile bath.

Flocculants: ATBS polymers are used as flocculants in water treatment. They help to remove suspended solids and other impurities from water by forming flocs that can be easily settled or filtered out.

Dispersants: ATBS polymers are used as dispersants in a variety of industries, including paints, coatings, and plastics. They help to prevent the separation of pigment particles and other additives from the liquid medium.

Scale control agents: ATBS polymers are used as scale control agents in oilfield applications. They help to prevent the formation of scale (calcium carbonate deposits) on the inside of pipes and other equipment.

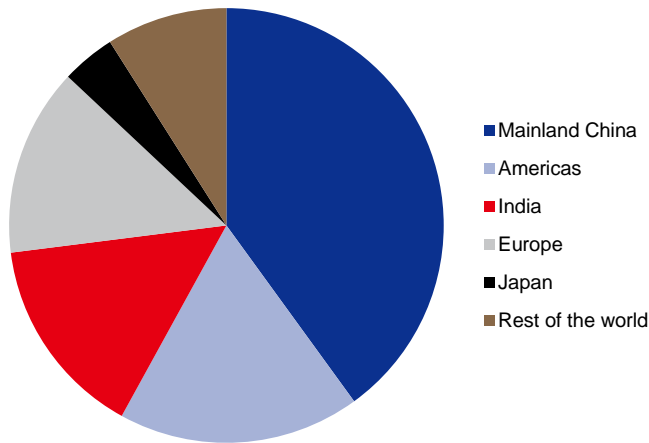
Well additives: ATBS polymers are used as well additives in oilfield applications. They help to improve the flow of oil and gas from wells.

However, the primary usage of ATBS is in oil fields. Normally, higher crude oil prices (which is the base) leads to higher acrylonitrile prices.

There is a normal tendency to produce more acrylonitrile and hence, acetonitrile ➤

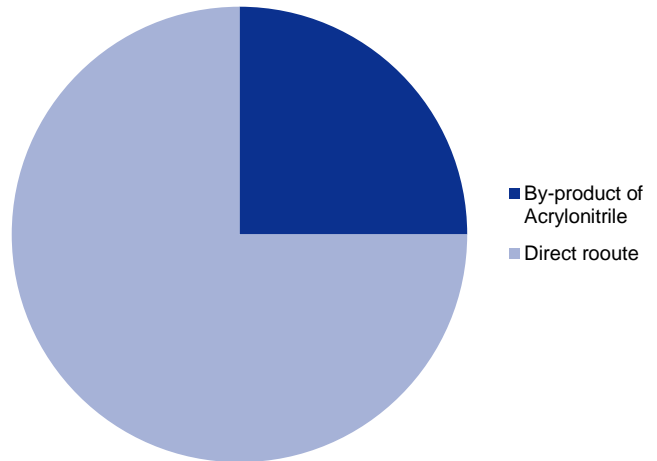
In the global context, almost 25% of acetonitrile comes as a by-product of acrylonitrile production. Globally, the top five manufacturers are INEOS Nitriles, Ascend Performance Materials, Tongsoh Petrochemical, Shanghai SECCO, and Sailboat Petrochemical/Honggang Petrochemical. Their combined production capacity stands at 41.6% of global total capacity.

Figure 49: Almost 40% of global acetonitrile production is from mainland China



SOURCE: INCRED RESEARCH, COMPANY REPORTS

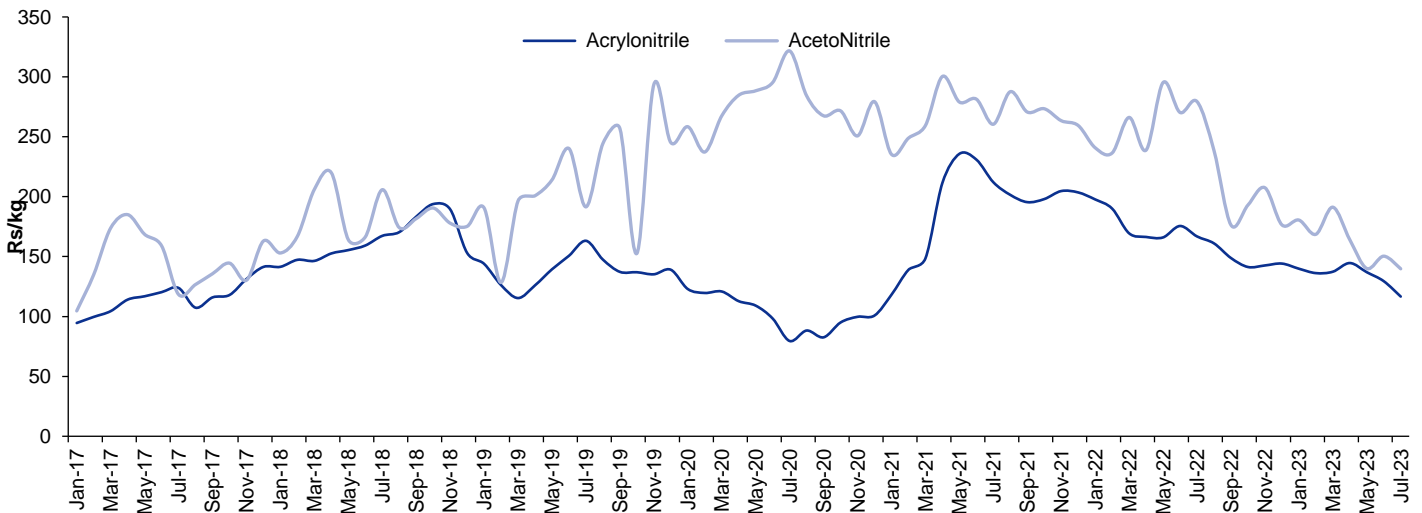
Figure 50: 25% of global acetonitrile production comes as a by-product of acrylonitrile



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Hence, prices of acetonitrile and acrylonitrile (in a normal scenario) move in the opposite direction ➤

Figure 51: In a normal scenario, these chemical prices have a negative correlation (except during the Covid-19 pandemic supply chain filling boom and then the eventual bust)

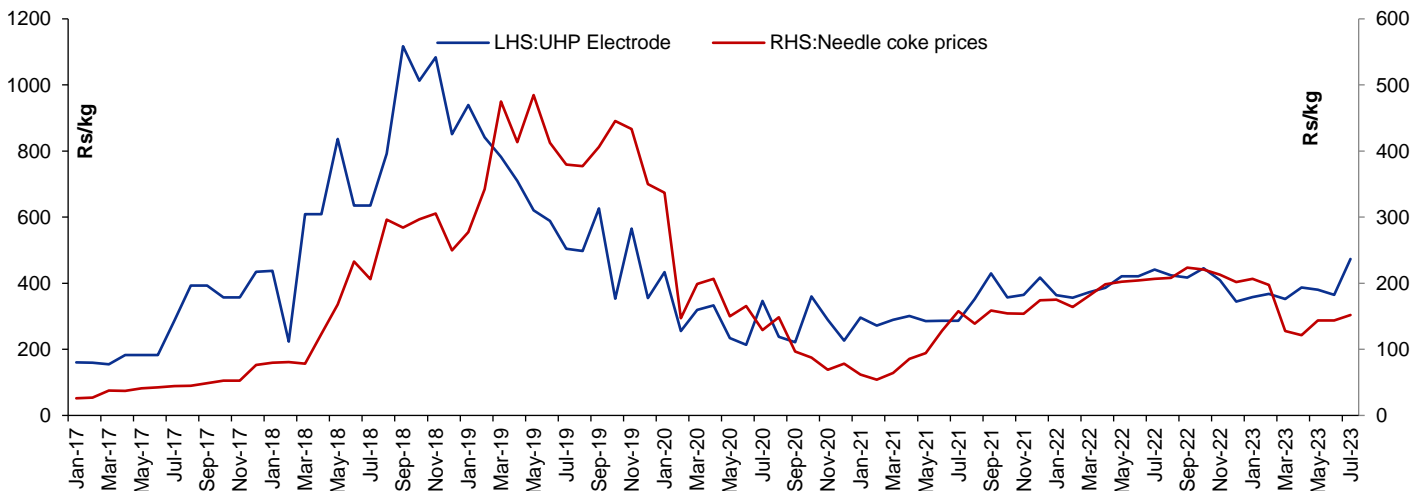


SOURCE: INCRED RESEARCH, COMPANY REPORTS

The rise in crude oil prices won't have a big impact on needle coke (a raw material for HEG and Graphite India) ➤

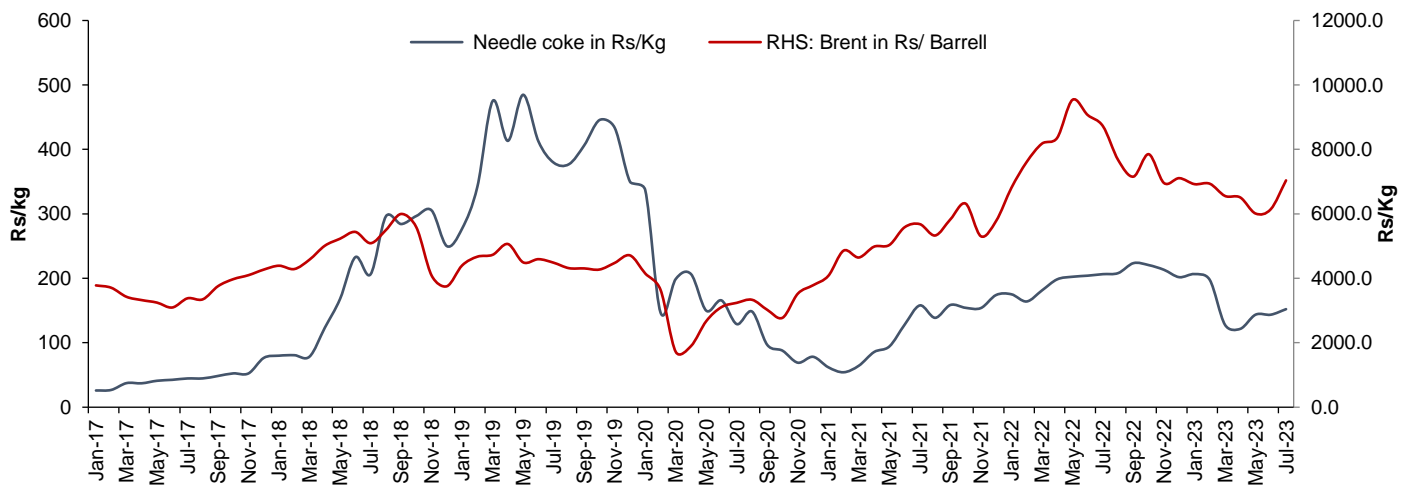
India imports its needle coke requirements mostly from the US. Needle coke is produced in refineries and hence, its prices are also linked to crude oil prices. However, as seen in the past, the prices of UHP electrodes have been the main driver of the prices of needle coke.

Figure 52: Needle coke prices are mainly driven by the prices of UHP electrodes; gas prices rise and fall with a lag vs. UHP electrode prices, and this phenomenon results in accentuated profits as well as losses for UHP electrode manufacturers



SOURCE: INCRED RESEARCH, COMPANY REPORTS

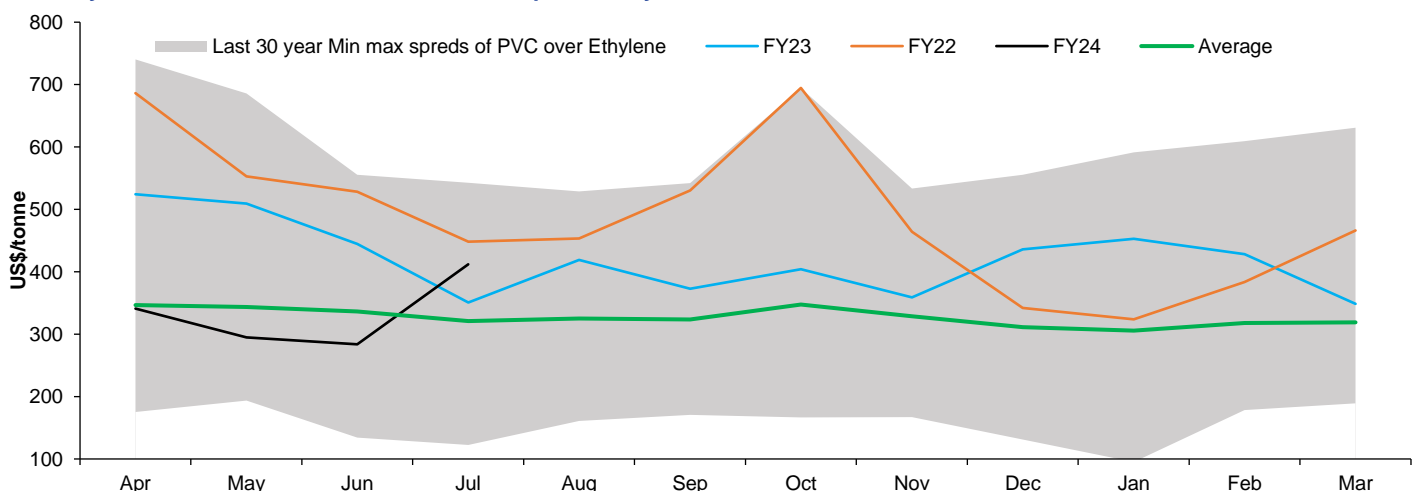
Figure 53: Needle coke prices are much more related to UHP electrode prices than crude oil prices



SOURCE: INCRED RESEARCH, COMPANY REPORTS

The rise in ethylene prices will lead to pressure on PVC margins, but things will be better off for PVC makers as they were mostly hit by high-cost inventory during this quarter ➤

Figure 54: During the Covid-19 pandemic, primarily led supply chain disruption, PVC spreads over ethylene rose, which also marked the IPOs of some of the weakest business models in the PVC space; mean reversal is already happening, and as high-cost inventory is consumed in the users' basket, their profitability will make a comeback

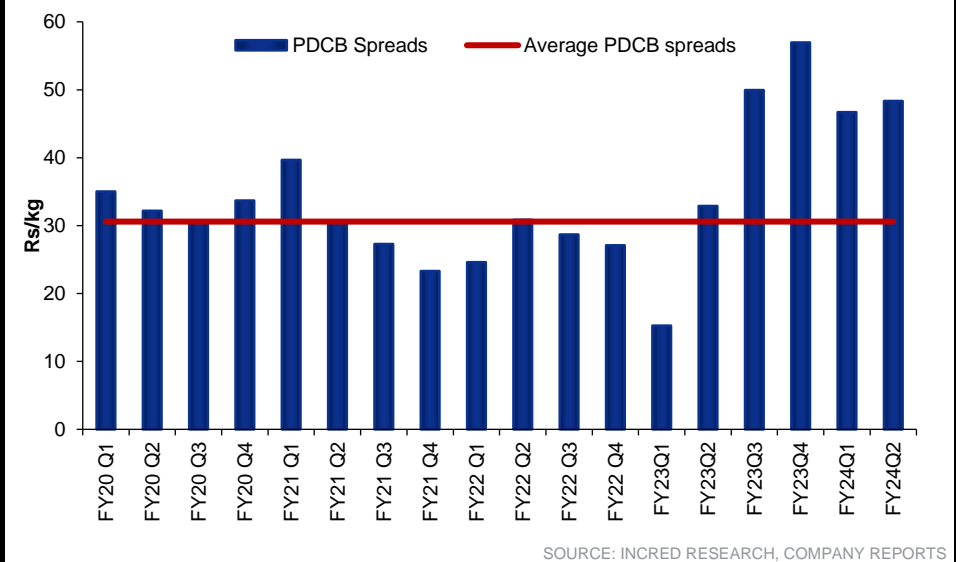


SOURCE: INCRED RESEARCH, COMPANY REPORTS

The rise in benzene prices will be negative for PDCB (para dichloro benzene), which is struggling from demand slowdown ➤

In the past quarter, despite lower volume offtake, PDCB makers have not passed on lower benzene prices to their end-customers. When the prices go up, then it is highly unlikely that customers will pay higher prices to cover the margins of PDCB makers.

Figure 55: PDCB spreads over raw materials are much higher than the historical average



Aniline prices will also rise, which will be a negative for MMA (mono methyl aniline) spreads ➤

Aniline is a colourless, oily liquid with a strong odour. It is an important industrial chemical with a wide variety of applications. The most common method for producing aniline is the catalytic hydrogenation of nitrobenzene. This process involves the following steps:

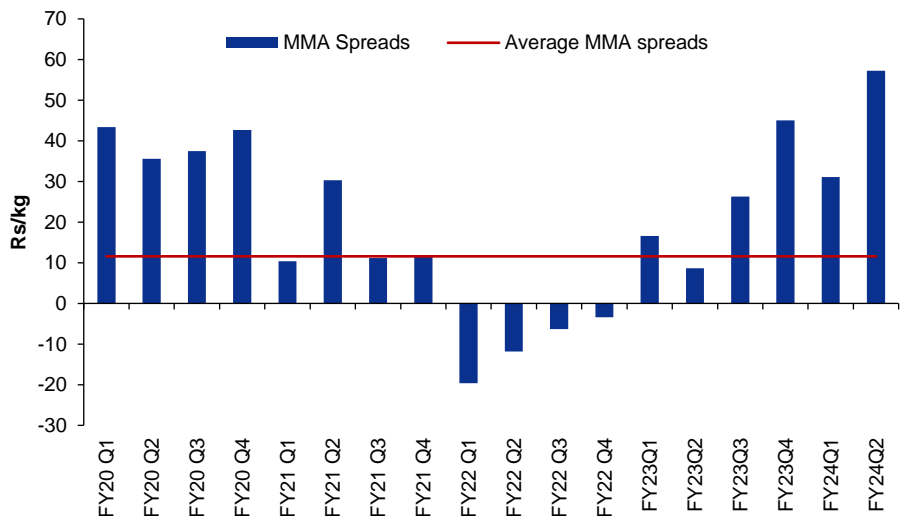
1. Nitrobenzene is mixed with hydrogen gas and a catalyst, such as nickel or copper.
2. The mixture is heated to a temperature of 200-300 degrees Celsius.
3. The catalyst helps to reduce the nitrobenzene to aniline.
4. The aniline is separated from the reaction mixture and purified.

Another method for producing aniline is the amination of phenol with ammonia. This process involves the following steps:

1. Phenol is mixed with ammonia and catalysts such as sodium hydroxide or calcium hydroxide.
2. The mixture is heated to a temperature of 150-200 degrees Celsius.
3. The catalyst helps to react the phenol and ammonia to form aniline.
4. The aniline is separated from the reaction mixture and purified.
5. The catalytic hydrogenation of nitrobenzene is the most common method for producing aniline because it is more efficient and produces a higher yield of aniline. The amination of phenol is a less common method, but it is sometimes used when the starting material is phenol.

According to a study by the American Chemical Society, about 90% of the world's aniline is produced through the nitrobenzene route. This route is more efficient and produces a higher yield of aniline than the amination of phenol.

Figure 56: MMA spreads over aniline and other raw materials are a lot higher than their historical mean



SOURCE: INCRED RESEARCH, COMPANY REPORTS

As of now, aniline spreads over the raw material are high because of capacity constraints and raw material cost pressure will only add to the price ➤

Benzene is first reacted with nitric acid and sulfuric acid to form nitrobenzene. Nitrobenzene is then hydrogenated in the presence of a catalyst, such as nickel or copper, to form aniline.

The reaction equation is as follows:

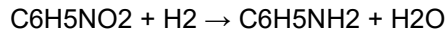
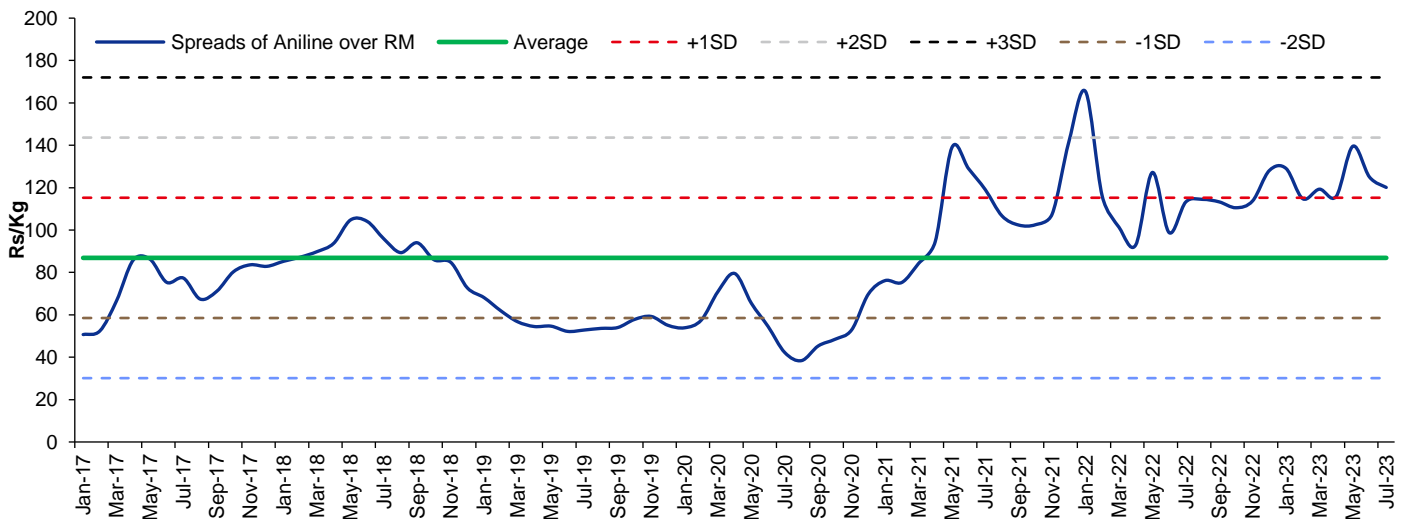


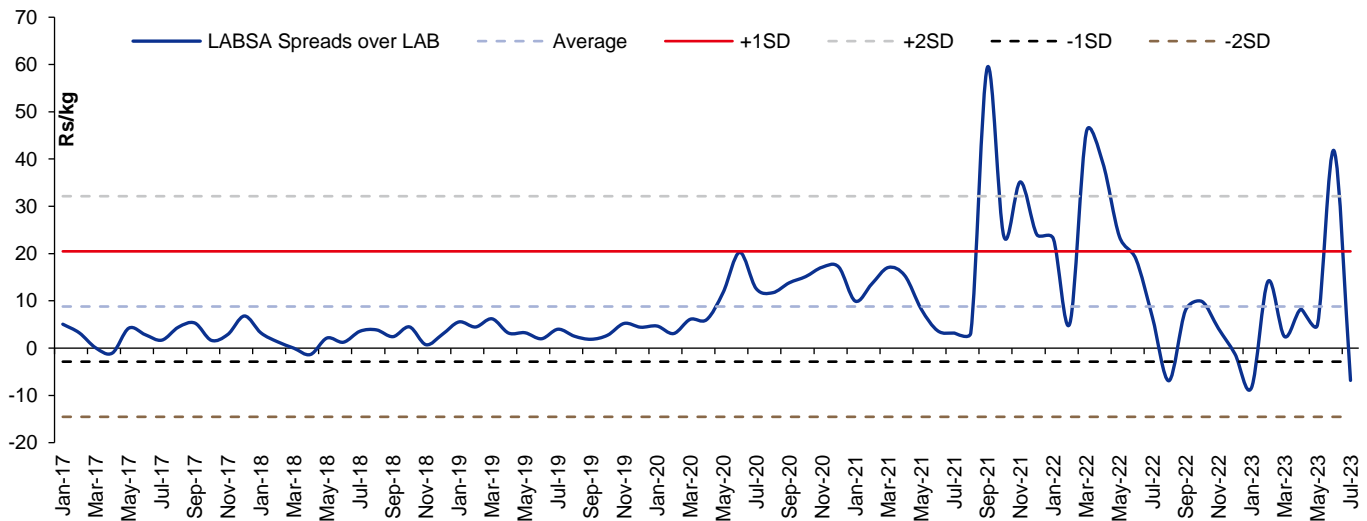
Figure 57: Aniline spreads have moved structurally into a higher range because of capacity constraints; we are not forecasting any further rise in spreads, but aniline-makers will be able to pass through the rise in costs



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Linear alkyl benzene prices will also rise as benzene prices will rise, which is bad news for LABSA spreads and Galaxy Surfactants ➤

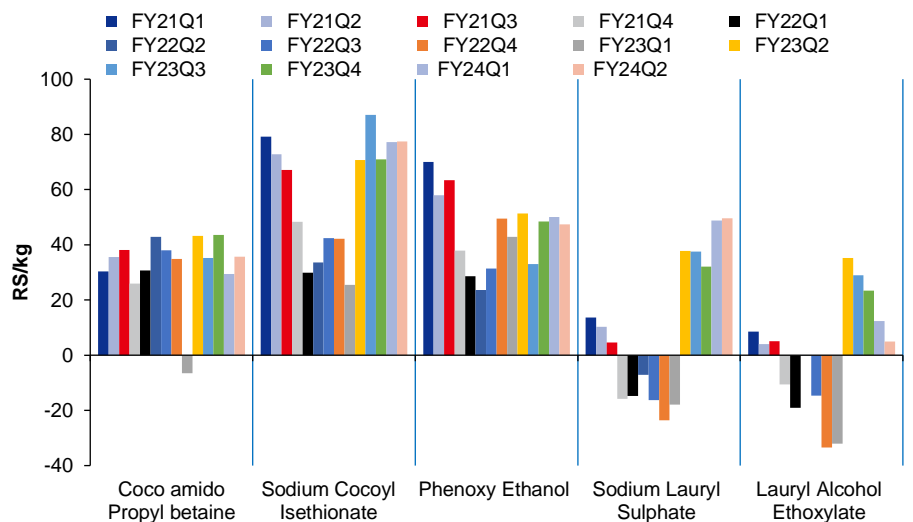
Figure 58: LABSA spreads have collapsed, and demand is under pressure; rising benzene prices will be another nail in the coffin



SOURCE: INCRED RESEARCH, COMPANY REPORTS

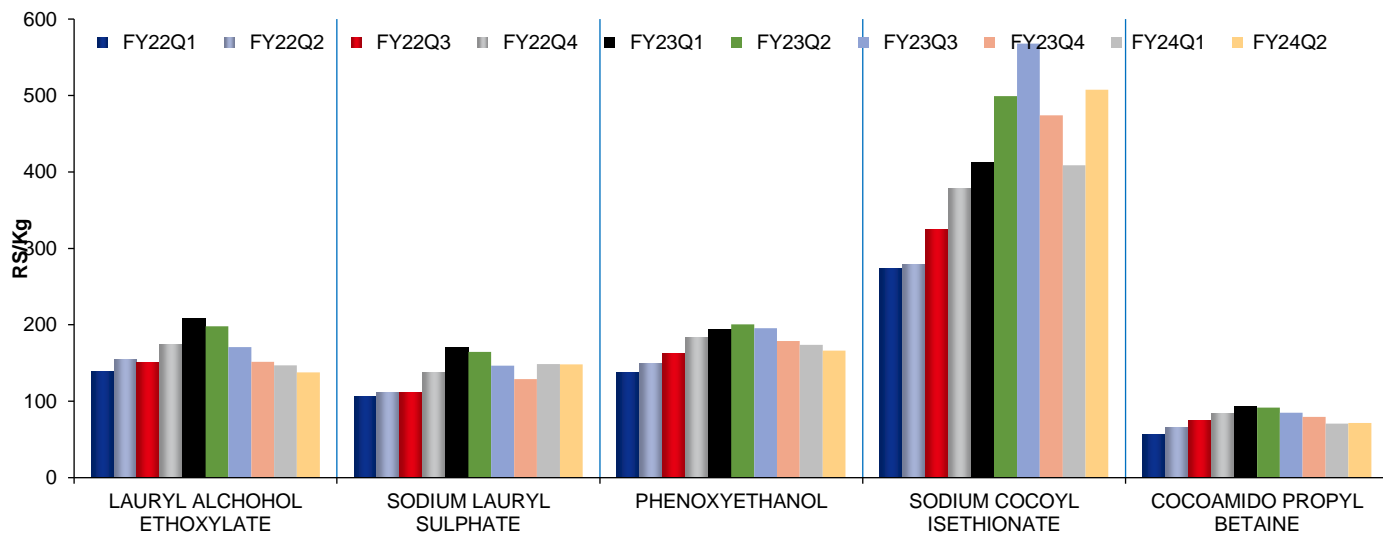
Rising crude oil prices will be negative for most of the surfactants as raw material costs will go up and product margins will fall in a slowing world economy ➤

Figure 59: The product margins for most of the important products made by Galaxy Surfactants are falling because of demand pressure and the rise in cost of raw materials will only add to its problems



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 60: Product prices are falling as the demand is low



SOURCE: INCRED RESEARCH, COMPANY REPORTS

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