Deloitte.
Insights

Electric power supply chains: Achieving security, sustainability, and resilience

As supply chain disruptions become the new norm, what strategies is the electric power sector adopting to mitigate their impact?

Deloitte's Power, Utilities & Renewables practice helps clients across power generation, transmission, and distribution; natural gas and water distribution; and renewable energy development anticipate and respond to complex market challenges and resulting opportunities by offering an unparalleled range of services, innovation, and critical thinking. Learn more.

Contents

Introduction

OVER THE PAST two years, multiple disruptions to supply chains have affected operations across most industries. And the electric power sector is no exception. The sector was grappling with numerous challenges within its supply chain networks even before recent disruptions driven by the pandemic and the Russian invasion of Ukraine.[1]

These disruptions—ranging from logistics bottlenecks to shortages of raw materials and components and labor shortages—have resulted in rising costs and a scarcity of essential electric supplies.[2] They have also widened the gap between demand and supplies of electrical equipment and components, slowing the clean energy transition. As a result, many electric power and renewable energy companies are revisiting supply chain strategies and rebooting their approach to supply chain risk management—and their boards increasingly expect it. Some are integrating supply chain management deeper into business planning and involving supply chain managers in the capital planning process. They are working to develop more secure and sustainable supply chains, while managing third-party risk to ensure resilience in the face of future disruptions.

To better understand the types of supply chain disruptors, their impact on the sector's operations, and the strategies used to overcome these disruptions, Deloitte surveyed more than 50 electric power and renewable sector executives in the United States. The findings were supplemented by interviews with executives and leaders in utilities and other electric power providers. Using these insights, this report takes an in-depth view of how the electric power sector can improve its supply chain security, sustainability, and resilience.

Multiple disruptors impact the electric power supply chain

A COMBINATION OF DISRUPTORS is driving supply chain gridlock and impacting end-to-end operations in the electric power sector. Prepandemic supply chain vulnerability, due largely to the geographic concentration of component manufacturing and critical minerals mining, has been compounded by the effects of the pandemic and the Russian invasion of Ukraine.

We have divided these disruptors into five categories—environmental, geographic, operational, technological, and macroeconomic—which impacted between 32% and 98% of our survey respondents' supply chain operations (figure 1).

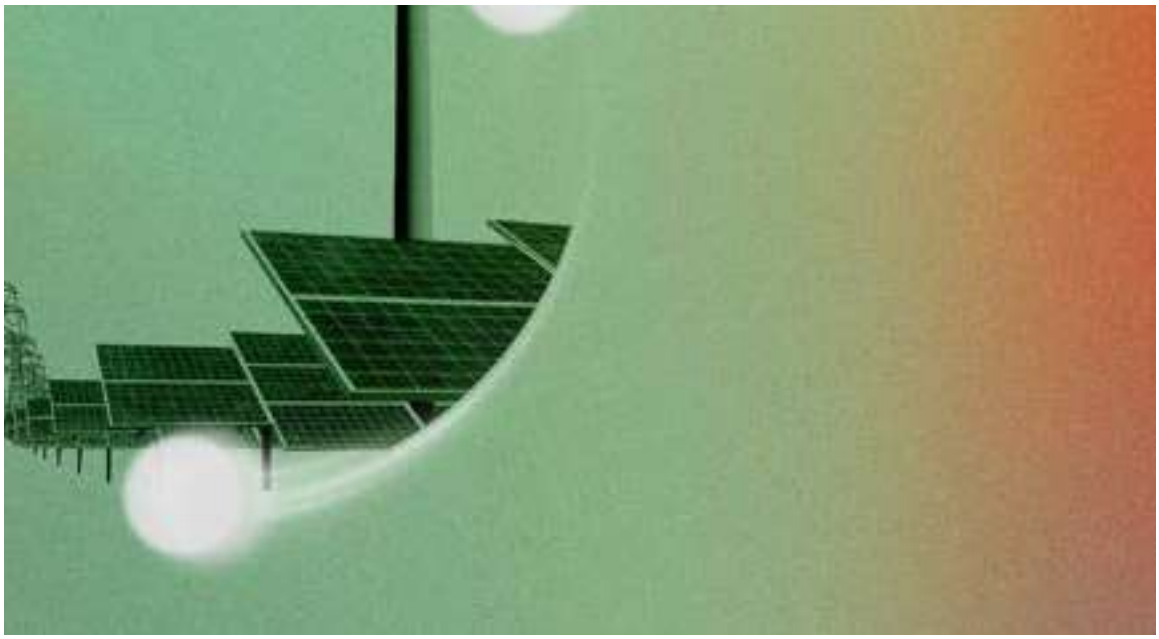


FIGURE 1

Respondents report operational and macroeconomic disruptions as the most significant supply chain challenges

Percentage of respondents who identified each disruptor as having significant impact

Operational

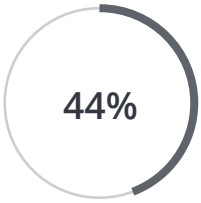
Manufactured component shortages, logistics constraints, divergent product standards and regulations

- Limited availability of raw materials and longer lead time for components
- Global shipping congestion, rising freight charges, and container shortages are affecting project timelines
- Divergent product standards coupled with pent-up demand can hinder electrical equipment procurement

Macroeconomic

Trade policies, labor shortages

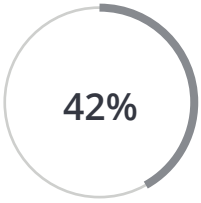
- Trade tariffs and quotas can disrupt procurement of materials and components from foreign suppliers, and domestic manufacturers may lack production capabilities to fill gaps
- Labor constraints at ports and shortages of skilled laborers are also contributing to the supply imbalance



Technology

Risk of cyberattacks, chip shortages

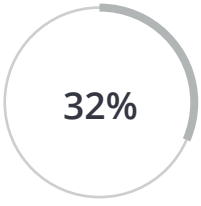
- Fragmented digital supply chains for electric power companies are contributing to supplier-driven cyber risks
- The global shortage of high-end semiconductors concerns electric power companies, as components such as solar panels and wind turbines require chipsets to control and manage



Geographic

Major commodity shortages, price fluctuations

- Clean-energy transition is shifting key raw materials from fuel to minerals, making supply chains highly dependent on potentially insecure foreign sources
- Global materials sourcing often limited to a small number of countries can constrain supplies of power equipment and materials



Environmental

Tougher environmental regulations, climate-related natural disasters

- Increasing severity and frequency of extreme weather events risks damaging utility infrastructure
- Stringent environmental policies for domestic mining have led to US dependence on foreign sources

Source: Deloitte Electric Power Sector Supply Chain Survey.

- Nearly all of the respondents (98%) consider operational challenges as major disruptors in their supply chains.

- In addition, almost all (92%) also see macroeconomic factors, such as labor shortages and trade policy, as significant disruptors. Pandemic-driven labor shortages, on top of preexisting shortages resulting from a rapidly retiring workforce, are further exacerbating supply chain challenges.

The impact of these disruptors on the electric power sector has been wide-ranging—from increased costs to project delays (figure 2). They're not only impacting grid modernization efforts and clean energy deployment, but also causing service-related delays. Electric power companies are draining inventories as they continue to upgrade equipment, while replacements are often delayed.[3]

Along with other supply chain disruptions, a US trade investigation into solar panel supplies from four Southeast Asian nations has also loomed over the industry, with the potential to further constrain supplies. To mitigate the dampening effect on the market, the Biden administration waived tariffs on panels from the four nations for two years and invoked the Defense Production Act to boost domestic solar panel manufacturing.[a]

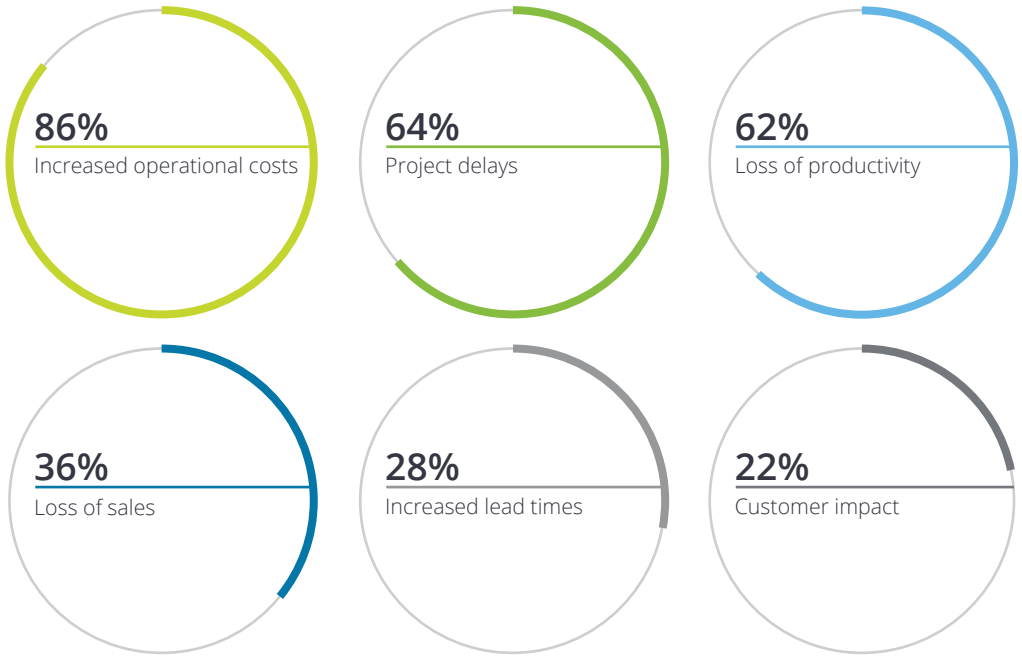
[a]Nichola Groom, "US to consider tariffs on solar panels made in Southeast Asia," Reuters, March 29, 2022.

And ripple effects are impacting the broader economy, sometimes slowing new home construction due to a lack of electrical equipment—especially distribution transformers and smart meters[4]—and delaying transportation electrification.[5]

FIGURE 2

Electric power providers highlight multiple consequences of supply chain disruption

Percentage of respondents who selected each consequence



Source: Deloitte Electric Power Sector Supply Chain Survey.

According to our survey, respondents believe increased operational costs (86%), project delays (64%), and loss of productivity (62%) are significantly impacting the industry. Among the industries most acutely affected by these supply chain constraints has been the solar industry, where a third of all utility-scale solar capacity scheduled in the United States for completion in Q4 2021 was delayed by at least a quarter. At least 13% of the planned capacity for completion in 2022 has either been delayed by a year or canceled.[6] This trend will likely continue over the next two years as some utilities have warned they may need to delay 3–4 GW of total solar installations until 2024 due to shortages of solar panels and other equipment.[7]

A severe shortage of key commodities, materials, and labor can create an inflationary cost environment for companies, resulting in increased component costs. Transformer prices have doubled, while the average lead time for delivery has at least tripled from what it was two years earlier, reaching 52 weeks in some cases (figure 3).[8]

FIGURE 3

Disruptors have significantly impacted components' cost and delivery lead time

	Cost increase	Lead time
Transformers	20–100%	100–400%
Wire and cables	20–60%	60–300%
Precast manholes (electric)	60%	400–600%
PVC conduits	400–500%	900–1,400%
Stainless steel valves and fittings	5–20%	200–300%
Batteries	15–25%	50–100%
Solar PV	20–30%	30–50%

Note: Cost increases and lead time are calculated from secondary research, examples, case studies, and utility project status reports, using information from the sources listed below.

Source: *Jacksonville Daily Record*; Federal Reserve Bank of St. Louis; Scoop Robotix; Kit Carson Electric Cooperative; *News Herald*; Dawson Public Power District; WUSF Public Media; *Reuters*; Merfish United; *Business Wire*; American Public Power Association; *ETEnergyworld*; and Deloitte analysis.