SUPPLY×CHAIN connect™

April 2026

Small Materials

BIG STAKES for GLOBAL TECH

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April 2026

SUPPLY CHAIN connect™

By AVERY LARKIN

Small Materials, Big Stakes for Global Tech

Rare earth minerals power everyday tech, but supply constraints are starting to ripple across global manufacturing

Every time you scroll through your phone, work on your laptop or watch your favorite streaming series on a flatscreen TV, you're harnessing the power of rare earth minerals. These naturally occurring minerals contain significant concentrations of rare earth elements. The most important rare earth ores include bastnäsite, monazite and xenotime, according to Worcester Polytechnic Institute (WPI).

These natural ores are composed of oxides, phosphates, carbonates or fluorocarbonates that contain the metals. To obtain the pure metals, the minerals must be concentrated, refined and chemically reduced. The process is complex, expensive and often environmentally challenging.
Currently, China holds the world's largest reserves and dominates the global production and refining of rare earths.

While rare earth minerals aren't exactly "rare" in abundance, economically viable deposits are uncommon. And the extraction and separation processes are costly and environmentally intensive. "Typical rare earth ores contain only 0.5–6% rare earth metals," WPI says, "compared to 25–65% metal content in more common ores like aluminum or iron."

Combine that reality with the growing demand for electronics, artificial intelligence (AI) and other advanced solutions, and it's easy to see how rare earth minerals are becoming a pressure point for companies that mine, process and/or use them in their products. A new report from the International Energy Association (IEA) shines a spotlight on the critical role that rare earths play in everything from energy technologies to mobile devices to defense systems.

"Though relatively plentiful in the Earth's crust, this set of 17 elements have garnered the label 'rare' because economically viable concentrations are uncommon and they are seldom found in pure form," IEA explains. "Their chemical similarities make them hard to separate during the extraction process, but their different physical and magnetic properties give individual rare earth elements distinct value for various technological applications."

Twice the Demand

According to IEA, demand for magnet rare earth elements (neodymium, praseodymium, dysprosium and terbium) has doubled since 2015 and is set to expand further by a third by 2030. It says growing electrification and the rapid deployment of new energy technologies such as electric vehicles (EVs) and wind turbines are driving much of the demand.

Growth in automation, robotics and digital technologies is also driving demand beyond 2030, it says, "as permanent magnets enable precision motion control, miniaturization and energy efficiency improvement for these applications."

Today, China accounts for around 60% of globally-mined production of magnet rare earths, while its share of refining is above 90%. Its dominance is even more evident in downstream segments, where it controls almost 95% of permanent magnet production. According to IEA, China represented only around half of global permanent magnet output in 2006.

"Rare earth elements are indispensable to many of the technologies shaping the Age of Electricity and our increasingly digitalized economies, yet their supply chains remain among the most concentrated of all critical minerals," said IEA's Fatih Birol in the report. "Recent disruptions have underlined how quickly these vulnerabilities can translate into real economic risks. Addressing them will require sustained investment, stronger resilience measures and deeper international cooperation."

Closing the Gap

The IEA report also highlights a notable imbalance in current supply chain development efforts, with the pipeline of magnet production projects substantially smaller than that of upstream projects. Existing and planned magnet projects outside China account for only around a third of mining capacity.

"Closing this gap would require substantial growth across the entire value chain, particularly in refining and magnet manufacturing, which remain key bottlenecks," says IEA, which estimates that around $60 billion of investment will be needed over the next decade to develop diversified supply chains. "While significant, this investment is modest compared with the scale of potential economic losses associated with supply disruptions."

Recycling and innovation offer important complementary pathways, according to IEA, with recycling alone having the potential to reduce the need for primary supply by up to 35% by 2050, while "advances in innovative production and substitution technologies could ease pressure on the most constrained elements."

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By AVERY LARKIN

March Brings Mixed Signals for Supply Chains

Shipping routes shifted, chip supply tightened and Amazon expanded delivery options across hundreds of U.S. cities.

In a world where new disruptions and uncertainties seem to be lurking around every corner, supply chain and procurement professionals had their hands full in March. From the conflict in the Middle East to the shipping backlog in the Strait of Hormuz to ongoing capacity constraints in key sectors, the news throughout much of the month kept teams adjusting and responding in real time.

The war in Iran was top of mind for many companies, with the supply chain impacts being felt both immediately and longer term. In "It's Not Just Oil: The Iran War Upends Global Supply Chains," WSJ reported that ports in and around the Indian Ocean filled up with redirected cargo and that "rates to ship goods from Asia to anywhere near the Middle East have rocketed."

Shipping hubs in Asia were also running low on fuel, it adds, and more than 100 ships were stuck in the Gulf. "Much of the shipping industry's pain—like that for oil—can be traced back to the effective closure of the Strait of Hormuz, the small but globally significant waterway between Iran and Oman," *WSJ* adds.

It says container shippers like A.P. Moller-Maersk and Hapag-Lloyd suspended key routes in and out of the Middle East for safety reasons. "The disruption is starting to add to costs and delays for businesses around the world."

Supply Constraints Continue

In March, chip designer Broadcom announced that it was "seeing supply chain constraints across the technology sector, including capacity limits at its manufacturing partner TSMC, as soaring demand for AI chips strains production," *Reuters* reports.

"We are seeing that TSMC is hitting (production capacity) limits," Broadcom's Natarajan Ramachandran said. "They will be increasing the capacity to 2027, but that has become a bottleneck, or that has kind of choked the supply chain in 2026."

The Taiwanese firm, the world's main producer of advanced AI chips, said in January that capacity was tight, as the boom in AI infrastructure buildout has soaked up much of its advanced production lines, the publication adds. The shortages extend beyond semiconductors and are impacting adjacent supply chains like the PCBs used in optical transceivers, whose lead times have stretched from about six weeks to six months.

Freight Markets Pick Up

Trucking activity in the U.S. picked up in February, pushing tonnage levels to the highest point in three years, according to the American Trucking Associations' March report. Specifically, truck freight tonnage increased 2.6% after gaining 0.7% in January.

Trucking serves as a barometer of the U.S. economy, representing 72.7% of tonnage carried by all modes of domestic freight transportation, including manufactured and retail goods, according to the ATA. Trucks hauled 11.27 billion tons of freight in 2024. Motor carriers collected $906 billion, or 76.9% of total revenue earned by all transport modes.

"February's robust gain is great to see, but the size of the gain is likely magnified due to lower industry capacity," said ATA Chief Economist Bob Costello in a press release. "With that said, particularly after a very prolonged freight recession, improving volumes in any manner is welcomed."

Amazon Does it Again

Just when you thought Amazon's supply chain and logistics couldn't get any faster, tighter or on target, the company rolled out new one- and three-hour delivery options in hundreds of cities and towns nationwide. And with that, the e-tailer that often sets the standard for fast, trackable delivery (aka, the "Amazon Effect") has again raised the bar on what that means for both B2C and B2B buyers.

The company says customers now have access to the one- and three-hour delivery windows in areas like Los Angeles, Chicago, Oklahoma City, Nashville, Houston and Washington, D.C., and smaller cities such as Des Moines, Iowa; Boise, Idaho; and American Fork, Utah. And three-hour delivery is offered in over 2,000 cities and towns.

"Our customers are busier than ever and are looking for new ways to save time while keeping their households running," Amazon's Udit Madan says. "We saw an opportunity to use our unique operational expertise and delivery network to help make customers' lives a little easier while unlocking even more value for Prime members."

Also last month, the e-tail giant announced that its Zoox self-driving unit will launch a robotaxi service in Austin and Miami later this year. *CNBC* says Zoox will deploy the toaster-shaped robotaxis for testing in "a small area" of both cities. The company is currently testing its autonomous technology in 10 U.S. cities.

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New Funding Push Encourages Public-Private Grid Upgrades

The DOE's Speed to Power through Accelerated Reconductoring and other Key Advanced Transmission Technology Upgrades (SPARK) funding opportunity is offering up to $1.9 billion for utility grid upgrades.

The U.S. Department of Energy's Office of Electricity (OE) just announced a $1.9 billion funding opportunity to accelerate "urgently needed" upgrades to the nation's power grid. The OE says these investments will meet rising electricity demand and resource adequacy needs, while lowering electricity costs for American households and businesses.

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By BRIDGET MCCREA

U.S. Energy Investment Shifts

The latest offshore wind project cancellation and new investments highlight changing priorities across the U.S. energy landscape.

Over the last year or so, a number of national wind, solar and other clean energy projects have been delayed, scaled back or canceled, while activity around oil and natural gas has picked up. That momentum has stepped up, and a recent agreement between the federal government and TotalEnergies is the latest sign of that.

According to a U.S. Department of the Interior (DOI) press release, TotalEnergies has committed to invest approximately $1 billion—the value of its renounced offshore wind leases—in oil and natural gas and LNG production in the U.S. This includes trains for a Rio Grande LNG plant in Texas, as well as the development of upstream conventional oil in the Gulf of America and of shale gas production.

The DOI says it's terminating the following leases and reimbursing TotalEnergies for:

- Lease No. OCS-A 0535. Located in the Carolina Long Bay area, this lease was fully executed by TotalEnergies Renewables USA, LLC on June 1, 2022.
- Lease No. OCS-A 0538. Situated in the New York Bight area, this was fully executed by Attentive Energy, LLC on May 1, 2022.

"These reinvestments by TotalEnergies will directly advance the [administration's] ongoing efforts to lower costs for American families, increase baseload and grid reliability and help maintain global leadership in artificial intelligence," the DOI adds.

For and Against

Not everyone views the nation's shift away from offshore wind and other large-scale renewables the same way. Supporters point to cost and reliability, while critics question what it means for future clean energy development. That debate is playing out against a backdrop where offshore wind has become a major part of the energy mix in other regions, particularly in Europe, where over 150 gigawatts of new wind power capacity is expected to come online by 2030.

The administration has been clear about its views on wind power. "Offshore wind is one of the most expensive, unreliable, environmentally disruptive, and subsidy-dependent schemes ever forced on American ratepayers and taxpayers," said Secretary of the Interior Doug Burgum in the release.

"We welcome TotalEnergies' commitment to developing projects that produce dependable, affordable power to lower Americans' monthly bills while providing secure U.S. baseload power today," he continued, "and in the future."

2050 Carbon Neutrality May Not Be Attainable

In other TotalEnergies news, the company says that the Paris Agreement's 2050 carbon neutrality goals may be out of reach and that it's adjusting its own 2050 net zero plans. According to *Reuters*, the goals outlined in the 2015 Paris Agreement to limit global warming require a significant drop in carbon emissions by 2050, which would require weaning key systems off oil and gas consumption.

Citing TotalEnergies' annual sustainability report, *Reuters* says the company has decided to "confront its ambition with reality and acknowledge that our societies have embarked on a transition, but at a pace that does not yet allow for the collective achievement of carbon neutrality as pursued under the Paris Agreement."

"Our own ability to achieve carbon neutrality together with society depends on technical innovation, public policies and consumer choices," the company continued, "meaning that the pathways to our carbon neutrality ambition must be reassessed and adapted over time in line with the evolution of the global energy system."

More broadly, *Reuters* says both BP and Shell are still aiming to bring the carbon intensity of the products they sell to zero by 2050, but both say that "the pace at which society transitions away from hydrocarbons would be an important factor."

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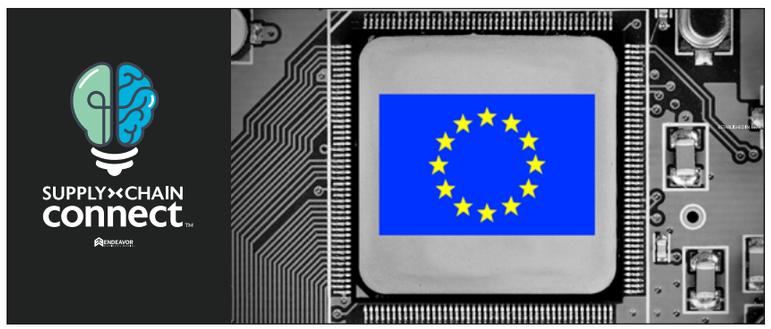
The Podcast Channel for Supply Chain Professionals

Supply Chain Connect provides supply chain and purchasing professionals with essential news, information and analysis about the technology and business trends that impact the global supply chain industry.



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Organizations are rethinking how their supply chains anticipate, absorb and recover from disruption. Here are five steps businesses can take to establish supply chain resilience.

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By AVERY LARKIN

War Takes a Toll on Global Supply Chains

The war in Iran is straining global supply chains, raising costs, and disrupting transportation and trade routes.

In an era where even a slight blip can throw a supply chain off balance, the war in Iran and the cascading events associated with it are taking a toll on these critical networks. Oil price hikes and shortages; shipping and air travel interruptions; and disruptions to crucial trade routes are some of the key pressures rippling through global logistics systems.

In response, organizations are adjusting plans, rethinking their sourcing strategies and bracing for new interruptions. It's par for the course in this "new normal" operating environment—where tariffs, trade wars, rising business costs and labor struggles were already in play—but the war is creating new pressure points.

Here are some of the most visible ways the conflict is impacting global supply chains right now.

Auto supply chains feel the shock. The automotive sector is already seeing immediate fallout from the conflict, particularly as disruptions ripple through energy and transportation networks that support vehicle production. When a key artery like the Strait of Hormuz slows or shuts down, the impact hits everything from fuel costs to the movement of parts and finished vehicles.

"Just about 33 kilometers wide at its narrowest point, the Strait of Hormuz handles almost 11% of global maritime trade and a significant part of the world's automotive supply chain," Sarwant Singh writes in "Iran War Derails The Automotive Industry," "from the oil that powers logistics networks and the liquefied natural gas that fuels plants, to the components moving between Asia and Europe through the Gulf's major hubs."

Major shipping hubs like Jebel Ali Port and Hamad International Airport, both of which facilitate the transportation of materials, parts and finished vehicles, are also expected to be affected. "For many, the Iran conflict is a significant geopolitical event. However, for the automotive sector, it is worse," Singh says. "Analysts have long cautioned against depending too heavily on a single supply route and highlighted the subtle vulnerabilities of just-in-time production."

On the sale side of the equation, inflation, higher fuel costs, and weaker consumer confidence are contributing to lower new-vehicle sales, especially in price-sensitive markets. "Financing demand also softens as households shift focus to essentials and as interest-rate expectations remain elevated," Singh adds.

Helium supplies tighten overnight. Most of us don't even think about helium until it's time to blow up balloons for a party, but the gas is used for cooling during semiconductor production. This makes helium an essential input both for chipmakers and the broader tech supply chain.

According to *CNBC*, the conflict has disrupted a major source of global helium supply, with Qatar accounting for more than 30% of the market before the war. The sudden loss of that capacity has tightened supply and pushed prices higher, forcing buyers to look for alternatives.

"The shutdown of Qatar helium production due to the U.S.-Iran military conflict has removed roughly a third of global helium supply and shifted the market from oversupplied to undersupplied," Deutsche Bank analysts told the news outlet.

Helium prices have surged since the war started, CNBC adds. "Many market watchers are optimistic about chipmakers retaining access to the material," it says, "a drawn-out conflict will mean helium buyers are forced to scramble to maintain supply chains."

Higher oil prices set off a chain of events. Rising fuel costs have been one of the most immediate and far-reaching effects of the conflict, and they're already working their way through global supply chains. In early March, U.S. gasoline prices jumped from $3.01 to $3.96 per gallon, while diesel climbed from $3.89 to $5.37, pushing up the cost of everything from transportation to production. Last week, prices hit $4 a gallon in some states.

Because diesel powers trucks, farm equipment and much of the freight network, those increases don't stay contained, *Fast Company* reports. They spread quickly into food, construction materials and consumer goods, raising prices across the board. "When items become more expensive to harvest, build and ship, diesel costs spread quickly into grocery, household and building material prices."

Some mitigation is possible: 32 nations will be releasing more than 400 million barrels of oil to the global market over the next few months. "There are pipelines and alternative ports in Saudi Arabia and the United Arab Emirates that, if they remain undamaged and uninterrupted," Fast Company explains, "can handle potentially 40% of the 20 billion barrels per day that were passing through the Strait of Hormuz."

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U.S. Manufacturing Sector Flexes Its Muscles

After more than a year of contraction, new data shows U.S. manufacturing expanding again, with stronger orders, growing backlogs and rising production activity.

After months of declining numbers and stagnant growth, the U.S. manufacturing sector is springing back to life with vigor according to two different industry indexes. The positive momentum started in January, when the ISM Manufacturing PMI Report showed a positive reading for a sector that had been in contraction mode for the prior 12 months.

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By BRIDGET MCCREA

What Are Biodegradable Electronics?

Biodegradable electronics offer a new approach to reducing e-waste by designing devices that break down after use.

Electronic waste (e-waste) is one of the fastest-growing waste streams in the world, and most of it doesn't go away. Devices are getting smaller, faster and cheaper, but the materials inside them often outlast the products themselves. This is creating a growing pile of waste that has to be managed at end of life.

Unfortunately, current systems can't keep up with the volume that's being produced. According to the World Health Organization (WHO):

- E-waste is one of the fastest growing solid waste streams in the world.
- At last count, about 62 million tons of e-waste were produced globally.
- Only 22.3% of that e-waste was documented, formally collected and recycled.
- Lead is a common substance released into the environment when e-waste is recycled, stored or dumped using informal activities, including open burning.
- Informal e-waste recycling activities may have several adverse health effects. Children and pregnant women are particularly vulnerable.
- The International Labour Organization (ILO) and WHO estimate that millions of women and child laborers working in the informal recycling sector globally may be exposed to hazardous e-waste.

This puts pressure on manufacturers, regulators and other stakeholders to think harder about how electronics are designed, used and ultimately disposed of. It's also putting a spotlight on alternative options like biodegradable electronics that break down after use instead of adding to the waste stream.

What are Biodegradable Electronics?

When most people hear "biodegradable," they think compost bins, paper straws or that takeout container that's not supposed to take 1,000 years to break down in the landfill. Electronics don't usually make that list, but that could soon change if biodegradable options start to gain traction.

By definition, biodegradable electronics are bio-based electronic components that dissolve harmlessly in natural settings. Unlike traditional electronics, they offer a sustainable life cycle and help lighten the e-waste burden. "By leveraging biological and chemical principles, these devices enhance the synergy between technology and nature," ScrapsIndustries, Inc., explains.

The foundation of biodegradable electronics lies in their materials. Utilized substances include organic polymers derived from plants, carbon-based conductive materials like graphene and metals with low environmental impact, such as magnesium and zinc. "The selection of these renewable electronic materials ensures the devices are both functional and environmentally friendly," it adds.

So what do biodegradable electronics actually look like in real life? One of the most common examples is temporary medical sensors that monitor temperature or healing after surgery and then dissolve in the body, eliminating the need for removal. There are also biodegradable sensors that can be placed in soil to track moisture or nutrients that break down after a growing season, and small electronic tags that monitor food freshness and degrade after disposal.

A Work in Progress

Do biodegradable electronics offer a promising solution for tackling the e-waste problem? Susan Fourtané believes so, and highlights the possibilities in "Biodegradable electronics: The rise of sustainable tech." Along with having a sustainable lifecycle that reduces e-waste, biodegradable electronics have a wide variety of applications in biomedical devices, environmental monitoring, the military and transient consumer electronics such as wearables.

"Even though biodegradable electronics aren't yet being mass produced, we can already see prototypes at tech industry events such as the recent Mobile World Congress (MWC)," Fourtané says. There, Fairphone showcased a sustainable smartphone designed to be modular and easily repairable. The phone is made with over 51% fair and recycled materials, and is 100% e-waste neutral.

Over the next decade, Fourtané predicts that biodegradable electronics will be used in temporary implants such as neural probes, cardiac pacemakers and drug delivery systems.
And by 2050, she envisions biodegradable electronics being fully integrated into mainstream consumer goods, healthcare and IoT devices.

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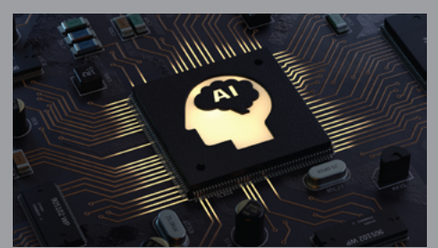
AI Boom Drives a Memory Shortage

From HBM to hard drives, AI's infrastructure boom is pushing memory markets to the breaking point.

For procurement teams focused on electronic components, shortages have become part of life. Over the past several years, buyers have moved from scrambling for microcontrollers and analog chips to managing tight supply of power devices, memory and specialty semiconductors. Lead times expand, then contract. Allocation eases in one category while another tightens, and stability never seems to last long.



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By AVERY LARKIN

U.S. Manufacturing Growth Hits a New High for the Year

The U.S. manufacturing sector grows at the fastest clip since August 2022 even as tariff, supply chain disruptions and geopolitical headwinds prevail.

It's been more than three-and-a-half years since the U.S. manufacturing sector posted the kind of growth it saw in March, according to the latest Institute of Supply Management Manufacturing PMI report. That's good news for a sector that hasn't seen this kind of growth since August 2022, and that is now solidly in growth territory after its third month in a row of positive results.

According to ISM, the PMI registered 52.7% in March, a 0.3-percentage point increase compared to the reading of 52.4% in February. The overall economy continued in expansion for the 17th month in a row. A Manufacturing PMI above 47.5%, over a period of time, generally indicates an expansion of the overall economy.

Other key findings:

- The new orders index expanded for the third straight month after four straight readings in contraction, registering 53.5%, down 2.3 percentage points compared to February's figure of 55.8%.
- The March reading of the production index (55.1%) is 1.6 percentage points higher than February's reading of 53.5%.
- The prices index remained in expansion territory, registering 78.3%, a 7.8-percentage point jump from February's reading of 70.5%.

"In the last two months, the prices index has increased 19.3 percentage points to reach its highest level since a reading of 78.5% in June 2022," says Susan Spence, chair of ISM's Manufacturing Business Survey Committee. "The backlog of orders index registered 54.4%, down 2.2 percentage points compared to the 56.6% recorded in February."

New Concerns Emerge

ISM says March was the first month where the manufacturers it interviewed cited the Iran war as a new impact to their business, along with ongoing uncertainty with U.S. economic policy. "In March, 64% of comments overall were negative," Spence says. "Among the negative comments, about 20% cited tariffs and about 40% the war in the Middle East."

For example, one manufacturer said that "current Middle East unrest is already starting to impact business operations by increasing lead times, costs, container delays and the like." Another maker of transportation equipment said that changes in the tariff structure are bringing "cautious opportunities" to offset significant costs for the balance of 2026. "The actions in Iran, however, add a new wrinkle to energy costs throughout the world, including India. We continue to try and plan for the unpredictable and unexpected."

Cautiously Optimistic

According to ISM, the 13 manufacturing industries reporting growth in March included printing & related support activities; primary metals; transportation equipment; miscellaneous manufacturing; electrical equipment, appliances & components; textile mills; computer & electronic products; fabricated metal products; machinery; paper products; nonmetallic mineral products; wood products; and chemical products.

And the three industries reporting contraction were plastics & rubber products; furniture & related products; and food, beverage & tobacco products. Based on the write-in comments, the overall sentiment seems to be "cautiously optimistic" across the sector, which has faced some tough challenges over the last 12-24 months. Still, the geopolitical climate and issues like the War in Iran continue to put new challenges in front of producers.

"This is expected to be a transition year for the U.S. trucking market, with gradual stabilization driven by capacity tightening and replacement demand instead of growth," one transportation equipment manufacturer commented. "Demand should stay constrained by weak carrier profitability and high equipment costs but improve modestly late in the year."

"Customer orders have increased considerably as the construction market remains strong, resulting in higher production volume and increased forecasts to suppliers," a machinery producer said, while a plastics and rubber products maker was decidedly less optimistic.

"The Middle East war has created domestic and global turmoil for the olefins and polyolefins business. Feedstocks and finished product pricing are accelerating dramatically as Middle Eastern and Asian producers suffer from shipping blockages," it said. "Global customers for packaging resins are scrambling to cover needs from North America and South America in the face of supply chain complications."

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How Will the SCOTUS Tariff Decision Impact Supply Chains?

The U.S. Supreme Court vacated sweeping tariffs but left importers uncertain about refunds and what comes next.

A business function that's absorbed more than its fair share of whiplash over the last year, U.S. supply chains were thrown for another loop last month when the U.S. Supreme Court (SCOTUS) ruled that the President couldn't use the International Emergency Economic Powers Act (IEEPA) to impose sweeping tariffs on other countries. It also vacated the existing IEEPA-based tariffs but didn't address whether companies that paid roughly $130 billion (give or take) in duties would be eligible for refunds.

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By BRIDGET MCCREA

Data Center Boom Faces Pushback

States, towns and federal lawmakers take a stand against a data center boom that supports the proliferation of AI, cloud computing and digital services.

Demand for more artificial intelligence (AI), cloud computing and digital services are all driving massive investment in data center development in the U.S. Projects continue to come out of the ground nationwide, with developers targeting markets that can support the scale and infrastructure these facilities require.

The surge is running up against new resistance at the local level. In some states and communities, residents and officials are raising concerns about the size of these sites, their power demands and their long-term impact on land and resources. Most of the projects are still moving ahead, but that pushback is getting louder as these large-scale facilities move into new areas and compete for finite power and land resources.

"A new generation of data centers that can support advanced AI is rapidly being built up," Goldman Sachs states in a recent report. "In the U.S. alone, spending on the construction of this infrastructure has tripled over the last three years. Even as new facilities come online, occupancy rates remain near record highs for third-party leased data-centers across most U.S. markets."

Tracking the Data Center Boom

Goldman Sachs Research forecasts data center demand to grow by about 50% to 92 GW by 2027, with a compound annual growth rate (CAGR) of 17% between 2025 and 2028. Should demand for AI turn out to be lower than expected, it says that growth rate could be closer to 14%. "In a more bullish scenario, in which GPUs require even more power than predicted, or customer demand for AI models is higher than expected," the company says, "the [CAGR] could reach 20%.

Global real estate firm JLL has been tracking the data center boom closely and says vacancy rates for these facilities stayed at a record low 1% in 2025. At the same time, new ones continue to be planned, built and brought online. It also says that 92% of capacity currently under construction is pre-committed, either through binding lease agreements or owner-occupied development.

JLL says more than 35 GW of data center capacity is under construction in North America, an "extraordinary volume by historical standards," it adds. "For context, this is roughly equivalent to the annual electricity consumption of the UK or Italy."

Of this pipeline, nearly 60% is leased, while the remaining 40% will be owner-occupied by hyperscalers (i.e., companies that build very large data centers at massive scale). Today, 64% of capacity under construction is located in what JLL calls "frontier markets," including West Texas, Tennessee, Wisconsin, and Ohio.

"Texas, when viewed as a single market, could overtake Northern Virginia as the world's largest data center market by 2030," it says. "Abundant energy resources, ample land availability and a business-friendly operating environment support this trajectory."

Banning Data Center Growth

Not everyone likes the idea of a data center coming to their town or city. Currently, nine states are considering statewide bans and a tenth (Pennsylvania) is considering one. Earlier this month, for example, Maine laid out a plan to freeze large data-center construction, which would make it "the first state to enact such a measure as communities across the U.S. grapple with fallout from the boom in artificial intelligence," *WSJ* reports.

The Maine bill calls for a ban on major new data-center construction until November 2027, so the state can assess the impact of such development on the environment and electricity grid. Legislators have introduced measures to temporarily ban or restrict data centers in New York, South Carolina, Oklahoma and other states, WSJ adds. "In Ohio, one of the top states for data-center development, a group of rural activists is collecting signatures to put a statewide ban of large data centers on a November ballot."

At the federal level, U.S. Senators Bernie Sanders and Alexandria Ocasio-Cortez introduced a bill that would pause new data centers in the U.S. until "safeguards are in place to protect workers and consumers and ensure the technologies don't harm the environment," *AP* reports.

Towns Taking a Stand

Drilling down to specific towns, residents in Port Washington, Wis., recently voted on a measure that would halt future data center development in its 12,000-person town. This is the nation's first anti-data center referendum, and it probably won't be the last.

Yahoo! News says the initiative came in response to an $8 billion data center project that's expected to receive more than $450 million in property tax breaks. The project also wouldn't have to pay state sales tax on everything from construction to the servers inside to electricity at the site, "which is estimated to require as much electricity as the city of Los Angeles once fully operational."

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New Efforts to Strengthen U.S. Critical Materials Supply

An innovative federal lab is applying its research capabilities to strengthen domestic mineral extraction and processing.

The U.S. relies heavily on foreign sources for many of the critical materials used in defense systems, advanced manufacturing, energy technologies and electronics. In many cases, U.S. companies import not only raw materials but also refined and processed inputs from a small number of countries.

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SUPPLY CHAIN connect™

By AVERY LARKIN

Fewer Supply Chain Leaders Feel Ready for the Future

Supply chain leaders say they're less prepared this year as disruptions pile up and decisions get harder.

Supply chains have become pretty unpredictable. Ever since the global pandemic tore the cover off of the industry and educated the general public on how supply chains and logistics actually work (or as was the case in that situation, don't work), more attention is being paid to these global networks.

All of that attention also brought a steady stream of new reports, all focused on key supply chain pain points, strategies and outlooks. And every time a new disruption emerges—the war in the Middle East and subsequent oil price hikes being two of the most visible right now—it sets off a string of headlines, analyst notes and corporate responses.

Companies reassess sourcing, rethink inventory levels and look for ways to reduce exposure to the next shock. Blue Yonder set out to capture that thinking in a new survey, which found that the news cycle, tariff whiplash and world events have left many supply chain leaders with a severe case of decision fatigue. Most of them (66%) are also concerned about the future and focusing harder on improving their organizations' productivity and efficiency.

Key Trends to Watch

For its second-annual *Supply Chain Compass*, Blue Yonder focused on several core areas of interest to supply chain leaders. The report outlines the key strategic priorities for about 700 supply chain professionals across North America and Europe. The research found that fewer supply chain leaders believe they are ready for the future now (66%) than last year (73%). Amid widespread uncertainty, leaders' top two priorities are improving efficiency and productivity and achieving faster, better decision-making.

Blue Yonder also looked at the 46% of leaders who identified as highly optimistic about the future of their supply chains to find any differences in performance or outcomes over those who were not highly optimistic. "Confidence correlates strongly with expected financial performance," the company points out in its report.

"The most optimistic leaders are doing things differently, taking an end-to-end approach, collaborating and breaking down silos, and investing in technology, particularly in AI and unified data platforms," it continues. "As a result, they're much less concerned about disruption or the pace of technological change."

Addressing Top Priorities

When asked what their top three strategic priorities are for the upcoming year, the highest ranking (at 35%) answer across all organizations surveyed was "improving efficiency/productivity." Among the report's other key findings:

- Only 48% of less optimistic leaders believe they are ready for the future, compared to 87% of optimistic leaders.
- Improving efficiency and productivity is the top strategic priority for 2026, selected by 35% of leaders, followed by faster, better decision-making, which moved up significantly this year to claim the number two spot after only ranking seventh in last year's report.
- While supply chain leaders felt more equipped to handle technological threats or operational issues, they are slowest to be able to effectively respond to geopolitical disruptions.
- Only 20% of leaders can develop and deploy a response within 24 hours.
- Another 38% take longer than a week to develop and deploy a response to geopolitical disruptions.
- AI adoption is widening: 45% are using machine learning and predictive AI today, 24% are using generative AI (double from 2025), and only 8% are using agentic AI.

"The top five priorities of supply chain leaders highlight a focus on fundamentals and resilience in the face of an increasingly complex and unstable environment," Blue Yonder says. "Becoming faster, leaner, more profitable, and more cost effective is the name of the game, but that's becoming more difficult than ever, as leaders have to manage this at the same time as withstanding constant disruptions."

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By EMILY NEWTON

Can Early Defect Detection with AI Solve Your Supply Chain's Waste Problem?

A defective part that reaches a distribution center triggers a chain reaction of reverse logistics, warehousing, labor and customer dissatisfaction—all of which can go beyond the initial cost of the part itself. Discovering that defect at the production line can change the entire outcome, and that is where AI-powered quality control can help.

The Hidden Costs of Postproduction Defects

Supply chain and procurement professionals know the material cost of scrap. The world generates over two billion metric tons of solid waste annually. The downstream costs when defective goods go past the production floor undetected are often underestimated, yet they can have significant impacts.

Wasted Logistics
Wasted logistics is the most immediate and quantifiable hit. Shipping defective products to distribution centers only to manage returns or disposal can add freight costs and administrative burden. These movements also consume resources that companies could otherwise use to generate revenue. Returns processing introduces additional complexity. Staff members need to inspect, sort, rework or discard products, often across multiple facilities, which adds to the overall overhead costs.

Wasted Storage
Warehousing defective products creates a silent drain on resources. Inventory that companies cannot sell still occupies space, representing sunk capital in labor, facilities, energy and inventory management.

For high-volume manufacturers, even small defect rates can translate into significant storage inefficiencies. Defects can reduce warehouse efficiency over time and may force organizations to expand their capacity prematurely.

Wasted Labor
Discovering defects late down the line shifts priorities from value creation to damage control. Instead of focusing on revenue, teams will need to handle manual inspections and the administrative handling of returns.

This shift increases labor costs while also reducing workforce productivity. Skilled workers spend time and energy fixing avoidable issues instead of scaling output or optimizing current processes.

Reputational Damage
Reputational risk can be challenging to quantify, but its effects are real. Faulty products reaching customers erode brand trust with buyers and distributors. Customer dissatisfaction often leads to lost future sales and negative reviews. In B2B environments where trust is critical, product defects can jeopardize contracts and supplier relationships.

The Mechanics of AI-Powered Defect Detection

AI-based quality control systems operate at a level of precision and speed that traditional inspection methods struggle to match. Many supply chain professionals recognize this value, with commercial AI use reaching 78% in 2024. Here are some of the ways AI can reduce supply chain waste through defect detection.

Computer Vision and Deep Learning
At its core, AI defect detection relies on computer vision powered by deep learning models. These systems are trained on large datasets of product images, and they learn to distinguish between acceptable variations and true defects.

On the production line, high-resolution cameras capture images of each product in real time. The AI model analyzes them instantly and flags anomalies like surface imperfections or assembly errors. While rule-based systems can perform similar tasks, deep learning models can adapt to complex patterns, allowing them to detect subtle defects that would be challenging to define manually.

Data as the Engine
The system's performance is directly proportional to the quality and volume of the training data. High-quality, labeled datasets improve model accuracy and reduce false positives.

These systems continue to learn over time. Each detected defect feeds back into the model, refining its ability to identify rare cases and anomalies. This ability creates a compounding effect where detection accuracy improves the more it is used.

Going Beyond Human Capability
Human inspectors are highly capable and detail-oriented, but fatigue can limit accuracy and visual perception. AI systems operate continuously, maintaining consistent accuracy regardless of shift length or production volume.

AI can also detect defects invisible to the human eye. It can identify microscopic cracks or color deviations before they escalate into functional failures. This capability drastically improves quality control. Aside from catching the obvious defects, manufacturers can use AI to prevent more subtle issues from entering the supply chain in the first place.

The Predictive Power of AI Defect Prevention

Another benefit of AI comes when defect detection evolves into defect prevention. By analyzing patterns across production data, AI systems support more proactive decision-making.

Root Cause Analysis
In addition to flagging defects, AI can analyze them. It can then correlate defect occurrences with machine data or environmental conditions, thereby identifying underlying causes.

For example, a spike in defects might correlate with a specific machine calibration issue or a particular supplier batch. This level of insight allows teams to address problems at the source and prevent future defects.

Predictive Maintenance
Defects can sometimes be early indicators of equipment degradation. AI models can detect patterns that signal when a machine is likely to malfunction or produce faulty products. This approach enables predictive maintenance strategies where teams can service equipment before it fails. As a result, companies experience fewer unplanned downtime events and lower defect rates.

Process Optimization
AI-driven insights can be used to fine-tune production parameters in real time. They can enable dynamic adjustments to temperature or assembly workflows to maintain optimal quality. Over time, this process leads to a more stable and efficient production process.

Quantifying the ROI of Early Defect Detection

Research shows that 70% of manufacturing CEOs have found that AI has delivered strong ROI for their operations. These returns often show up in several ways. Drastic Reduction in Returns Fewer defective products reaching customers translates directly into lower return rates, which reduces reverse logistics and overhead costs while improving customer satisfaction.

The impact can be especially significant in industries or regions with high return volumes. In the U.S., for example, 48% of consumers have returned a product they have purchased within the past year. In India, 81% of buyers have done the same.

Optimized Resource Allocation
Preventing defects early saves wasted material and energy inputs that would otherwise be used to produce faulty goods. As a result, companies achieve greater cost savings while supporting sustainability goals by increasing output with the same resources.

Improved Supplier Relationships
AI-generated insights provide objective, data-driven feedback on supplier performance. When teams find defects linked to specific material batches, they can communicate with suppliers using clear evidence. This approach fosters better collaboration and improves input quality, leading to a stronger supply chain.

From Insight to Impact

AI-driven defect detection shifts quality control from a reactive to a more preventive approach. Catching issues early reduces waste and keeps operations running efficiently. Leveraging this technology is a practical way to improve product quality, vendor relationships and customer satisfaction.

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By AVERY LARKIN

New Call to Reverse the Conflict Minerals Disclosure Mandate

The National Association of Manufacturers is the latest group to question the effectiveness of Dodd-Section 1502.

It's been 16 years since Congress passed the Dodd-Frank Act, directing the SEC to issue rules requiring certain companies to disclose their use of conflict minerals if those minerals are "necessary to the functionality or production of a product" manufactured by those companies. Under the Act, those minerals include tantalum, tin, gold or tungsten.

Congress enacted Section 1502 of the Act to address concerns that the exploitation and trade of conflict minerals by armed groups was helping to finance conflict in the Democratic Republic of Congo (DRC region) and contributing to an "emergency humanitarian crisis." The final rule applies to a company that uses minerals including tantalum, tin, gold or tungsten if:

- The company files reports with the SEC under the Exchange Act.
- The minerals are "necessary to the functionality or production" of a product manufactured or contracted to be manufactured by the company.

Companies using any of the designated minerals were required to conduct a reasonable "country of origin" in good faith. Using that process, organizations would be able to learn whether any of its minerals originated in (or, if were scrapped or recycled from) the covered countries.

Organizations that source minerals from covered countries and aren't using scrap or recycled materials must trace where those minerals came from and how they moved through the supply chain. Then, they have to file a Conflict Minerals Report, post it on their website and include the link in the filing. The due diligence has to follow a recognized standard (e.g., the framework developed by the Organisation for Economic Co-operation and Development).

Still Figuring Out if it Works

The verdict is still out on Section 1502's effectiveness and impacts. Its detractors question whether the disclosure rules have driven any real-world change, especially in conflict zones like the DRC. In a 2025 Viewpoint, Ropes & Gray LLC says the ruling has been "controversial since its adoption in 2012."

The law firm says the U.S. Government Accountability Office (GAO) reported in 2024 that peace and security in the DRC hadn't improved as a result of the SEC disclosure rule. "The GAO concluded that the SEC rules had "not reduced violence in the DRC and has likely had no effect in adjoining countries," it adds. "In fact, the GAO found that the rule was associated with a spread of violence."

On the other side of the argument, groups like the Enough Project say Dodd-Frank 1502 and related reforms have led to "significant improvements in the transparency of corporate supply chains and to a major reduction in the number of conflict mines for the 3T minerals in the eastern Congo."

"More than 75% of the world's smelters and refiners for the four minerals have now passed third-party audits," the organization states. "Before Dodd-Frank 1502, there was no certification mechanism for distinguishing conflict mines (i.e. mines controlled by armed groups or the Congolese army) from conflict-free mines, and there were no federal transparency requirements for companies on conflict minerals."

NAM Speaks Up

The National Association of Manufacturers (NAM) is the latest group to speak out against Dodd-Frank Section 1502. In early April it called on the U.S. Department of State to end the mandate completely, stating that it's "failed to stem violence in the DRC and discouraged American private-sector investment in the region and should be phased out."

Along with the 2024 GAO report, NAM pointed to high compliance costs that companies have to bear in order to stay compliant with the ruling. "The provision has also added staggering compliance costs for U.S. industry," says NAM, which in 2011 estimated it would cost U.S. industry between $9.4 billion and $16 billion initially to comply with this mandate (plus ongoing due diligence and reporting costs).

"After 15 years of failing to end violence in the DRC, forcing U.S. companies to incur billions of dollars in compliance costs and reducing U.S. supply chain resilience," NAM says, "it is time to end this mandate and try a different approach, including greater U.S. investment and continued diplomatic pressure."

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By BRIDGET MCCREA

CBP's Tariff Refund Portal Opens for Business

Importers rush to file refund claims as CBP opens its long-awaited CAPE system.

The much anticipated Consolidated Administration and Processing of Entries (CAPE) portal opened last week and companies began lining up quickly to submit their tariff refund claims. By the end of the first day, major shipping companies like FedEx, DHL and UPS had all filed claims for refunds, CBS News reports.

Run by U.S. Customs and Border Protection (CBP), the newly launched portal was developed in response to a recent Supreme Court ruling that found that the Trump administration lacked the legal authority to impose those tariffs. In a nutshell, the justices ruled that duties imposed under the International Emergency Economic Powers Act (IEEPA) were illegal and that refunds were in order.

American importers can now apply through the portal to get back billions of dollars in tariffs collected illegally over the past year. The CAPE refund program allows entities that directly paid taxes on imports to submit documentation to CBP to request reimbursement, *MS Now* explains. Of more than 330,000 U.S. importers, about 56,497 have applied for refunds, according to recent filings from CBP. Claims from those importers total about $127 billion. CBP said refunds are to be distributed 60 to 90 days after they are processed.

The portal is just the first step in a multi-phase effort to return the tariff revenue. It's designed to consolidate refunds of IEEPA duties (including interest), rather than processing refunds on an entry-by-entry basis, the publication reports. "The refunds are expected to take between two and three months to reach importers' bank accounts, a timeline that could be extended if CBP flags applications for further review."

System Glitches and Errors

As with any major web rollout, CAPE dealt with its fair share of glitches and bugs during its first week of operation. Some businesses immediately experienced problems accessing the U.S. government's new tariff refund portal. One manufacturer told *CBS News* he received an error message when the company tried to file a claim for a tariff refund using the CAPE platform.

"The system is currently experiencing high volume, please try again later," the message stated.

"The system seems to have gone blinky," said a spokesperson for the manufacturer, which CBS says filed the 2025 lawsuit that led to the Supreme Court striking down the Trump administration's emergency tariffs in February. "It seems like the system is overwhelmed."

Not as Easy as it Sounds

Not all IEEPA tariffs are eligible for refunds. Initially, CAPE will accept requests for estimated tariffs, as well as those finalized by CBP within the past 80 days, CBS explains. The agency has said it will issue tariff refunds for valid claims within 60 to 90 days of approval, although it may take longer if claims contain errors or inaccuracies that require correction.

Also, not all companies will get their tariffs refunded, and some of the refunds may take months or even years to process and return. Baker Tilly's Pete Mento explains that the CBP CAPE portal is an intake system within the Automated Commercial Environment (ACE). Claims move through a defined workflow that includes submission, validation, review and ultimately liquidation or reliquidation.

The front end is intentionally streamlined, but submission is just the first step. "Submission gets you in the door. It does not get you paid," Mento writes. "Getting a file accepted means the data matches CBP's system. It does not mean the claim is correct."

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Potential Supply Chain Implications of the Iran Conflict

Exploring the immediate and long-term implications of the Middle East conflict on the world's supply chains.

Major geopolitical events almost always ripple through global supply networks, and the escalating conflict involving Iran is already raising concerns across multiple fronts. From potential disruptions to shipping routes in the Strait of Hormuz to tighter airspace restrictions and rising energy prices, the U.S. and Israel's attack on Iran could affect transportation, manufacturing and procurement channels worldwide.

The situation remains fluid and the long-term implications are still unclear. In the meantime, supply chain teams are already looking for pressure points that could emerge if the conflict expands or drags on. Here are several areas companies should be paying attention to.

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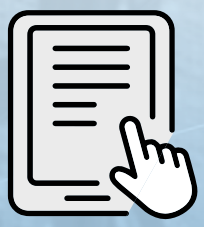

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