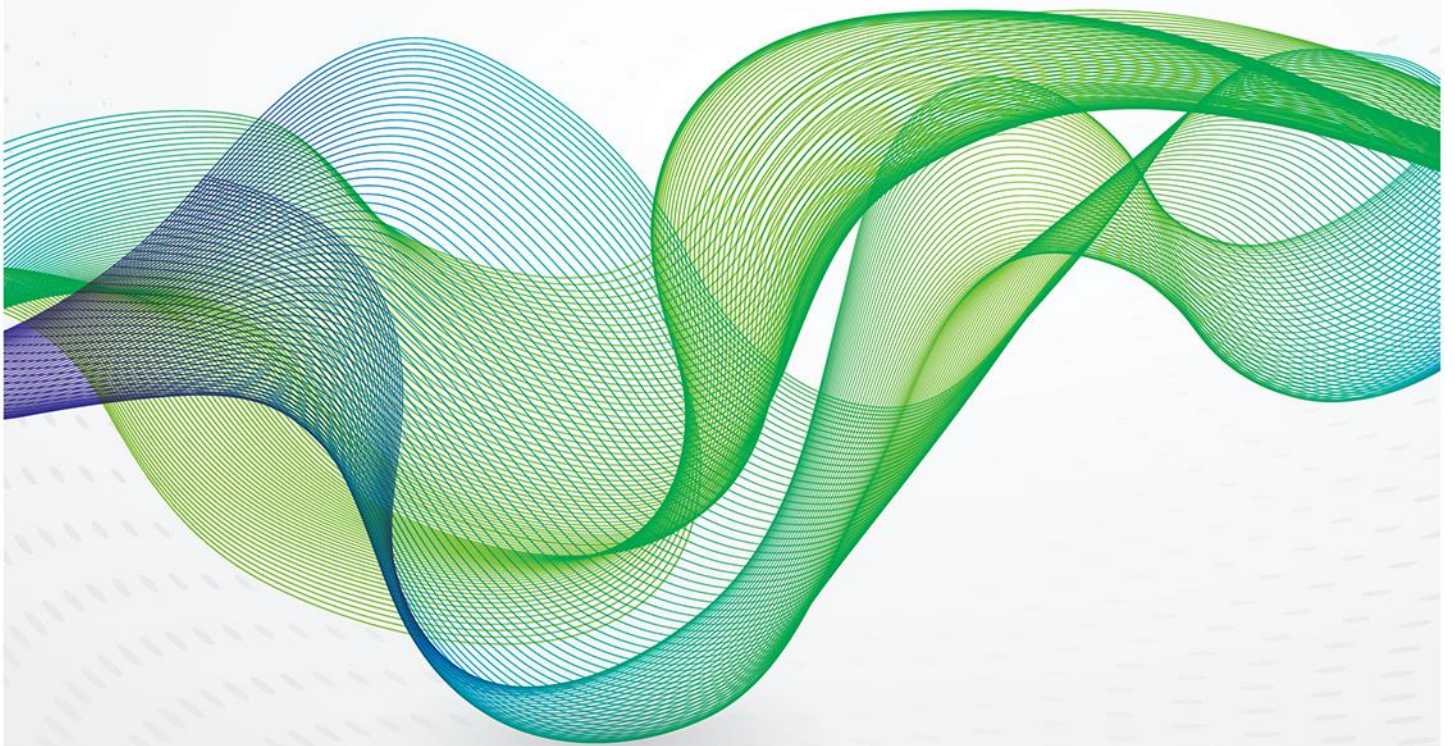




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# The coronavirus: petrochemicals' perfect storm



OXFORD ENERGY COMMENT

John Richardson  
OIES Research Associate and ICIS



Markets continue to grapple with the impact of the coronavirus outbreak on China's economic growth and demand for commodities. But given that China is now at the heart of global manufacturing supply chains—which in turn fuel demand for petrochemicals—the coronavirus outbreak and the ensuing collapse in economic activity are weighing on both a large importer and exporter of polymers. And given that chemicals are widely seen as the next frontier for oil demand—as gasoline, diesel and jet fuel consumption is projected to peak over the coming years—how demand for petrochemicals fares matter greatly.

Run cuts in China are reducing the availability of feedstock (such as LPG, naphtha and reformat) for the petrochemical industry, just as the lockdowns have crimped demand. Petrochemicals producers are now struggling to ascertain when and by how much to adjust output: Produce too much and they could exacerbate an oversupply in an environment of declining prices; ramp up too slowly and they could miss the opportunity to capitalise on a tight market once demand recovers. These uncertainties reverberate globally. In 2020, China is estimated to account for 61 per cent and 41 per cent of global net imports of polyethylene and polypropylene, respectively. Producers around the world have invested in steam crackers and export capabilities to feed China's seemingly insatiable demand, leaving them with abundant supplies should China's demand growth disappoint this year, weighing on ethylene and naphtha.

At the same time, China is a large exporter of some polymers, including PET film and bottle grade resins (made from paraxylene which relies on refinery-produced xylenes). Therefore, the reduction in exports from China is causing buyers to seek alternative supplies from the Middle East and South Asia, but these may not be enough, raising the price per tonne of the resin. And the uncertainty going forward remains huge: Will the collapse in demand be offset by supply outages? Will a potential stimulus in China lead to a strong demand recovery? As chemicals producers need to adapt to the ongoing uncertainty, one thing is clear: no other market can displace Chinese demand. While a Chinese stimulus in H2 20, assuming the virus peaks soon, will offer some relief, the coronavirus is offering markets a taste of just how disruptive a downside scenario in China can be.

### **Petrochemicals caught between a rock and a hard place**

The petrochemicals industry is a vital part of global manufacturing supply chains. And because it is a step up in the hydrocarbon chain from the natural gas business and refining—as it takes raw materials from the energy sectors—it is caught in a perfect storm as a result of the novel coronavirus (2019-nCoV) outbreak. The industry is seeing its raw material supplies hugely constrained by the cutbacks in refinery runs in China. As noted recently:

*'run rates in Shandong have already reportedly fallen from close to 70 per cent in December to under 50 per cent in February. A number of refiners that shut down for the Chinese New Year have failed to resume operations as transport restrictions and a shortage of truck drivers limit their ability to sell products, while other independents have been discounting products to reduce their inventories'<sup>1</sup>.*

This implies that supplies of naphtha, LPG, reformat (benzene, toluene and mixed xylenes) from refineries, which is feedstock that the petrochemicals industry needs to run its operations in China, will have been very sharply curtailed.

At the same time, many of the downstream companies linked to the Chinese petrochemicals players are shut down because of a lack of labour resulting from the outbreak. These are mainly small- and medium-sized enterprises that take the petrochemicals and polymers and convert them into finished and semi-finished goods (for example, plastic bottles, car dashboards and bumpers).

Further, the demand at the end of all these manufacturing chains, from consumers, has totally collapsed because of the transportation restrictions imposed in an attempt to control the spread of the virus. There

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<sup>1</sup> See Michal Meidan, "When China sneezes...", OIES Energy Comment, February 2020, <https://www.oxfordenergy.org/publications/when-china-sneezes/?v=79cba1185463>

has also been a huge dent in consumers' confidence and their willingness to spend. Even where people can leave their homes, they are not doing so because of understandable fears of contracting the disease. Any consumption is limited to strict essentials, with consumer prices now soaring as supplies take time to reach their destinations.<sup>2</sup> Many companies have taken the decision to let their workers work from home, where possible, because of the precautionary principle.<sup>3</sup>

Petrochemicals producers in China will thus have little idea how much to buy of the feedstock that is still available as there is huge uncertainty as to when their customers—the petrochemicals converters—will return to work. When this happens, the confusion will continue as it is impossible to gauge the lingering effect on final consumer demand. Even when the virus peaks, will people still shy away from shops and public events for many weeks, even months, because of concerns over contracting the disease? At the same time, demand for online grocery shopping and food-delivery services are surging so judging production levels will be very hard for petrochemicals producers. They will not know how much stocks of their products the converters had when the extended Lunar New Year shutdowns come to an end. For instance, what will inventory levels be like at the auto makers and the retailers of the goods made by the converters? Run too hard and the petrochemicals producers risk ending up with stuff they cannot sell in an environment of declining pricing; run too slow and they will miss the opportunity of tightening markets and rising prices.

### China at the epicentre of the global chemical industry

This only scratches the surface of the extent of the problem facing the global petrochemicals business. China is at the epicentre of the industry because it is the world's biggest source of demand, due to its extraordinary economic growth, as petrochemicals consumption and overall economic growth tend to rise in tandem. Take one major polymer, polyethylene (PE), as an example. PE is heavily used in single-use packaging from food to electronics as well as in end-use applications ranging from disposable detergent and shampoo bottles all the way up to high pressure natural gas pipes. It is produced in steam crackers that rely on naphtha as their main feedstock. In 2019, according to ICIS estimates, global ethylene production totalled 545 Mt, leading to 547 Mt of naphtha demand, or 54 mb of oil use. China consumed 32 Mt of PE in 2019 or almost a third of global demand, up from just 12 per cent in 2000. As Figure 1 below shows, in 2009 China overtook North America (the US, Canada and Mexico) to become the biggest consumer by volume of PE.

If we then consider China's global role in petrochemicals demand now versus in 2003, when the SARS epidemic occurred—and widen this out to polymers other than just PE—the scale of the risk for the global industry becomes even clearer (Figure 2). China's share of total global demand for a variety of major polymers has risen from 22 per cent in 2003 to 43 per cent this year.

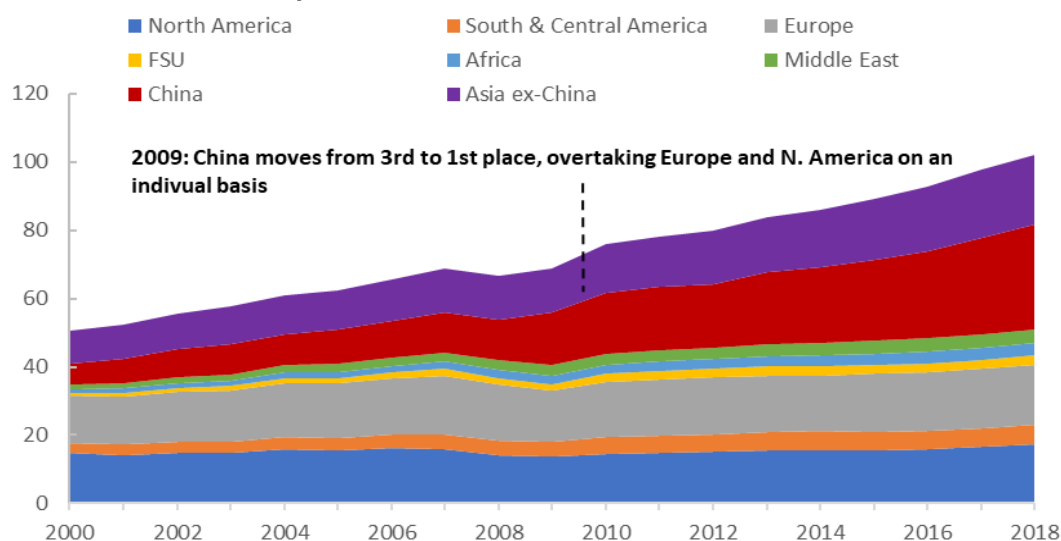
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<sup>2</sup> "Coronavirus Helps Drive China's Consumer Prices to Highest Level in Over Eight Years", Wall Street Journal, 10 February 2020, <https://www.wsj.com/articles/coronavirus-helps-drive-chinas-consumer-prices-to-highest-level-in-over-eight-years-11581314378>

<sup>3</sup> Ryan McMorrow, "China struggles to return to work after coronavirus shutdown", Financial Times, 10 February 2020, <https://www.ft.com/content/775d4c14-4bbb-11ea-95a0-43d18ec715f5>

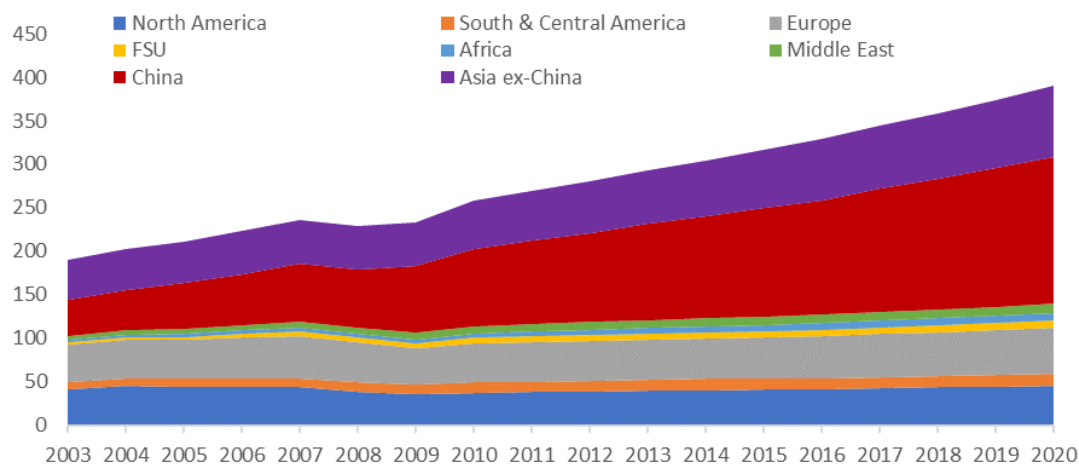


**Figure 1: Global PE Consumption, million tonnes**



Source: Independent Commodity Intelligence Services (ICIS<sup>4</sup>) supply and demand database

**Figure 2: Global consumption of major polymers (million tonnes)**



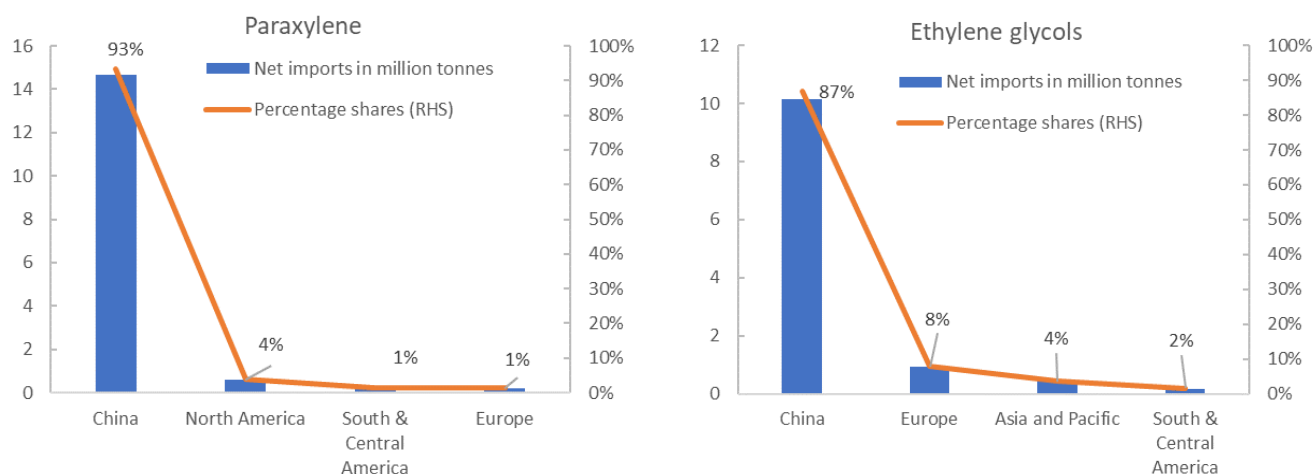
Note: Polymers include acrylonitrile butadiene styrene, expandable polystyrene, polyethylene, polybutadiene, polycarbonate, polyester polymers (fibre film and bottle grade), polypropylene, polystyrene, polyvinyl chloride, nylon fibres, nylon resins and styrene butadiene, rubber.

Source: ICIS supply and demand database

The other problem for the global petrochemicals business is that because of China's voracious demand growth over the past 20 years, the country has been unable to match this growth with increases in its own production. It has thus become an ever-more important destination for imports. In PE and in polypropylene, another polymer that goes into packaging, auto components and electronics, China will account for 61 per cent and 41 per cent respectively of all global net imports in 2020, highlighting the world's enormous exposure to event in China. It gets even worse when you shift to analysis of the polyester value chain (Figure 3).

<sup>4</sup> <https://www.icis.com/explore/>

**Figure 3: China's share of global net imports of paraxylene, ethylene glycols in 2020**



Note: Share of net imports among countries in net import positions. Many other countries still import considerable collective volumes even though they are net exporters

Source: ICIS supply and demand database

These factors inform the chaos that has resulted from the coronavirus outbreak. Many overseas petrochemicals producers have largely justified investments in new crackers and export facilities assuming large increases in imports from China. Rumours abound of cargoes being stuck at ports, or even turned away, because the virus has led to shortages of customs officers and dockers. And even where cargoes have landed, local demand has collapsed.

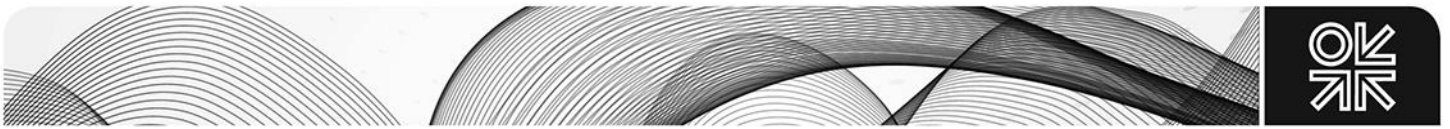
### China is also a large exporter of polymers

While China is a large importer of polymers, it is also an exporter of co-products. Paraxylene, made from mixed xylenes supplied by refineries and ethylene glycols—which is made from ethylene produced by a steam cracker—are intermediate materials needed to make polyester fibres for clothing and non-clothing applications such as pillowcases and sheets. They are also intermediates to make PET film and bottle grade resins which, in turn, are used to make packaging films converted into transparent bottles for water, cola and other carbonated drinks. Another aspect of the exposure to China is that in some polymers, China dominates global exports. In PET films, for instance, ICIS estimates that it will account for 46 per cent of global net exports in 2020, more than any other individual country or region.

As a result of the current outages, PET bottle grade buyers are said to have switched to alternative Middle East and Southeast Asian suppliers because of the absence of Chinese cargoes. This has been putting upward pressure on the price per tonne of the resin. It is still highly uncertain how long Chinese cargoes will be absent from the PET bottle grade market. But the longer the absence, the more likely it is that global supply will be insufficient to meet demand for drinking water and other bottles. The concerns are similar across so many other global manufacturing chains because of China's critical role in supplying intermediate goods and services to the global economy, along with the finished goods. For example, the Financial Times cites unconfirmed reports that the release of the next Apple iPhone could be delayed by several weeks because of operating problems at Apple's Chinese assembler, Foxconn.<sup>5</sup>

Yet another problem for the global petrochemicals business and its customers is the effect of the virus outbreak on the global economy. As with their counterparts in China, the overseas petrochemicals players and converters are experiencing great difficulty in deciding what volumes of materials to buy

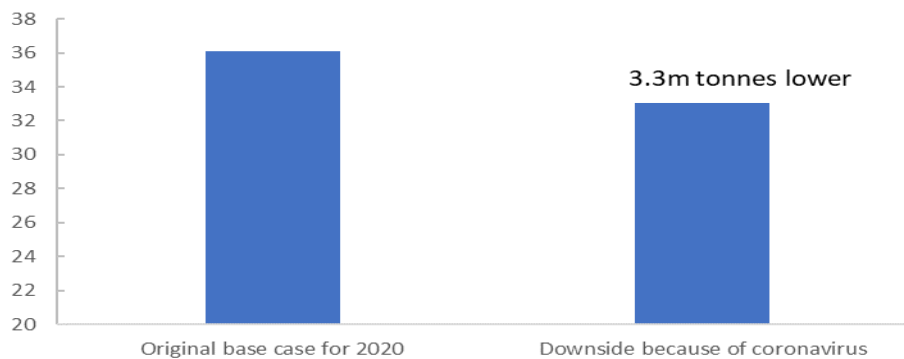
<sup>5</sup> Kathrin Hille, Ryan McMorro, Qianer Liu, "Coronavirus shakes centre of world's tech supply chain", Financial Times, 5 February 2020, <https://www.ft.com/content/22345198-47e6-11ea-aeb3-955839e06441>



and what volumes of finished goods to produce in every overseas market, especially since consumption is driven as much by sentiment as it is by fact.

Despite all the uncertainties, from an industry perspective, it is looking increasingly likely that China's petrochemical demand growth will disappoint in 2020. When looking at polyethylene (Figure 4), ICIS for example estimates that the downside could be as much as an 8.6 per cent below base case demand growth scenario. The downside scenario assumes that the virus is contained by April. But because the outbreak took place during a peak consumption season, the Lunar New Year holidays, some demand will not be recovered during the rest of 2020. More than 50 per cent of PE end-use applications are in packaging, mainly single-use and or disposable packaging. So, think of all the lost demand from lower-than-expected consumption of food, especially luxuries and gifted foods, because so many millions of people were unable to visit their families for their holidays. Think also of the reduced number of train and car journeys and less demand for drinks and snacks during those journeys.<sup>6</sup> PE is also used to manufacture goods for exports and for protective packaging when TVs and refrigerators etc. are exported. Add this all together and the preliminary estimate is for demand to be 3.3 million tonnes lower than the base case.

**Figure 4: Two scenarios for China's 2020 PE demand growth, million tonnes**



Source: ICIS supply and demand database

The losses will extend globally. Every manufacturing supply chain is highly vulnerable to disruptions in China, much more than in 2003 when SARS broke out. The obvious first response will be to seek ways of reducing this dependence, of diversifying away from China, once the dust has settled on the coronavirus outbreak. But in the case of petrochemicals, it will be just about impossible to substantially change the reliance on China as a source of demand. There is no realistic scenario under which this could happen. While a Chinese stimulus in H2 20, assuming the virus peaks soon, will offer some relief, the coronavirus is offering markets a taste of just how disruptive a downside scenario in China can be.

<sup>6</sup> It is estimated that only 2 per cent of demand goes into plastic bottles for medicines which should benefit from the virus outbreak.