

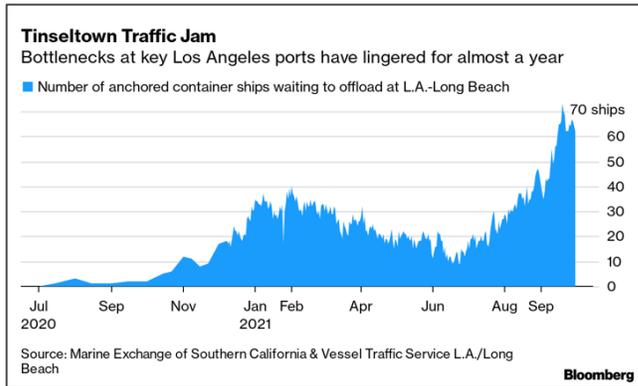
Exiger Trends Report

September - October 2021

Logistics

Port Logjams.

The global **port backlog** continues. Domestically, **L.A. and Long Beach** ports are the most severe pinch points for U.S. trade, while shortages of trucking, rail, and warehouse capacity at alternative gateways are challenging importers seeking to avoid the Southern California port logjam. Meanwhile, port congestion extends worldwide and **container freight prices are surging**, including in China from two of the three biggest container ports in the world.¹



Port Congestion

Supply chain disruptions increase global congestion rates

Anchorage	Total Ships	Waiting Ships	In Port	Congest (%)	Net Chg
Shanghai/Ningbo/Zhoushan	269	68	77	46.9%	-4.9%
Hong Kong/Shenzhen/PRD	237	88	62	58.7%	+15.5%
Los Angeles/Long Beach	112	35	29	54.7%	+1.2%
Singapore	81	34	38	47.2%	+10.6%
Rotterdam	58	3	34	8.1%	-11.3%
Busan	53	6	31	16.2%	-1.7%
Qingdao	53	9	28	24.3%	+0.3%
Jebel Ali/Dubai/Sharjah	40	3	26	10.3%	-6.3%
Bangkok/Laem Chabang	39	3	22	12.0%	-10.7%
Savannah	35	24	4	85.7%	+10.7%
Antwerp/Zeebrugge	33	0	22	0.0%	-23.1%
Surabaya	31	8	5	61.5%	+11.5%

Sources: Bloomberg, IHS Markit, Genscape
 Note: Congestion % estimated as anchored container ships waiting divided by sum of anchored container ships and container ships in port. Total container ships provided above include all vessels in anchorage area to show all activity. Net change shows current congestion minus April-Oct. median.



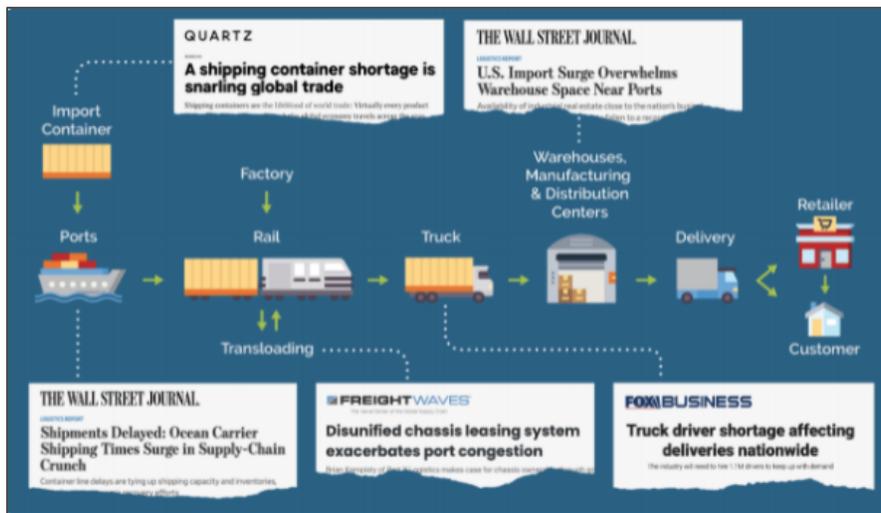
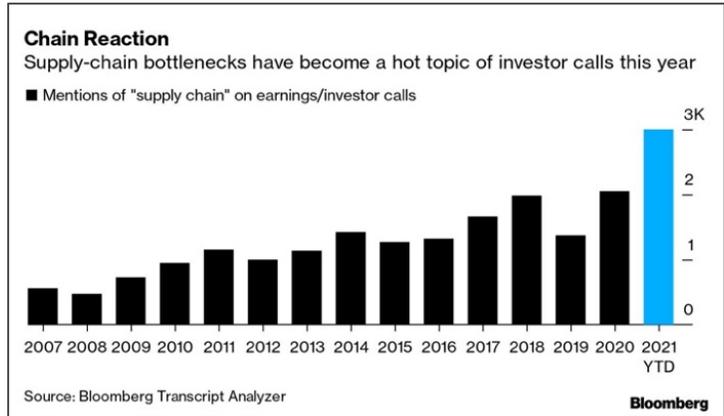
¹ WSJ, [Shippers Find New Supply-Chain Hurdles at Alternate Ports](#), Oct. 24, 2021; Bloomberg, [Container Ships Headed for U.S. Poised to Worsen Port Bottleneck](#), Oct. 22, 2021; Statista, [Container Freight From Asia Surges](#), 2021.

- California Oil Spill.**

Authorities believe a **container ship dragging its anchor near a Southern California undersea pipeline** led to a **large oil spill** discovered in October 2021 (but that may have occurred as early as January 2021, when the container ship backlog was already mounting).²

- Hot Topic.**

“**Supply chain**” - and its associated challenges - are mentioned more than ever on **corporate earnings calls**.³ This is unlikely to stop anytime soon. According to Transportation Secretary Pete Buttigieg, supply chain disruptions will likely persist as **long as the world is battling COVID-19**, engendering “off-the-chart” surges in demand for physical goods against supply constrained by pandemic-driven factors like port shutdowns and labor shortages. The upshot is a “**domino effect**” of logistical challenges.⁴



² Bloomberg, [Coast Guard Boards Vessel That Draggged Anchor Near Pipeline](#), Oct. 17, 2021.

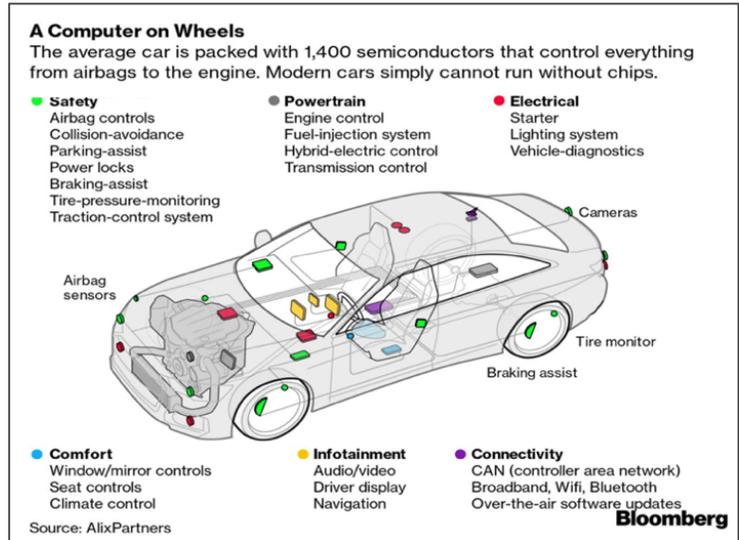
³ Bloomberg, [“Supply Chain” Mentions on Earnings Calls Hit a Record High](#), Oct. 13, 2021.

⁴ Business Insider, [Pete Buttigieg Says Supply Chain Disruptions Won't Really Go Away Until We 'Put the Pandemic in the Rearview Mirror'](#); Nov. 1, 2021; ABC News (WXYZ Detroit), [Global Supply Chain Continues To Grapple with Domino Effect of Pandemic-Related Issues](#), Oct. 13, 2021.

Materials & Goods

■ Semiconductor Woes.

The global semiconductor shortage continues, which experts estimate will not diminish until mid-2022 or later. The auto industry has been hit especially hard. It first ran into trouble by backing out of chip orders during last year's first pandemic lockdowns, ceding its spot in line to sectors that saw demand surge when consumers were forced into quarantine. The shortage was then exacerbated by winter storms in Texas, a factory fire in Japan, and COVID outbreaks in Malaysia, a key hub for semiconductor packaging and testing.⁵

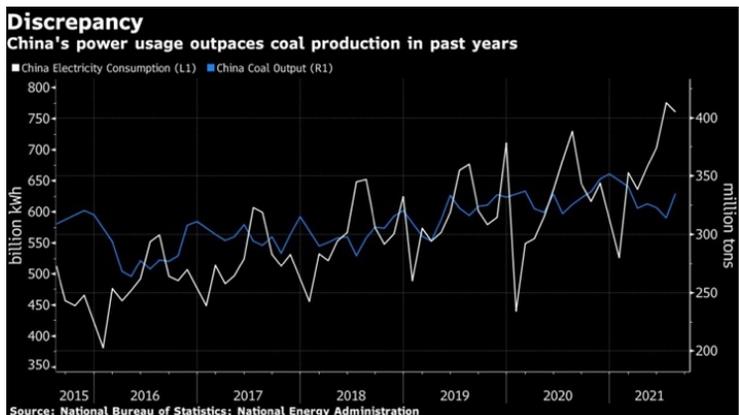


■ China's Electricity Crunch.

A power shortage across China has rippled from factory floors to homes and even traffic lights in some places, leading economists to cut their growth forecasts for the world's second-largest economy. The shortages mirror tight energy supplies in Europe and elsewhere that have roiled commodity markets.

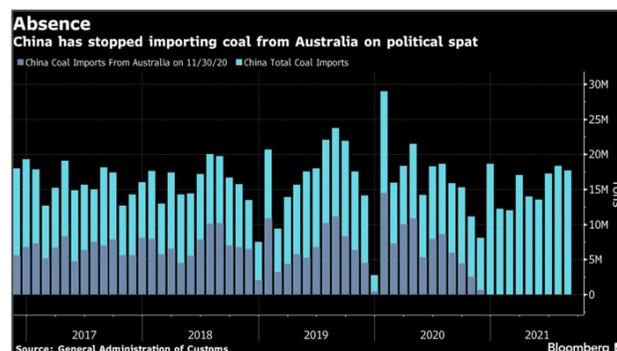
■ Part of the issue stems from the **economic rebound** after lockdowns that has **boosted demand**, while **lower investment by miners and drillers** has constrained production.

■ But the crisis is partially due to China's own environmental agenda, as **President Xi Jinping's vision of decarbonizing the economy discouraged the burning of coal**, a cheap energy source that subsidized its economic growth for decades. **Chinese manufacturers warn that strict measures to cut electricity use will slash output in economic powerhouses like Jiangsu, Zhejiang and Guangdong provinces.** Local governments are ordering the power cuts as they try to avoid missing targets for reducing energy and emissions intensity, while some are facing an actual lack of electricity. **China has vowed to cut energy intensity – the amount of energy consumed per unit of economic growth – by around three percent in 2021 to meet its climate goals, and to go “carbon neutral” by 2060.** Coal-based producers account for more than 70 percent of China's electricity generation.



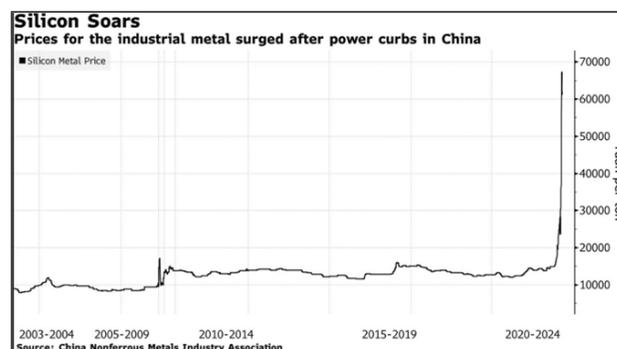
⁵ Bloomberg, [The World's Automakers Buckle Up for More Chip Turmoil Ahead](#), Sept. 27, 2021.

- Traditionally a major importer of coal, China stopped buying Newcastle grade coal from Australia last year amid a political dispute. Rising purchases from Indonesia helped make up for the missing Australian coal this year, but Indonesia's energy demand also soared. Mongolia, China's resource-rich neighbor, sold less coal this year partly due to China's strict border controls to prevent the spread of COVID.⁶



- Silicon Price Spike.**

A metal made from the second-most abundant element on earth has become scarce, threatening everything from car parts to computer chips and throwing up another hurdle for the global economy. The silicon issue exemplifies how the **global energy crisis is cascading through economies** in numerous ways, as **China is far and away the world's largest silicon producer and yet has slashed output to curb power consumption.**⁷



- Aluminum Price Spike.**

The raw cost of aluminum has reached a **10-year all-time high in pricing** and is predicted to increase significantly more over the next several years. An excellent heat and electricity conductor and pound-for-pound twice as conductive as copper, aluminum is used for many applications because of its **heat sink capabilities** such as in **computer motherboards**. Pure aluminum is used principally by the electronics industry for **capacitor foil, hard disc drives, and conductor tracks on silicon chips.**⁸

Market Forecast for Aluminum Prices		
Organization Name	Y/E Prediction 2021 (per metric ton)	Long-Term Prediction (per metric ton)
The World Bank	\$2,000	\$2,400 (by 2035)
The International Monetary Fund (IMF)	\$2,083	\$2,276 (by 2026)
Innovation and Science Australia (ISA)	\$2,134	\$2,160 (by 2022)

⁶ WSJ, [China's Power Shortfalls Begin to Ripple Around the World](#), Oct. 1, 2021; Bloomberg, [China's Electricity Crunch Is World's Latest Supply-Chain Threat](#), Sept. 27, 2021; Bloomberg, [Why China is Facing a Power Crunch and What It Means](#), Sept. 27, 2021.

⁷ Bloomberg, [Silicon's 300% Surge Throws Another Price Shock at the World](#), Oct. 1, 2021.

⁸ SiliconExpert, [Record-Level Aluminum Price Spike in 2021](#), Sept. 25, 2021.

- **Power Crunch: Impact on Electronics Manufacturers.**

The electricity shortage caused by soaring prices of coal could dramatically hit the tech industry given that China is the world's biggest production base for gadgets and a major center for **semiconductor packaging**. Several companies have already experienced **downtime at their Chinese facilities to comply with local restrictions**. **Pegatron Corp. said in late September that it began to adopt energy-saving measures**, while ASE Technology Holding Co., the world's biggest chip packager, halted production for several days. Curbs on industrial energy use have been imposed across several provinces, including economic powerhouses Jiangsu and Guangdong. **Pegatron's iPhone production facility in Shanghai and Foxconn Technology Group's key Apple handset manufacturing base in Zhengzhou have reportedly continued uninterrupted**. **Eson Precision Engineering, an affiliate of Foxconn, temporarily suspended production at its facilities in Kunshan**. Unimicron Technology, a print circuit-board maker, said its subsidiaries in the Chinese cities of Suzhou and Kunshan in Jiangsu Province also needed to temporarily stop production.⁹

Labor & Industry

- **Vietnam Labor Shortage.**

Numerous Vietnamese industrial sectors are reporting **worker shortages of about 50 percent** after anti-virus restrictions began lifting early in October. **Electronics manufacturers countrywide in Vietnam are operating with a shortage of nearly 56 percent of workers**, according to labor ministry data. Tens of thousands of workers began fleeing the nation's commercial hub of Ho Chi Minh City and nearby industrial provinces after tough lockdowns began easing. **As many as 2.1 million workers in the industrial belt want to return to their home provinces**, the government reported. **The electrical equipment manufacturing sector is reporting a 44.5 percent shortage of employees.**¹⁰

- **Silicon Alternatives.**

On October 4, 2021, **Cree**, a pioneer in **silicon carbide (SiC)** applications, relisted on Nasdaq and changed its name to **Wolfspeed**, heralding its transition to a pure-play in **wide bandgap semiconductors**. This class of semiconductors, including SiC and **gallium nitride (GaN)**, are considered essential to the future of power electronics used in EVs, the electrical grid, and compact portable power applications. Because SiC and GaN have a bandgap roughly three times larger than conventional silicon, they can handle **higher power levels, higher electrical currents, and operate at higher frequencies and temperatures**, as well as have properties that make them **more efficient**.

- Wolfspeed is currently **building the largest global SiC semiconductor fab in Marcy, New York**. The fab, which will come online in early 2022, will have the **world's first 200 mm SiC production line**.
- Wolfspeed both sells SiC wafers to other device manufacturers and makes its own devices. With a **60 percent share of the global SiC wafer market**, it is roughly four times larger than its next

⁹ Bloomberg, [China's Energy Crisis Is Hitting Everything From iPhones to Milk](#), Oct. 8, 2021; Nikkei Asia, [Key Apple, Tesla Suppliers Halt Production Amid China Power Crunch](#), Sept. 27, 2021; Bloomberg, [iPhone Assembler Starts Energy-Saving Measures in China](#), Sept. 27, 2021.

¹⁰ Bloomberg, [Vietnam Electronics, Apparel Sectors Facing 50% Worker Shortages](#), Oct. 18, 2021.

largest competitor. The company has signed large supply agreements with Infineon and ST Microelectronics, among others.¹¹

- **Chinese Gallium Dominance.**

Gallium nitride (GaN) is increasingly important as an alternative to traditional silicon-based semiconductors in light of its **greater performance at higher temperatures**, support of significantly **higher voltage designs**, and **greater efficiency**. China controls **95 percent of global gallium production** (five percent by Japan, South Korea, and Russia); **the U.S. imports 100 percent of its gallium consumption**, with 55 percent originating in China. In 2018, the U.S. Government designated gallium a “critical mineral” (E.O. 13817).

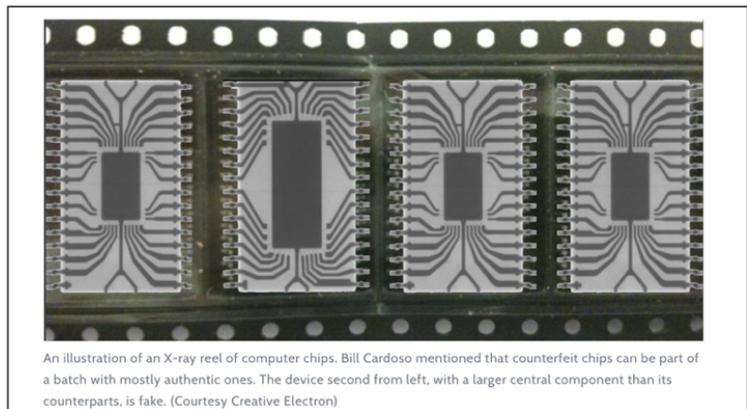
- GaN demand is rising in China for use in 5G, and China has already begun to exert control to benefit its domestic telecoms. In 2020, for example, **China cut production**, which led to a **32-percent price increase**. Notably, **Huawei has shown a keen interest over the last decade in developing GaN tech**: it’s listed as an assignee on over 3,000 gallium nitride-related patents since 1999 and offers various GaN-based product.¹²

Risk & Innovative Mitigation

- **Fake Chips.**

Microchip counterfeiting has risen as a result of **soaring global demand**, compounded by **limits on U.S. chip exports to Huawei and other large Chinese manufacturers**, which has led to **chip stockpiling**. This has forced other consumers to make riskier chip purchases – namely, “**chips in distribution**,” meaning from parties other than authorized distributors and manufacturers (the so-called **grey market**) that are often **stripped from discarded electronics** – which then find their way back into the U.S. supply chain. All told, this is prompting greater demand for **chip authentication and counterfeiting detection programs**.

- Creative Electron CEO Bill Cardoso, whose company uses x-rays to inspect computer chips: “We look at connections inside the chip, and if those connections are not correct, based on the documentation of what the component’s supposed to do, we can determine that it’s a fake component...There’s one **common application of counterfeit chips in the military and aerospace markets**. And the difference between a military spec and a commercial spec, sometimes it’s just one letter in the package of the chip. So what counterfeiters do is they erase the commercial – the ‘C’ – and replace it with an ‘M.’ And now that’s a military component, and the **price went up by 100 times**. So electrically, under normal conditions, it’s going to work exactly the same. But **at the extremes** where



¹¹ Forbes, [Cree Becomes Wolfspeed](#), GM Deal Signals the Coming End of the ICE Age, Oct. 4, 2021; WSJ, [For Longer-Range EVs, a Cousin of Silicon Makes a Material Difference](#), Oct. 7, 2021.

¹² TechXplore, [Researchers Realize Gallium Nitride-Based Complementary Logic Integrated Circuits](#), Sept. 6, 2021; Somag News, [Huawei Introduces 65W Super Fast Gallium Nitride \(GaN\) Charger](#), Apr. 9, 2020; South China Morning Post, [Gallium: China Tightens Grip on Wonder Metal as Huawei Works on Promising Applications Beyond 5G](#), July 20, 2019.

the military component should perform, if it's on a fighter jet or a nuclear missile, **that's where you can have a failure in the worst possible time.**¹³

- **Atomic Authentication.**

To help prevent counterfeit computer chips, researchers at the National Institute of Standards and Technology (NIST) have demonstrated a method that could **electronically authenticate products** before they leave the factory. The scientists employed **doping**, in which small clusters of "foreign" atoms of a different element from those in the device to be labeled are implanted just beneath the surface with an atomic force microscope probe. The implanted atoms alter the electrical properties of the topmost layer without harming it, **creating a unique label that can be read by an electronic scanner.**¹⁴

Threats & Regulatory Compliance

- **U.S. Expels China Telecom.**

On October 26, 2021, the FCC **barred China Telecom (Americas) Corp. from operating in the U.S.**, ordering it to cease domestic operations within 60 days. China Telecom has had a point-of-presence (PoP) presence in North America since the early 2000s. As per the FCC, China Telecom is subject to **"exploitation, influence, and control by the Chinese government."** The FCC reached this conclusion after a **10-month investigation** into allegations China Telecom was covertly helping China's intelligence agencies commit **espionage**, and said that its ownership and control by the Chinese government raise **"significant national security and law enforcement risks"** by providing opportunities to **"access, store, disrupt, and/or misroute U.S. communications."**¹⁵ The FCC's decision and reasoning raise **security concerns** for U.S. companies that knowingly - and sometimes unknowingly - **use China Telecom products**, such as servers and other hardware.



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For Immediate Release

FCC REVOKES AND TERMINATES CHINA TELECOM AMERICA'S AUTHORITY TO PROVIDE TELECOM SERVICES IN AMERICA

WASHINGTON, October 26, 2021—The Federal Communications Commission adopted an order ending China Telecom (Americas) Corporation's ability to provide domestic interstate and international telecommunications services within the United States. The Order on Revocation and Termination directs China Telecom Americas to discontinue any domestic or international services that it provides pursuant to its section 214 authority within sixty days following the release of the order. Promoting national security is an integral part of the Commission's responsibility to advance the public interest, and today's action carries out that mission to safeguard the nation's telecommunications infrastructure from potential security threats.

- **U.S. Bars Another Malaysian Manufacturer Over Labor Abuses.**

The U.S. barred imports from Malaysian glove maker **Supermax Corp.** over alleged forced labor - **the fourth Malaysian firm to face such a ban in the past 15 months.** Malaysian factories - which make everything from palm oil to medical gloves to iPhone components - have increasingly come under scrutiny over allegations of abusing foreign workers. Supermax

¹³ Nikkei Asia, [Fake Chips Slipping into Supply Chain. Industry Insiders Warn](#), Sept. 19, 2021; Marketplace.org, [No chips. Fake chips. The computer chip issues are still with us.](#), Oct. 11, 2021.

¹⁴ National Institute of Standards and Technology, [Implanted Atoms Create Unique Electrical IDs that Distinguish Bona Fide Devices from Forgeries](#), Sept. 16, 2021.

¹⁵ FCC, [FCC Revokes China Telecom America's Telecom Services Authority](#), Oct. 26, 2021.

said that, of its total sales, the U.S. accounts for 20 percent,¹⁶ which Exiger estimated at roughly \$1.7 billion.

- **International Statement on Principles for Supply Chain Resilience.**

On October 31, 2021, representatives of the U.S., EU, India, Japan, Mexico, South Korea, Singapore, and other countries met to discuss near-term supply chain disruptions and **paths to long-term resilience**. The group identified four key pillars for global supply chain resilience: (1) **transparency and information sharing** among countries; (2) **diversity, openness, and predictability of supply** among global markets consistent with the **rules-based multilateral system**; (3) **security – especially in technology supply chains** and critical infrastructure nodes – to prevent disruption to critical systems, unnecessary costs, inefficient delivery, loss of intellectual property, and delivery of unauthorized or compromised products; and (4) **sustainability**, including implementation of the Paris climate accord and international labor conventions to support clean and fair supply chains, especially given worsening extreme weather events.

- **Russian Hacking Holds Steady.**

Near the end of 2020, a Russian government-affiliated **supply chain cyberattack** was discovered that deployed a trojan horse in the software of U.S. company **SolarWinds**. The vulnerability allowed hackers to compromise up to 18,000 SolarWinds customers, including **multinational corporations, defense contractors, and government agencies**. A year later, renewed efforts by the same group to target the global IT supply chain are painting a picture of a defiant Russia undeterred by U.S. efforts to clamp down on malicious cyber activity. In that regard, on October 25, 2021, Microsoft said that the **same group behind the SolarWinds attack**, known as **Nobelium**, had **launched an even larger wave of attacks over the summer** with more than 600 customers attacked almost 23,000 times since the start of July 2021; although most were unsuccessful, Microsoft said more than a dozen resellers and technology service providers were compromised.¹⁷



- **Modern Slavery Legislation.**

2021 has seen several international **legislative efforts imposing human rights due diligence and transparency obligations on multinational companies**. Earlier this year, **Germany and Norway** each introduced such legislation, and draft legislation is expected to come into force in the **Netherlands** in 2022. Further, a **directive on corporate due diligence and accountability** is currently under review by the EU Commission that, once entered into force, will be applicable to **all EU Member States**. In Canada, **supply chain transparency legislation** was introduced that would prohibit the import of goods produced, in whole or in part, by

¹⁶ Reuters, [U.S. Bars Malaysian Glove Maker Supermax Over Alleged Labour Abuses](#), Oct. 21, 2021.

¹⁷ The Hill, [New Hacking Efforts Show Russian Undeterred by U.S. Actions](#), Oct. 25, 2021.

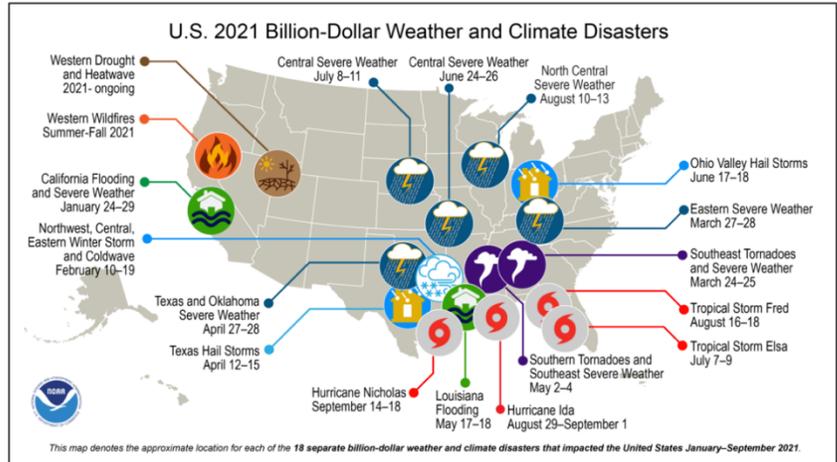
forced or child labor, and impose mandatory, continuous reporting obligations on certain businesses.¹⁸

Climate, Disasters, & Disruption

- Climate Change = Supply Chain Disruptions.**

President Biden recently called the climate crisis an “**existential threat**” and apologized for the U.S. withdrawing from the Paris climate accord.¹⁹ As of October 2021, the U.S. had undergone **18 weather disaster events** with losses **exceeding \$1 billion each**, including a drought, two floods, nine severe storms, four tropical cyclones, a wildfire, and a winter storm.²⁰ Experts warn

to expect product shortages in the future, especially for industries with intricate supply chains like **microchips**, as extreme weather events create global turmoil and **mimic the supply chain effects of COVID-19**.²¹

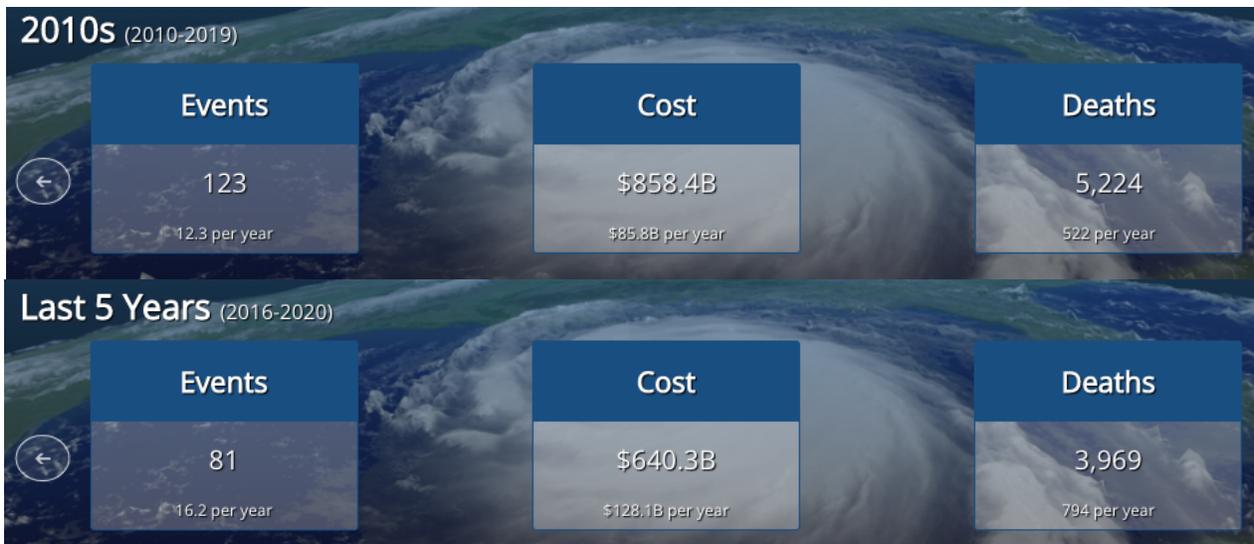


¹⁸ JDSupra, [Europe and Canada Seek To Mandate Human Rights Due Diligence and Transparency Obligations on Companies and Their Global Partners](#), Oct. 28, 2021.

¹⁹ Fox News, [Biden Calls Climate Crisis 'an Existential Threat,' Apologizes for Trump Pulling Out of Paris Accord](#), Nov. 1, 2021.

²⁰ National Centers for Environmental Information, [Billion-Dollar Weather and Climate Disasters: Overview](#), Oct. 8, 2021.

²¹ Salon, [Thanks to Climate Change, Supply Chain Disruptions Are Posted To Be the New Normal](#), Aug. 15, 2021.



ABOUT EXIGER

Exiger is revolutionizing the way banks, corporations, and governments manage risk through its combination of practical expertise, award-winning technology, and process excellence. In recognition of the growing volume and complexity of data and regulation, Exiger is committed to creating a more sustainable compliance environment through its holistic and innovative approach to problem solving. Powered by DDIQ and Insight 3PM, Exiger takes an analytics-led, technology-enabled approach to everything we do. Exiger operates out of 11 offices with more than 700 employees around the world.

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