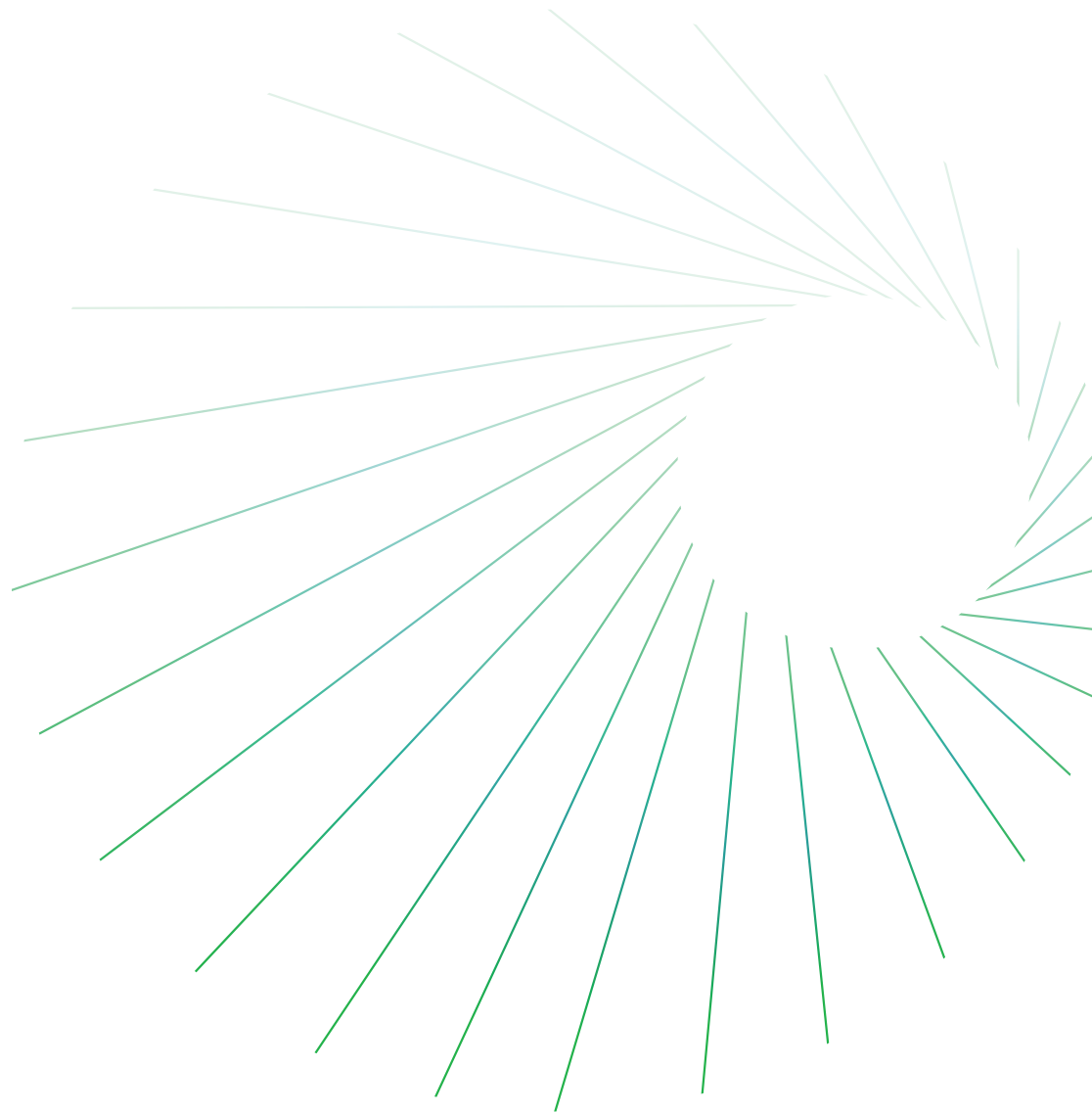


# The Great Supply Chain Disruption: Why it continues in 2022

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**This report, and the analysis conducted by our experts, leverages data and insights found in the following IHS Markit services:**

Supply Chain Practice: <https://ihsmarkit.com/products/supply-chain-solutions-enhancing-supply-chain-processes.html>

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## Introduction: Upheaval in global supply chains

**Daniel Yergin**, Vice Chairman

*There is no recent historical precedent for the current disruption in the modern highly integrated global supply chain system that has developed over the last three decades.*

What is unfolding in supply chains globally is not only disruptive, it is also historic. This is the first major disjunction in the synchronized supply chain system that has developed over the last 30 years of globalization. Moreover, the intense new focus on inflation adds to the urgency to understand what is ahead for supply chains in 2022.

Supply chains used to be something that only supply chain managers talked about. Now it is part of the profit reporting by major companies and a significant factor in inflation and, for some countries, in GDP. It is why consumers are experiencing delays in their online orders. And it resonates in anguished discussions ranging from retail shop owners to major manufacturers to disappointed customers to prime ministers and presidents.

COVID-19 has been a significant factor in driving the disruptions, although not the only one, as this report makes clear. There are significant capacity, logistical, and labor challenges. Recently, the chairman of the US Federal Reserve warned that the Omicron virus variant will add even more pressure in 2022 to supply chain systems, which are already under intense pressure.

Rather than a “sprint” to resolve the supply chain problems, we think it is more like a marathon. This report seeks to provide an integrated perspective on where we are in that marathon and when we will know when we may be getting closer to the finish line.

We introduced this team of IHS Markit experts, who cover a broad spectrum of the world economy, in a webinar a few weeks ago. Now, in this report, they provide forward perspectives and analyses on the supply chain challenges for 2022:

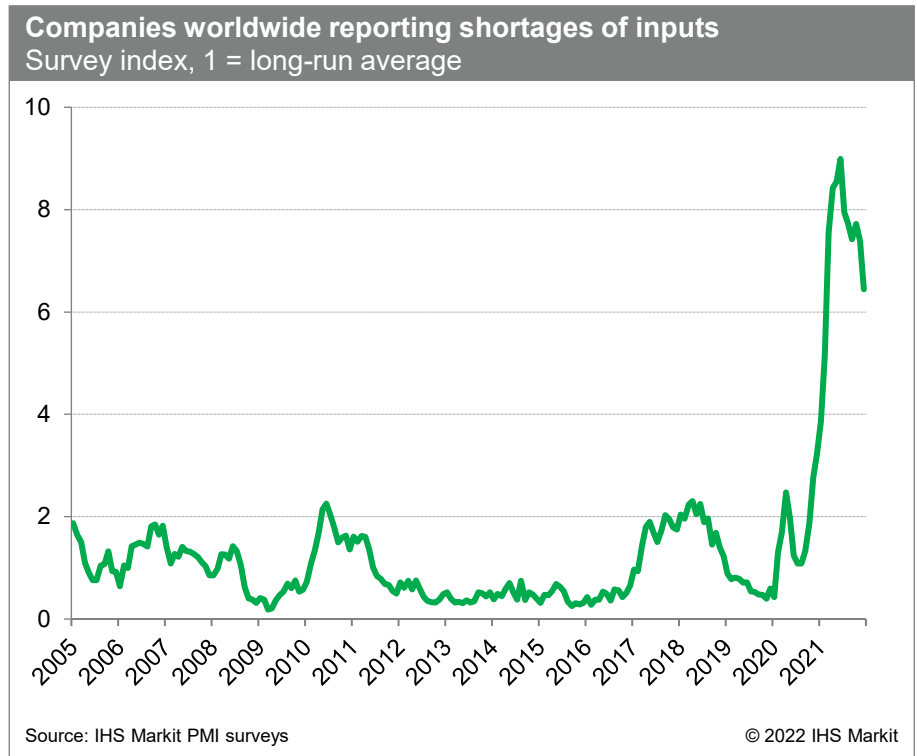
- Delays and disruptions for manufacturers and deliveries on a scale never recorded in our 30 years of PMIs
- Why the container shipping networks continue to be jammed
- The continuing constraints on the different “families” of computer chips—and new constraints coming, affecting auto output and the price and availability of new and used cars
- The growing strains on capacity in world oil
- How agriculture is being affected by shipping and labor shortages and the push to automation
- The impact of endemic shortages of labor and materials
- The growing significance of geopolitics and ESG on supply chains and company strategies

## Manufacturing: Early signs of normalization following unprecedented 2021 supply disruption

Chris Williamson, Chief Business Economist

*Delivery times lengthened significantly in 2021, and January 2022 began with many companies reporting severely constrained output, input costs rising faster than at any point in the decade prior to the pandemic, and Omicron causing fresh uncertainty.*

Our **newest global manufacturing PMI survey released on 5 January** shows signs of a sector that is still very much under strain from supply bottlenecks and COVID-19-related uncertainty, albeit with some signs that the situation is starting to improve. The incidence of worldwide supplier delivery delays was the lowest since March, allowing global factory output growth to accelerate to the fastest pace since July. Importantly, whereas in recent prior months production growth had lagged demand growth to an unprecedented degree as shortages of staff and materials meant factories simply could not produce everything being demanded by their customers, production and demand growth have come broadly back into line.



However, these improving data must be viewed in the context of a year of unprecedented supply disruption. IHS Markit has been conducting surveys of purchasing managers for 30 years, and we have not seen supplier delivery times lengthen to anything similar to the degree witnessed in 2021. Going into 2022, companies reporting that output was constrained by shortages was running 3.5 times the long-run average—lower than October, but still much higher than ever before recorded. Also the average lengthening of supplier delivery times, although easing somewhat, remained at a level far in excess of anything seen before the pandemic.

These shortages have created a seller's market. While December saw some welcome cooling of industrial price pressures as supply bottlenecks eased, the manufacturing sector is still seeing its input costs rise at a rate exceeding anything seen in the decade prior to the pandemic.

Furthermore, these latest PMI survey data come at a time when COVID-19 case numbers continue to rise due to the Omicron variant, raising the possibility of further global production and supply disruptions as we head into 2022, potentially amplified by lockdown policies in some countries.

As a result of these pressures, we have been nudging our global economic growth forecast down and our inflation forecast up. The longer the pandemic keeps affecting supply chains, the weaker the growth outlook. Back in mid-2021 we were forecasting 4.5% global GDP growth for 2022. That's now down to 4.2%, largely because inflation has become more pervasive than anticipated.

Meanwhile, our business outlook survey for 2022 of 12,000 companies showed profit expectations to be the weakest in the pandemic so far. There are widespread fears about price hikes, supply shortages, customer resistance to high prices, and an inability to pass costs on to customers after a year of sharply rising prices, damaging profit margins.

# Container shipping: Supply chains will remain disrupted well into 2022

**Peter Tirschwell**, Vice President, Maritime and Trade

*Port congestion continues to significantly slow the circulatory movement of ships, containers, and other transport assets including chassis—removing capacity, lengthening transit times, and forcing shipping rates much higher.*

As 2022 begins, the container shipping supply chain remains in the deepest crisis it has ever seen. Unwinding the disruption will take months. As the year begins, we remain in the midst of the most severe crisis in container supply chains going back to Malcom McLean, who founded the container shipping industry in the late 1950s. As 2022 begins, the situation is not improving. We would like to be able say that we see signs of the log jam breaking. But frankly, we don't.

There has been improvement in a few micro situations where very targeted efforts to alleviate certain aspects of supply chain bottlenecks were made. For example, US intermodal rail off the West Coast has seen substantial improvement due to the railroads simply accepting fewer container shipments. And the number of long-dwelling containers sitting on the docks at LA-Long Beach have been reduced by nearly 50% since October. But as of the beginning of January, there over 100 container ships waiting for a berth off the coast of the LA-Long Beach gateway or slow-steaming en route. In pre-COVID times over many years, that number was much less—actually zero. Ships arrived, berthed, loaded, and unloaded and were on their way.

What changed, very simply, was COVID. During the 2020 lockdown, when consumer spending in the United States swung wildly from services—travel, leisure, and entertainment—to home improvement, and from brick and mortar to e-commerce, the container supply chain was placed under unprecedented strain. E-commerce requires distribution centers, and distribution center capacity was nowhere near prepared. It remains unprepared today. For five to seven years of e-commerce growth has been compressed into a single year. Moreover, stimulus programs enhanced spending power. As a result, for example, US import container volumes in 2021 versus 2019 were up nearly 20%—a far higher rate of growth during the pre-COVID decade.

Exacerbating the crisis in container supply chains is capacity. Ocean carriers and freight forwarders report that there are enough ships and containers to handle even the elevated demand. The problem is that so much of that capacity is idled or circulating more slowly. The result has been to take significant capacity off the table. Estimates are that 10-15% of capacity has been removed due to congestion. This is evident in the freight rates, where spot container freight rates are up three to five times versus just a year ago, depending on the trade lane.

Some headlines over the past couple of weeks have said, “The supply chain crisis is easing.” As 2022 begins, we do not see the evidence for that, at least not in terms of fluidity of container flows. A recurring problem since the pandemic is that the system does not have time to recover before the next shock hits. The system did not have a chance to recover from the six-day Suez closure in March 2021 or the shutdown of the Yantian port in South China in the spring, one of the largest marine terminals in the world. New disruptions such as COVID manufacturing and port closures in China ahead of the approaching Chinese New Year and winter Olympics could further disrupt the system and further delay a return to normal container flow. That is why the 2022 outlook remains one for continuing disruption with no guarantee of a quick return to pre-pandemic system fluidity at least through the first half of the year.

## Automotive: No quick fix to supply disruption impacting vehicle availability

**Matteo Fini**, Vice President, Automotive Supply Chain and Technology

*Global semiconductor and electrical steel shortages will continue into 2022, forcing automakers to limit production and pivot away from longtime assumptions such as lean inventories and just-in-time manufacturing.*

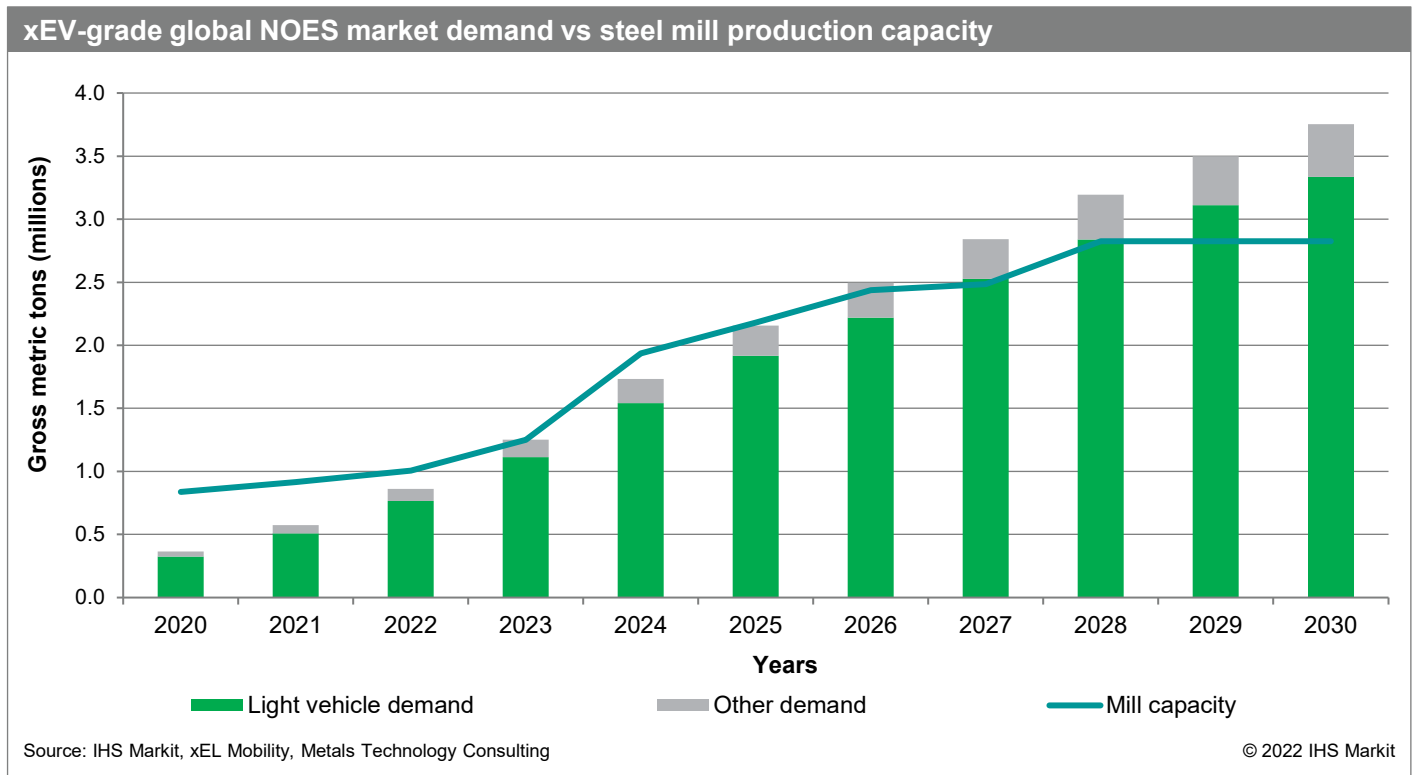
The supply chain issues in automotive are unprecedented. Consumers have to wait longer and be less picky when choosing vehicles and accept that there are certain features that may not be available due to the chip shortage. This globally synchronized, supply-led disruption is something that has never happened in the modern history of the automotive industry—in other words, a supply-led environment in which consumers cannot obtain vehicles on a global basis because of limitations on manufacturing inputs.

If the question is whether this gets fixed right away, the answer is no. Whilst the one-off chip shortage shock is largely in control, the underlying disruption is expected to continue for some time. The shortage is widespread because of the different semiconductor families that are impacted. The issue started, for example, with microcontrollers, which is a specific chip family, then moved into cross-chip manufacturing operations, particularly in Malaysia, which meant that several chip types were impacted. And as we look out into 2022, we think that analog chips will be another area of a big concern, thus indicating a further semiconductor product family is expected to experience some disruption.

With regard to the chip shortage, it would be safe to say 2022 is already something of a write off—in other words, disruption will continue. We're looking at semiconductor lead times that normally would be in the region of 12 weeks having shot up to 26 weeks or more with the prospect of an elongated lead time through 2022. As a function of this, automakers will be called upon to make trade-offs when producing vehicles in 2022.

Another area of automotive supply chain concern is electrical steel. Electrical steel is a grade of steel which, for automotive purposes, is used in significant amounts specifically in electric motors for propulsion. Anywhere between \$60 to \$200 worth of electrical steel goes into electric vehicles. More than two-thirds of the production takes place in China and South Korea—in other words, it's a very concentrated supply base. There are only 20 manufacturing sites on a global basis that can produce automotive-grade electrical steel, with virtually no capacity in North America. This means that the capacity is already really being stretched as we look out into 2022.

To put this into perspective, even in a worst-case scenario, this won't be as bad as the chip shortage because the chip shortage has meant that a vast portion of the manufacturers' portfolio could not be manufactured. Here, we are looking at specific segments of their vehicles that could not be manufactured, particularly battery electric vehicles. But similar to the chip shortage, we're looking at a structural deficit of electrical steel that needs to be addressed. We may get by in 2022, but as we look out at 2025, 2026, and beyond, a significant structural deficit of these input has begun to emerge, which will require significant investment in capacity. Building this capacity does require time.



The recent experience of these input shortages are forcing automakers to go against everything they have done in the past 30 years when it comes to supply chain management. This means going against the famous Toyota Way, which was predicated upon lean supply and having as little inventory as possible. Carmakers are now considering taking on inventory for certain parts because, in relative terms, it costs peanuts to have that inventory compared with having a line stoppage. A line stoppage costs upwards of \$50 million per week to an OEM (original equipment manufacturer), an unpalatable outcome if you're missing just maybe \$500,000 worth of inventory. The crisis is also forcing the OEMs to think differently about their supply chain. For example, there is an argument for automakers to create partnerships with companies with whom they had very limited dealings with only a few months back (or even ignored their existence), be it chip manufacturers or other companies in critical upstream operations. This is a sign of the changes that the supply chain crisis has imposed on the automotive industry.



## Energy: Omicron not expected to be repeat of 2020 but oil market tightening

**Jim Burkhard**, Vice President, Oil Markets, Energy and Mobility

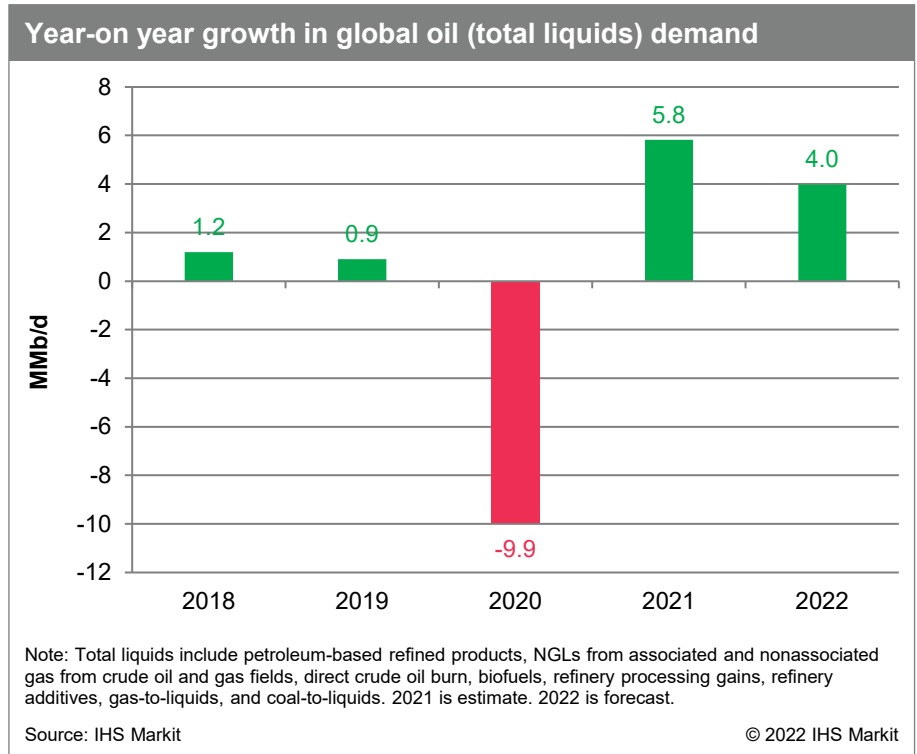
*Compared with a year ago, crude oil, coal, and natural gas are substantially higher, all owing to strong demand that has come with economic rebound. These rising prices are feeding into inflation, and geopolitical risks that could cause further disruptions hang over the market.*

Entering 2022, crude oil prices are up about 55% from a year ago at this time. Internationally traded coal prices recently were up 100%. And spot prices for gas in Europe and Asia in early January are 350% higher than a year ago. That can change by the day or the hour, but that provides a sense of the magnitude of the increase in prices and volatility we've seen over the last year.

The reason for the spot gas increases in Europe and Asia is pretty straightforward—we've had a strong demand push. Third quarter 2021 demand was up about 9% globally. That's been scraping up against production capacity, which means supply is relatively inflexible in the short term. Coal maxed out, which pushed up gas demand, and the only way to ration that supply is to see these really unanchored gas prices we've seen recently. Oil hasn't gone up nearly as much as liquefied natural gas (LNG), but it's still up substantially—one reason is the strong demand recovery in 2021 as we saw in so many other sectors. But there's also spare capacity for oil. We're not bumping up against spare capacity in oil as we have against LNG and coal. However, there is less spare capacity of crude oil production today—about 3 million barrels per day—compared with a year ago. If there is not significant supply growth from the United States and other sources outside of the OPEC+ agreement in 2022, then spare capacity could shrink further, which will make the oil market more crisis prone..

Regarding Omicron, we do not believe at this point in time that it's a repeat in terms of oil demand in March and April of 2020, when oil demand globally fell about 20%. You're not going to have that type of reaction. However, this is clearly a negative for demand. It's going to hurt jet fuel demand in the short term, in addition to bad weather and airline staffing shortages.

One can come up with varying scenarios. We think at this point that Omicron will cut off about 500,000 barrels per day in first quarter 2022, hitting jet fuel the most. This is in an oil market of close to 100 million barrels per day of consumption, so that's a relatively modest impact right now. But again, it's been less than two months since Omicron emerged in South Africa, so it's still early



days in terms of understanding it and its effects, as compared with Delta and the original virus. But it certainly does, as COVID did last year, hit at the heart of oil demand, which is mobility.

High gasoline prices get a lot of attention around the world, especially in the United States where increases are not muffled by high tax rates, as in Europe. There's always pressure on any US administration, Republican or Democratic, to do "something" about it, and one of the ideas that has been put forth is to ban US crude exports. The United States exports a lot of crude oil—about 3 million barrels per day. Should there be a ban on that to keep it in the country? Will that lower gasoline prices? The short answers to all these questions is that would make the problem much worse. If you want to make supply chain issues much worse, then implement a crude oil export ban from the United States. It would be a major shock to the global market and would create a new level of supply chain disruptions in the United States.

There's a number of reasons why it is such a bad idea. One is the gasoline price in the United States is not set by the price of domestically produced crude oil but rather by the global crude oil market price. India, Japan and Korea, the Netherlands—these are allies and partners of the US. If you were to rip out that 3 million barrels per day from the global oil market, what's going to replace it? Additionally, much of that oil is not really the preferred type of oil that US refineries want. Therefore, an export ban would just introduce a policy that would make the problem worse. And it wouldn't lower gasoline prices. If anything, it would probably raise them.

## Agriculture: End-to-end impact from crop inputs to labor shortages to containerized transportation

**Tom P. Scott**, Vice President, Agribusiness Consulting

*Major impact on agricultural production seen from COVID-driven labor shortages in labor-intensive processes such as meat packing, as well as disruptions in containerized transportation, are driving up costs and, as in other sectors, leading to reconsideration of lean inventories and a greater emphasis on automation.*

The agricultural commodity impacts have been profound, but they have been very uneven in that they have impacted different sectors in different ways. For example, in ocean transportation, dry bulk shipments of grains and oilseeds, which is a big part of agriculture, for the most part has not been impacted; we've seen only a few disruptions here and there. In contrast, the container shipping impacts highlighted earlier have had a significant impact on agriculture. Critical as we move forward in 2022 is that the duration of the impacts have been longer than anyone expected and as a result, the consequences will have a more profound structural impact on the industry.

With respect to the container shipping side, the impact to agriculture has been especially severe on high-value commodities such as dairy, meat, fruits, and vegetables. A lot of the agricultural product moving in containers are backhaul. That is, the container will come in with another item—for example, computer chips and auto parts—then it gets loaded with food commodities. Currently, the situation is the carriers are less interested in that backhaul. Agricultural products are low value compared with items such as computer chips or iPhones, and so agricultural products are not going to be the haul of first choice for the ocean carriers. They want to get the container back for those high-value items, and this has had a big impact on agriculture. We've seen instances where products that are high value in an agriculture and food sense cannot get containers as they are of much lower priority to container owners and shippers. The problem has become so severe that in some cases these products have to be shipped by air just to get them from point A to point B—something that was really inconceivable to think about a year or two ago.

Another impact to agriculture has been on any labor-intensive process, for example meat packing and fruit and vegetable harvesting, which have created really big problems in the supply chain that have persisted in 2022. The Omicron variant of COVID-19 is more highly transmissible, and for labor intensive operations such as meatpacking, where workers are in close proximity, the impact in late 2021 and now in 2022 is as bad if not worse than previous waves of infection. Then there are indirect impacts from things such as packaging materials, resins, linerboard, and aluminum—all vital inputs to the food products that consumers buy. Even if you can get the commodity to where it needs to be, getting it packaged up and to the consumer has been a serious challenge.

All of these disruptions relate to cost. When you increase costs in the supply chain, two things can happen. It can increase the cost to consumers, which has been very visible and has contributed to inflation and new political pressures. But the other impact is that for those commodities affected, it can mean lower prices to the farmers. You disrupt the export markets, and you disrupt the food supply chain, which increases costs, and that will lower the price the producer gets.

Coffee is a clear example of the impact of supply chain disruption. We can all relate to coffee consumption and coming out of the pandemic, we saw demand increase for all foods, including coffee. The onset of the supply chain issues described in this report probably increased shipping costs for coffee by approximately 30%—and ultimately, the price of coffee, by 30% or 40%. Then the coffee

market was hit with frost in some key coffee-producing areas of Brazil. The frost, and the impact this had on the size of the crop, came on top of the existing supply chain problems. This combination of supply chain disruption and weather-related problems ratcheted up coffee prices in a very short time to the point where coffee prices doubled and haven't really come down. Layer on top of that the shift during the pandemic from foodservice to retail, the adjustments that had to be made in the supply chain, and the difficulty of getting packaging materials—adding them together really creates a really difficult situation. All of this translates into cost increases back to the consumer as well as lower prices to the producer.

While much of the discussion of supply chain issues focuses on the consumer or manufacturer, agricultural production has been impacted with respect to crop inputs such as fertilizer and crop protection products. For example, supply chain bottlenecks have disrupted vital ingredients needed to produce crop chemicals; increased energy costs, especially for fertilizer producers; and have disrupted supply chains into farms. The cumulative impact is higher production costs, lower profits at the farm level, and some reallocation of crop acres from high-input crops to crops that are less intensive users of fertilizers and crop chemicals. These impacts have carried over into 2022 and we will see the consequences come harvest time.

In terms of the longer-term outlook, labor was a problem in agriculture before the pandemic, as it has been in other industries as well. For example, agribusiness and agriculture had really struggled with labor in certain sectors such as meat packing, production agriculture, and transportation. In transportation, truck drivers have been and remain in short supply. The increasing tightness in labor supply means that the negotiating power is shifting even more from employers to employees. As a result, if you have not been looking at automation as a solution to labor cost and availability before the pandemic, you're going to have to look at it coming out of the pandemic. How you can better manage labor costs is going to be a key issue moving forward, and automation is one of the answers.

Another consequence is that a generation of business leaders have focused on building “just-in-time” supply chains that by their nature have kept inventories minimal. That is not going to be reversed 100%, but we're definitely encouraging our clients to think about inventory levels—and more broadly their supply chains—and what they need in terms of buffer stocks and other forms of resiliency to guard against future supply chain disruptions. That adds to working capital and it comes back to cost. But the trade-off is a more reliable supply chain and better ability to meet customer needs.

## Labor and materials: Shortages drive costs higher

**John Anton**, Director, IHS Markit Pricing and Purchasing Service

*Businesses in 2022 will be forced to pay more for labor, especially to service workers who were some of the lowest paid workers and most in danger of getting COVID, and have been most hesitant to return come to work.*

Labor has been a major problem as the economy started recovering from the worst of the COVID lockdown in the second quarter of 2020. In the US, labor force participation collapsed during the pandemic and has had a hard time recovering. The US labor force remains 4 million workers below pre-pandemic levels. In Europe, wage subsidy schemes helped maintain the pre-pandemic labor force. However, COVID-19 disrupted migrant labor flows, which is starting to show up in job vacancy rates, especially in Western European countries. Even Southeast Asia is struggling with availability due to new waves of COVID-19 restrictions, and a zero-COVID policy in China is leading to lockdowns of entire cities, adding to supply chain disruptions.

Tight labor supply is shifting negotiating power away from employers toward employees. The bottom line is if you are a business, you are going to pay more for labor in 2022. It's that simple. Labor supply issues are hitting as demand for goods remains elevated. In the US, consumer spending on goods was up 17% in the fourth quarter of 2021 compared with the fourth quarter of 2019. Spending on durables was up 23%. Strong demand is putting a strain on the logistics sector, with a rapid acceleration in e-commerce boosting demand for truck drivers and warehouse workers. Even in normal conditions employers would have to hire a lot more workers to meet demand, and with tight labor market conditions employers are finding they need to pay more to attract and retain workers.

Worker availability is not limited to the goods producing sector. In Europe, China, and the US, those most exposed to COVID are service workers, who were some of the lowest paid and most in danger of getting COVID. These workers have been hesitant to come back to work and have been able to find jobs in other industries. In the US, low-paid workers in the hospitality and food service industries are seeing some of the strongest wage increases.

Higher wages should help bring more workers into the labor force. However, continuing COVID complications, especially in light of the Omicron variant, may slow the supply response. Another thing to consider in 2022 is inflation. Higher inflation rates are no longer transitory, nor are they limited to the United States. Rising inflation rates in the Americas and Europe will add to wage pressure. Workers are looking for an increased base to keep up with inflation, which can lead to a self-fulfilling spiral on the way up. If workers anticipate inflation, they ask for raises based on it, which makes inflation worse.

The mismatch between supply and demand is not limited to labor markets. Demand came roaring back in the second half of 2020 but capacity utilization came back slowly. Some of this is attributed to labor shortages, but some of it can be explained by other factors, such as logistic disruption and energy availability, which is keeping capacity idle. The recovery in utilization rates has been slow for multiple categories: steel, plastics, services. And demand is very strong but capacity utilization has been poor.

A good example of the problem is electrical steel, which was mentioned earlier for automotive. Electrical machinery is going to be a smaller version of 2021's story on microprocessors. Historically, electrical steel was used to make electric motors that go into generators and transformers. Now, it has

to make all of that plus battery vehicles, and there's not enough capacity to serve that new demand sector. While there was ample idle capacity before, going forward it will be stretched too thin.

Steel mills have told battery vehicle makers that for 2022 they will get all the electrical steel they need. But if you make electrical machinery, you're only going to get about 80%, at best 90%, of your requirements. We've heard this from the major electrical machinery makers around the world. All have been told the same thing by the mills: "You will get the remainder after we serve electric vehicles and it will not be all the steel you need." Therefore, there will not be enough electric motors, nor generators or transformers. It's going to hurt everything from expanding the power grid, to maintenance at factories where you need to replace a machine, possibly even down to vacuum cleaners and hair dryers.

The other major thing we worry about is chemicals. Many chemicals are made from natural gas. Natural gas is stretched thin, particularly in China and in Europe. If it's a cold winter and more natural gas goes for heating, you won't be able to make chemicals from it. Right now, inventory levels are sufficient to meet near term demand so chemicals should be okay. But if demand surges, supply chains will come under immense strain. We could then have a price spike and a supply shortage.

## Geopolitics: Growing politically driven decision making impacting supply chains in 2022

**Nathalie Wlodarczyk**, Vice President, Risk Intelligence Solutions

*Political decisions will play a much more significant role in supply chains in 2022 as governments seek to control strategic resources and secure competitive advantage.*

There are two key strands to the longer-term challenges we see to supply chain resilience—both ultimately anchored in more systemic shifts.

On the one hand, there is geopolitical risk impacting supply chains—this is really just a small slice of the challenges and disruption we see today, which as discussed is primarily about blowback from the pandemic and logistical challenges. But we expect to see political decisions playing a much more significant role for supply chains going forward, particularly as governments make decisions about strategic resources and how to secure their competitive advantage. Strategic minerals and components critical to energy transition are likely to be the key focus, but also a broader desire to secure advantageous trade relationships more generally to support domestic resilience.

On the other hand, there is increased focus on climate risk and ESG responsibility more broadly. There are two dimensions: direct disruption to supply chains from climate stress and social and governance instability; and regulatory, shareholder, and consumer pressure to improve sustainability credentials and protect corporate reputations.

### **So what will this mean in practice?**

For geopolitical risk, this is primarily about governments focusing on supply chain resilience. We have seen this across key regions: the proposed US Build Back Better Act; emphasis in China's 14th Five-Year Plan on 'self-sufficiency' in core technologies; the EU's focus on 'strategic autonomy' in high-capacity batteries, semiconductors, and the 'critical minerals' required for new, greener technologies; and India's focus on self-sufficiency and "trusted supply chains". We have also seen the Quad—loosely a framework for security cooperation among the US, India, Japan, and Australia—that has started talking about cooperation around supply chain resilience. There are two main implications of this for supply chains:

The imperative for resilience—in the context of very ambitious goals for energy transition—means demand for some 'critical minerals' is already surging and will likely intensify competition for influence over their major exporters, including Chile (copper), Indonesia (nickel), Australia (lithium), DRC (cobalt), as well as potential future exporters (such as Afghanistan and Saudi Arabia for lithium).

This in turn is likely to sharpen political scrutiny of the affected sectors, especially in extractive industries and manufacturing, and as a result there will probably be increased ad hoc interventions by governments in these sectors on grounds of national interest. That ultimately means greater uncertainty and, as a result, higher costs of operations and sourcing in these markets.

For climate stress and sustainability, we are likely to see both direct physical risks to supply chain and increased pressure from regulators, investors, and consumers for companies to ensure responsible and sustainable sourcing. There are already examples of water stress driving supply shortages, both directly and indirectly. Directly where agricultural production is affected by drought or floods, but also indirectly where water stress is impacting livelihoods and generating protests and disruption to

production and transport logistics. This has been evident in Mexico and in parts of Central America in the past couple of years. Continued climate stress is likely to exacerbate this, creating more regular disruption and delays that supply chain managers will need to plan for.

The increased focus on corporate—and government—sustainability credentials means supply chain managers will be dealing with a complex puzzle. So far, the attention is mainly on the environmental dimension to ESG, but social and governmental credentials are likely to come increasingly into focus. This will challenge some sourcing where suppliers are in locations with comparatively poor credentials in this space—for instance, labor practices, levels of corruption, and human rights issues. And whereas climate credentials can—to a degree—be tackled through offsets, there are no offsets to be had for social and governance impacts.



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