

A photograph of an offshore wind farm with several white wind turbines in the ocean under a blue sky. The image is framed by decorative geometric shapes in yellow, purple, and orange with diagonal line patterns.

# 2023 Renewable Supply Chain Risk Report

WTW Global Supply Chain Survey



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### About the survey

**Who:**

100 senior decision makers, including risk managers, supply chain and logistics managers and CEOs.

**Where:**

Countries across Europe, North America, Asia-Pacific and Latin America.

**Size:**

All companies surveyed had annual revenue over \$250 million.

Find full details of our sample and methodology on page 14. The survey contained all closed questions with different response options ranging from ranking questions and multi-select to single coded questions. In this report, we have included some of the findings from the survey. For the full results, including breakdowns by region and job role, please contact us using the details on page 15.



# Introduction

After years of exponential growth, renewables may be close to a tipping point when they become the main source of energy powering economies and industries. Supply chains have been central to this success, delivering the technologies and economies of scale needed to make the energy transition possible.

But there are signs that this progress could be stalling, at least temporarily. Rising raw material prices are reversing the downward trend in the cost of renewables, while shortages, bottlenecks and delays in the supply chain are lengthening project lead times, putting future plans at risk.

## How are energy businesses adapting?

To find out how the sector is navigating this changing landscape, we surveyed 100 risk and supply chain leaders in companies providing technologies, infrastructure and power generation in areas including hydro, solar, wind, biofuels, geothermal, battery storage and heat pumps.

How do they see the supply chain landscape? What are the main challenges and risks they face? What are they doing to overcome obstacles and to try to build resilience? And what will the supply chains of the future look like?

# Five key findings

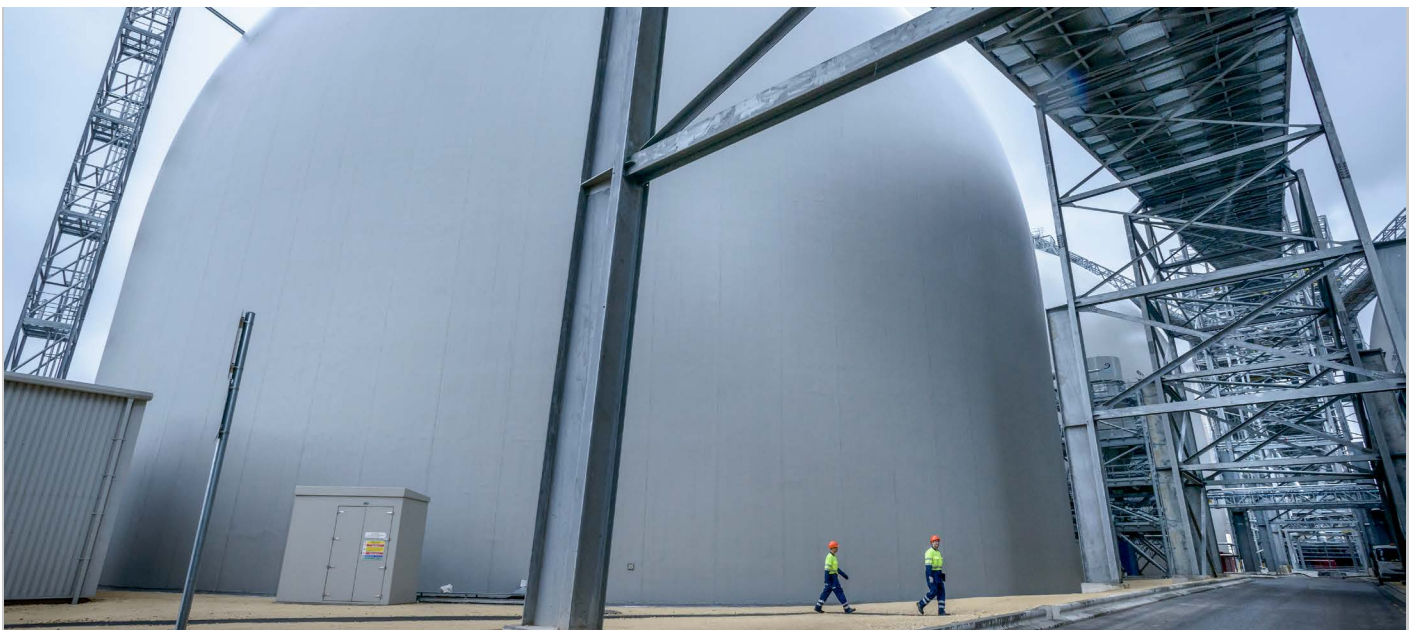
**74%** of businesses said losses related to the supply chain had been higher or much higher than expected over the last two years.

**44%** named a shortage of raw materials to be among the biggest supply chain factors expected to impact their businesses over the next two years, topping the list of concerns.

**84%** said they have made at least some improvements in their approach to supply chain management in response to the pandemic.

**85%** said a lack of data, knowledge and understanding were among the factors posing the greatest challenge to addressing risks over the next three to five years.

**80%** agreed or strongly agreed that a lack of alternative suppliers impeded their ability to implement an effective dual or multi-source strategy.



## Market overview

# Supply chain problems hold back renewables progress

There's no doubt that renewables are the future of energy. If climate change was not enough to motivate a switch from fossil fuels, the conflict in Ukraine has starkly highlighted the volatility of oil and gas, both in terms of cost and reliability of supply.

But there are questions over how far and how fast the energy transition will go. Even if the political will and economic incentives for renewables are aligned, supply chains may struggle to deliver the infrastructure and equipment needed to make this happen at the required pace.

Heavily impacted by the pandemic, they are now being tested by rising raw material costs and capacity constraints. Surges in commodity prices such as steel have inflated the cost of infrastructure such as wind turbines, while the growth of solar energy has been constrained by shortages of materials, trade tariffs and a lack of skilled labor.

The sector also faces shortages of critical minerals such as lithium, cobalt, nickel, graphite and copper, needed for clean energy technologies. All of these factors are contributing to higher costs and longer lead times, making projects less viable in the near term.

### Firms pay a high cost for disruption

Given these challenges, it's perhaps not surprising that almost three-quarters of respondents (74%) in our survey said that their losses related to supply chain risk were higher or much higher than expected over the last two years. It appears the issues have been building for some time — a large proportion (40%) agreed or strongly agreed that supply chains risks had been increasing before the pandemic.

However, experiences and learnings from the last few years have motivated businesses to increase robustness and resilience. A majority in this survey (64%) said they have made some improvements in their approach to supply chain management following the pandemic. A further 20% said they have completely transformed their approach.

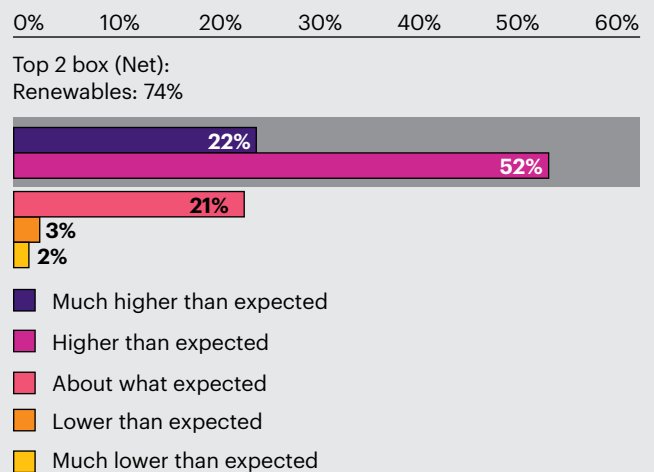
### Collaborating to reduce risks and losses

When asked about the greatest opportunities to improve supply chain management, increased collaboration with customers (53%) came top of the list, followed by

strategic planning within their organization (51%) and increased collaboration with suppliers (51%).

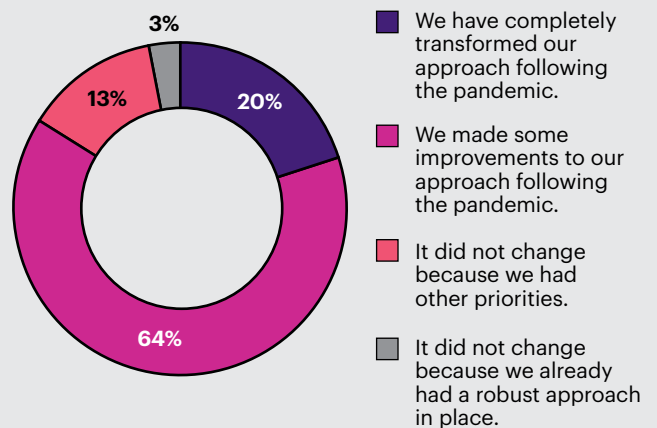
These results underline the need to work closer with key partners to optimize current supply chains where switching suppliers is often not an option. The vast majority (80%) agreed or strongly agreed that a lack of alternative suppliers impeded their ability to implement an effective dual or multi-source strategy — higher than any other industry in our Global Supply Chain survey.

Figure 1: Supply chain risk-related losses in the last two years



Q: Which of the following best describes the extent of your business's supply chain risk-related losses in the last two years?

Figure 2: Impact of COVID-19 on approach to supply chain management



Q: Which of the following best describes what impact, if any, COVID-19 had on your organization's approach to supply chain management?



Figure 3: **Greatest opportunities in terms of enhancing supply chain management**



**Q:** Which of the following offer the greatest opportunities in terms of enhancing your supply chain management?

Rank top 3

### Where renewables resources come from<sup>1</sup>

**60%** China accounts for 60% of global turbine capacity and half of total exports, as well as a large proportion of solar panels, batteries and heat pumps

**90%** Australia, Chile and China account for 90% of all global lithium production

**70%** The Democratic Republic of Congo produces 70% of all the world's cobalt

<sup>1</sup>Energy Technology Perspectives 2023, International Energy Agency <https://www.iea.org/reports/energy-technology-perspectives-2023>



### Expert view: supply chains showing the strain of rapid growth and change



“The market opportunity in renewables is vast. Wind, solar and battery technologies that were in their infancy at the turn of the millennium have grown into large scale global industries. Nevertheless, they still have a lot of untapped potential.

Record investment is now going in to secure the energy transition, for example through the U.S. Inflation Reduction Act and similar programs in the EU.

However, getting there won't be easy. For the first time in years, the cost of renewables is going up instead of down. The price of some raw materials has multiplied, driven by inflation and competition for resources. This reverses a long-term downward trend achieved through technological advances and economies of scale, making clean energy transitions more difficult and costly.

Suppliers and contractors face capacity challenges, as well as shortages of materials and skilled workers. The result is that lead times for delivering key equipment have doubled in some cases. The cost of insuring projects has also increased as values and possible losses are higher and longer indemnity periods are needed to cover them.

Added to these pressures, the production of key raw materials, minerals and components is concentrated in countries affected by conflict and geopolitical tensions. This could become a crunch issue in the coming years as demand for certain critical minerals is forecasted to rise by up to 500%.

To mitigate some of these challenges, companies should consider carrying out reviews with suppliers, improving and clarifying the terms of framework agreements, and obtaining full visibility of how and where raw materials and equipment are being produced. They should also look to diversify supply, recycle components, raw materials and building materials, and build buffer stocks to safeguard against future disruption wherever possible.”

**Stephen Munday**  
Global Renewable Energy Leader, Natural Resources  
Global Line of Business, WTW

## Risk landscape

# Global uncertainty widens the risk horizon

Uncertainty and obstacles on the road to the energy transition were reflected in the risks that arose most prominently in our supply chain survey. Shortages, delays, economic issues and geopolitical instability were all top of mind for respondents. Wider external factors such as cyber security and supply chain sustainability were also leading concerns.

**Geopolitical risk:** this was among the factors thought to have the greatest impact on supply chain risks, rated by 57% as medium and 25% high impact. The Ukraine conflict has cut off a source of lithium, while other mineral sources are in countries, such as the Democratic Republic of Congo and Peru, which are compromised by conflicts and political turmoil. China produces up to 60% of mass-manufactured clean energy technologies<sup>1</sup>, so tensions between that country and the west could pose a risk to supplies of critical equipment and components.

**Critical shortages:** a shortage of raw materials topped the list of factors having the greatest impact on renewables business in the next two years, named by 44% of respondents among their biggest concerns. Logistics and warehousing shortages (39%) and component shortages (35%) also ranked highly. These findings underline the sector's dependence on critical supplies — lack of even one essential item can hold up work on a whole project, which can be costly at a time of high demand.

**Cyber risks:** renewables infrastructure such as wind turbines and solar farms are in remote locations that need to be controlled remotely by centralized computer systems, which may increase their exposure to cyber risks. Contractors, suppliers and equipment manufacturers working on major projects may all share systems, adding potential entry points for malware into sensitive equipment. These trends may explain why cyber risks were believed to have the most profound effect on supply chains, rated by 39% as high and 49% medium impact.



<sup>1</sup>Energy Technology Perspectives 2023, International Energy Agency <https://www.iea.org/reports/energy-technology-perspectives-2023>





**Economic risks:** economic uncertainty (32%) was a top factor underlying supply chain risks. Soaring energy prices are hitting suppliers and contractors hard and could put manufacturing capacity for components in areas such as solar and batteries at risk. The rising cost of materials and labor, coupled with volatile energy prices, can also influence projections of income and growth, potentially reducing the scope for future investment.

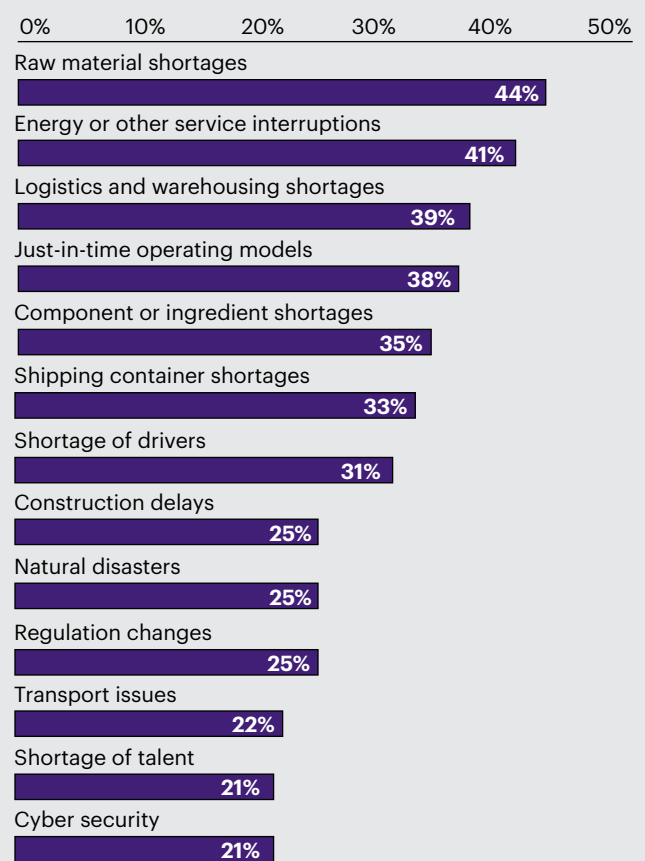
**Climate change and environment:** more than half (56%) placed climate change and environment among the top global trends affecting supply chain risks. In a business that's meant to deliver a clean energy future, there is obvious concern about the carbon footprint of the renewables supply chain and strong pressure to minimize emissions from activities such as mining and manufacturing. The result may also reflect concerns over the impact of extreme weather on the resilience of renewables infrastructure and supply chain.

**ESG:** in our survey 84% said sustainability was a key supply chain goal, while 82% said ESG is a specific selection criteria when selecting new supply chain vendors. As well as decarbonising the supply chain, there is pressure on the industry to source responsibly and sustainably. Much more effort is going in to making sure that the sourcing of lithium and other essential minerals is not tainted by exploitation or human rights abuses.

**Workforce issues:** supplier difficulties in attracting and retaining talent was one of the leading factors underlying supply chain risks, ranked by 32% among their top concerns. The industry faces major workforce challenges as demand for green jobs is outpacing the availability of qualified workers across the supply chain.

**Pandemics:** though we may be past the acute disruptive impacts of COVID-19, the risk of a new strain of the virus, or a new unforeseen pandemic, still seems to be front of mind, topping the list of global trends with the greatest influence on supply chain risks at 66%.

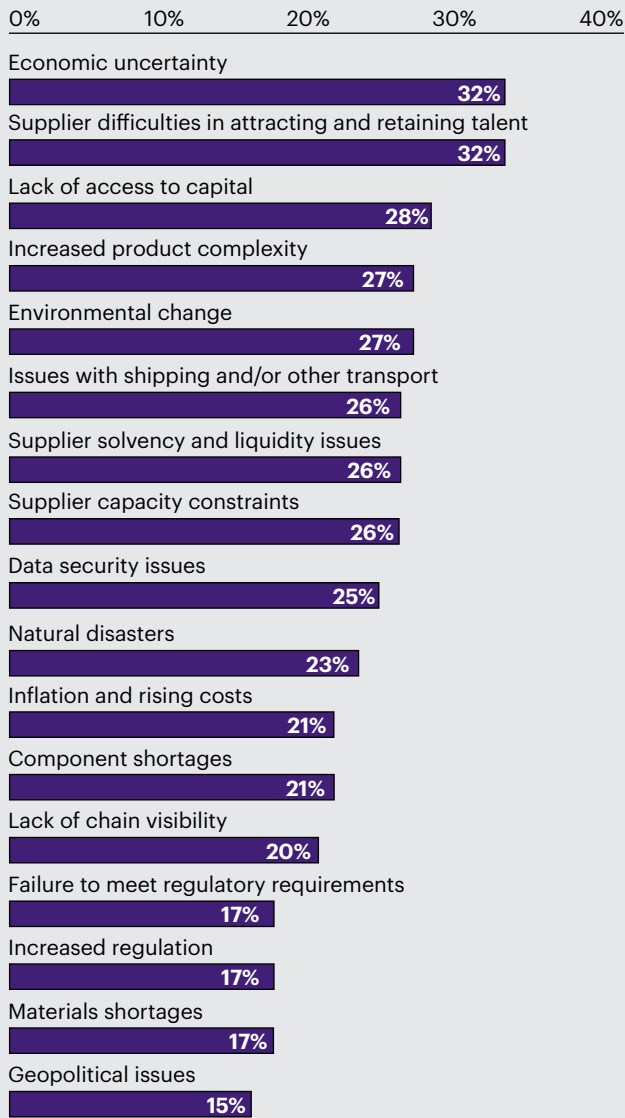
Figure 4: Supply chain factors having greatest impact on business in next 2 years



**Q:** Which of the following supply chain factors do you believe will have the greatest impact on your business in the next 2 years?

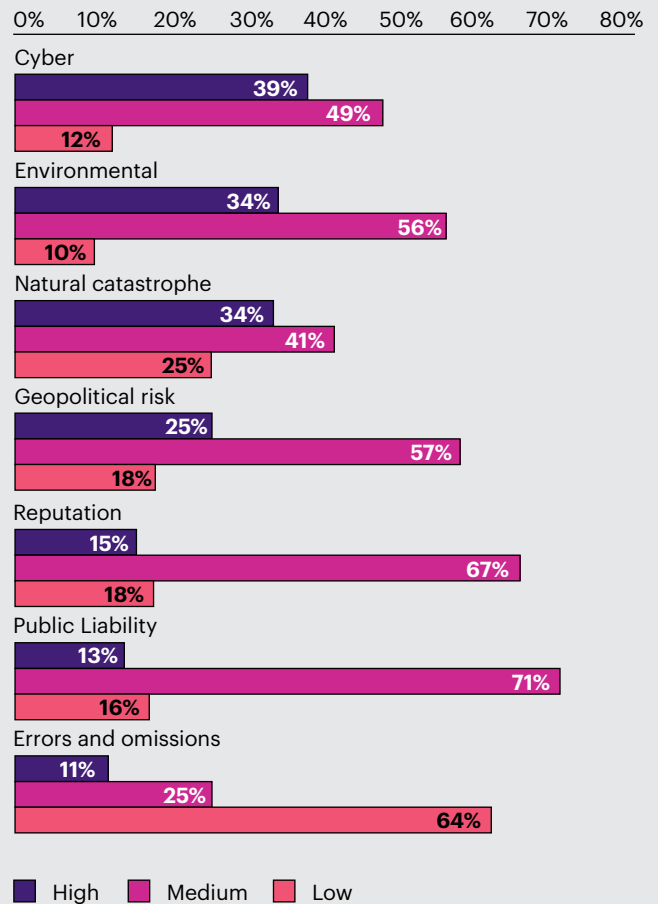
Rank top 4

Figure 5: **Factors playing greatest role in supply chain risks**



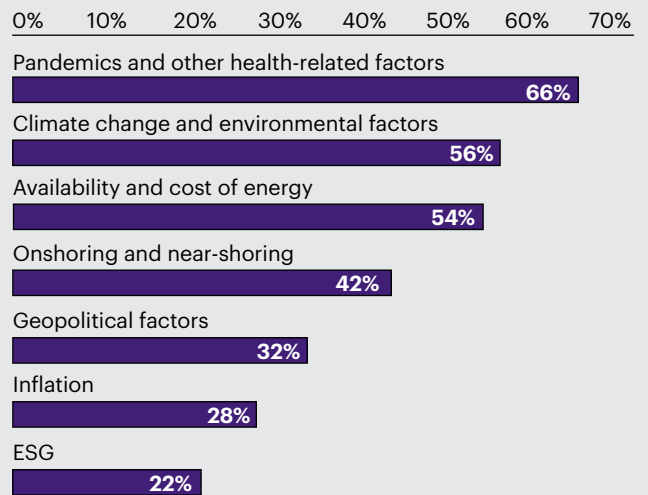
**Q:** Which of the following underlying factors do you believe to play the greatest role in your supply chain risks?  
Rank top 4

Figure 6: **Potential impact of the following risks on the supply chain**



**Q:** How would you describe the potential impact of the following risks on the supply chain risks faced by your organization?

Figure 7: **Global trends with greatest influence on supply chain risks**



**Q:** Which of the following global trends do you believe have the greatest influence on your organization's supply chain risks?  
Rank top 3



## Risk management and resilience

# Overcoming obstacles to build supply chain resilience

As we've discussed, the renewables industry is highly dependent on raw materials sourced from a small number of countries. The technologies needed to deliver clean energy are similarly concentrated among highly specialized manufacturers in a few locations.

These concentrations make the entire supply chain more vulnerable to instability and events in these places, ranging from conflict and political unrest to the effects of extreme weather. This can make it more difficult to develop greater resilience.

However, our survey suggests that businesses are aware of the vulnerabilities and taking action to address them. Almost two-thirds (60%) say the investments they've already made to strengthen their supply chain have somewhat improved their robustness, while a further 29% said robustness had greatly improved as a result.

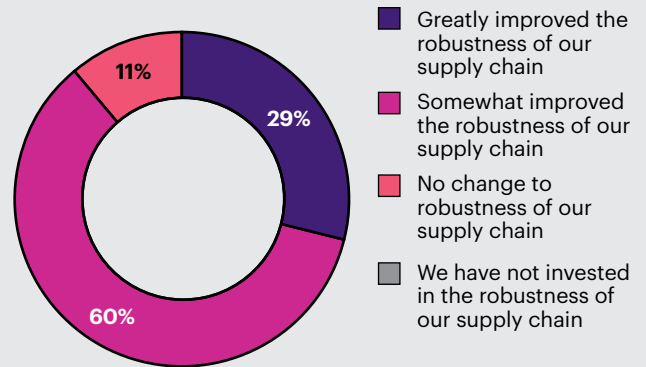
Companies are focused on deepening partnerships, increasing knowledge and achieving end-to-end visibility of all the tiers in the chain. When asked what would have the greatest impact on managing their risks, 62% said improving relationships with suppliers and customers and 58% said developing a detailed understanding of supplier networks.

### Firms face a lack of data and insurance solutions

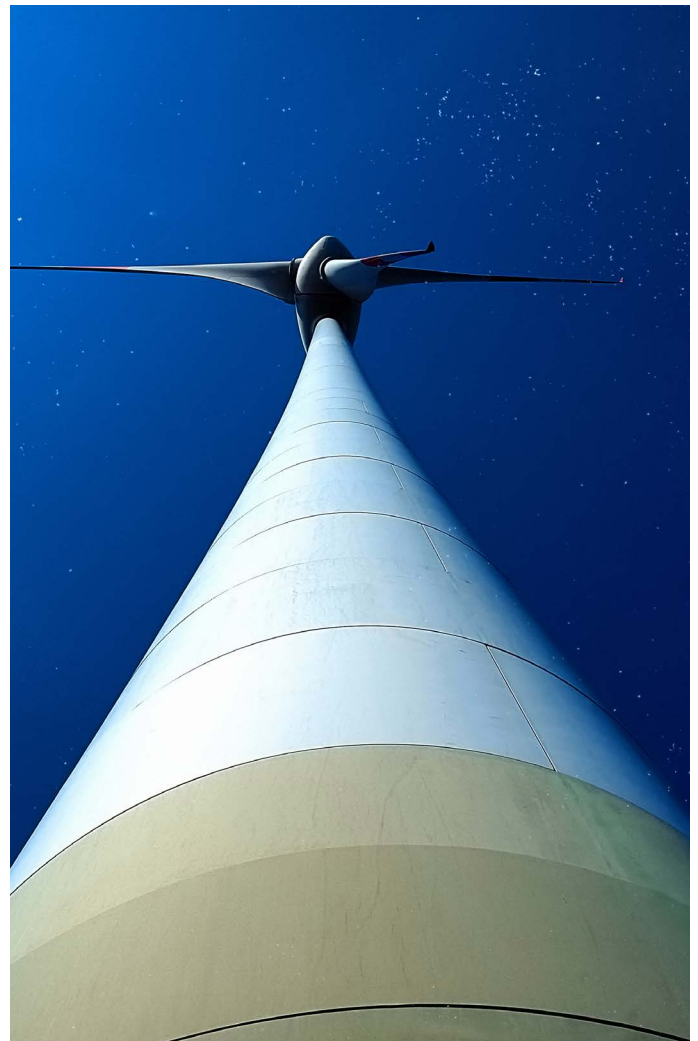
But these companies face obstacles in getting hold of all the data they need to achieve full visibility. The vast majority (85%) said that they lacked the data and knowledge to understand their risks. More than three-quarters (76%) agreed or strongly agreed that supplier concerns about protecting intellectual property and trade secrets make it difficult to achieve full transparency through the supply chain.

Almost four-fifths (79%) said that a lack of insurance solutions was among the greatest challenges to addressing their supply chain risks. This may reflect the lack of cover for many supply chain losses experienced during the pandemic, which were often unrelated to physical loss or damage and so not covered even where clients had contingent business interruption cover.

Figure 8: Impact of previous investment to improve robustness in supply chain



Q: How would you describe the impact of any previous investment you have made in improving the robustness of your supply chain?



Only a quarter (26%) feel they have sufficient insurance to cover the impact of extreme weather on their supply chain. This is concerning given the potential exposure to weather events, especially in longer global supply chains.

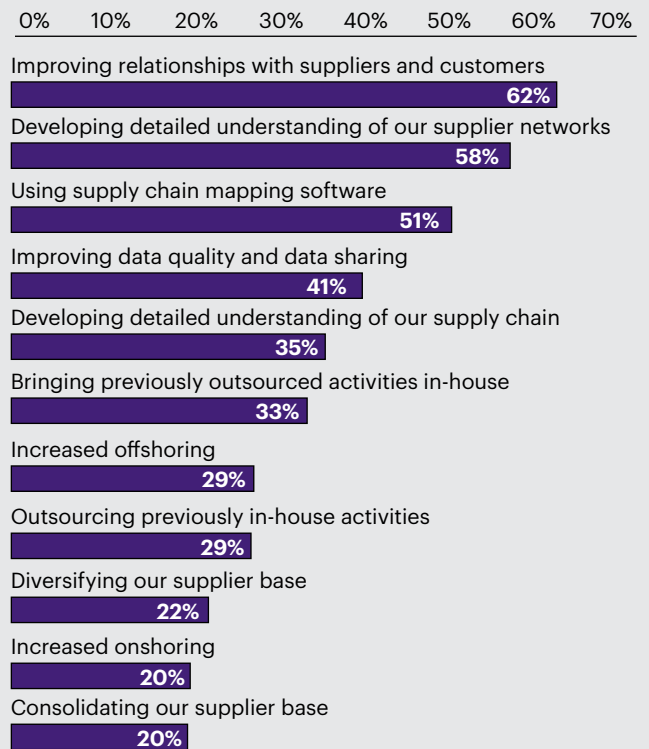
### Mapping and visualizing the supply chain

Using tools that map the supply chain can help businesses start to understand where they have gaps in information and data and begin to fill them. A total of 51% said that using supply chain mapping software was among the measures that would have an impact in managing risks, while 41% said improving data quality and sharing.

Diagnostic tools such as WTW’s Supply Chain Risk Diagnostic, enable companies to map the location of all the links and assets in the chain and assess how they connect and interact with each other. This transparency can give organizations a panoramic overview of dependencies and risk factors to enable better decision making.



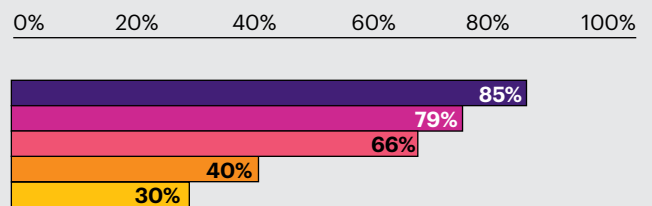
Figure 9: **Measures with greatest impact on managing supply chain risks**



**Q:** Which of the following measures do, or would have, the greatest impact on managing your supply chain risks?

Rank top 4

Figure 10: **Greatest challenge to addressing risks over next 3-5 years**



- Lack of data, knowledge and understanding of these risks
- Lack of access to insurance and risk transfer solutions
- Lack of internal risk management tools and insight
- Lack of budget
- Lack of board buy-in

**Q:** Which of the following will pose the greatest challenge to addressing your risks over the next 3 to 5 years?

Rank top 3



## Expert view: knowing your suppliers is key to managing exposures



“Sourcing critical raw materials and minerals for the renewables industry can be fraught with political, environmental and ethical issues. As an example, Ukraine was being considered until recently as a potential large-scale alternative source of lithium. Then Russia invaded and those plans had to be put on hold.

Businesses also face increasing reputational risks of sourcing from countries that don't always uphold the highest labor and human rights standards. Developing trusted partnerships with lead suppliers and industry analysts can help to reduce some of the risks around responsible sourcing and ESG by enhancing the research and development process.

When it comes to key renewables infrastructure, insurers are increasingly demanding more information about who is supplying, building, replacing or repairing it before they will provide cover. Even where suppliers are well-established, we're seeing pushback around where they are manufacturing equipment and the skills and experience of their workforce.

Transporting large items such as wind turbines from manufacture to the installation site can also be a high risk venture, given the size of the equipment and the remoteness of the locations. Marine cargo insurance will cover physical loss and damage in transit but not delays and bottlenecks. Some companies may buy contingent business interruption cover to transfer their non-damage commercial risks, but this is expensive and limited in scope.

One of the best ways to mitigate supply chain risks generally is to work with manufacturers, contractors and suppliers that have strong reputations in the market. They are not only more likely to deliver what they promise, but also have the resources needed to speed things up if there is a delay in one location, or reroute deliveries to avoid a logjam.”

**Robert Gardner**  
Renewable Energy and Power Leader GB



## Five steps to build your supply chain resilience



- 1. Make resilience a boardroom priority:** embed it in strategic planning and execution, with structured governance to ensure that decisions are made and acted on at the correct level and the right time. This can be associated with existing business risk assessments.



- 2. Develop closer working relationships:** working more closely with suppliers, especially at tier 1, can help you gain a better understanding of the wider supply chain and increase resilience. Being a partner rather than just a client can help overcome barriers to disclosing proprietary data.



- 3. Reduce reliance on single suppliers where possible:** relying on a single source for critical components and raw materials creates vulnerability, as well as using multiple suppliers in the same geographic area. Wherever possible, expand your network of suppliers and locations.



- 4. Aim for end-to-end visibility and transparency:** supply chain mapping software tools allow businesses to obtain a more complete picture of all the relationships and flows in the supply chain, with live event-tracking to support proactive risk assessment and decision making.



- 5. Stress test your response:** use scenario planning and simulation modelling, such as digital twinning, to quantify the impacts and mitigate the effects of risks. Also consider red teaming to obtain an outside challenger view on policies and processes.





# Conclusion: keeping the energy transition on track

Progress towards the energy transition has faltered as project costs spiral and the world seeks additional short-term sources of oil and gas for energy security following the global energy crisis.

The road to a fully renewable future is also strewn with a range of supply chain challenges, from shortages of raw materials and critical minerals shortages to capacity constraints and a lack of alternative sources and suppliers.

Our survey shows that businesses are working to overcome these problems and considering a range of strategies to increase resilience. However, they're

hampered by an inability to obtain enough accurate data on the supply chain to manage their risks.

Working more closely with suppliers as partners can help companies understand their supply chains better and address these risks. Diagnostic mapping and monitoring tools and analytics can help to visualize, quantify and assess risks across the chain and in specific locations.

WTW has an experienced team of experts with the tools and competencies to help clients understand their supply chain vulnerabilities and align their production with financial risk. We can also help you manage and transfer risks for both property-related and pure economic losses, helping you build greater resilience against future shocks.



# Survey sample and methodology

Our survey was carried out by our partner Coleman Parkes research in November and December 2022, using a mixture of phone interviews and web-based survey forms. We received 100 responses from senior decision makers in the renewable energy sector, based in Europe, North America, Asia-Pacific and Latin America.

## Study detail

### Methodology

Phone to web

### Sample size

100 Total:

- North America (53)
- Europe (20)
- APAC (19)
- LATAM (8)

### Audience profile

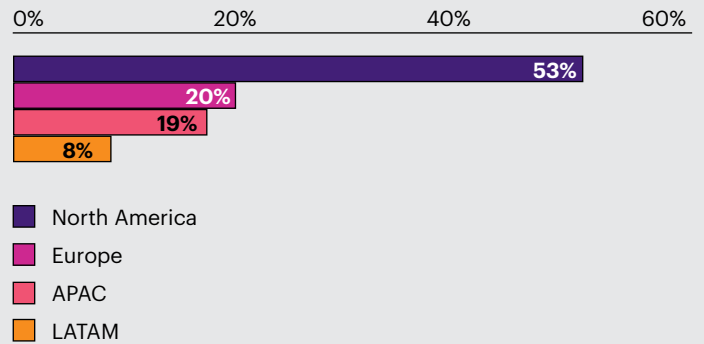
Senior decision makers of supply chain risk management in renewable companies with over \$250 annual revenues

### Fieldwork dates

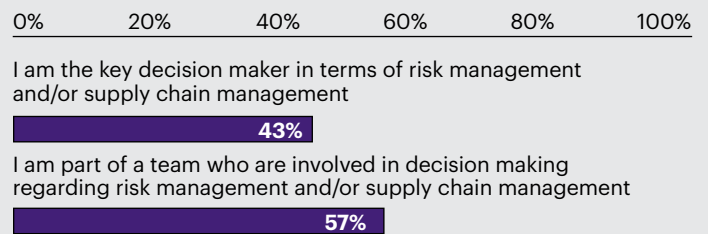
November - December 2022

## Audience profile

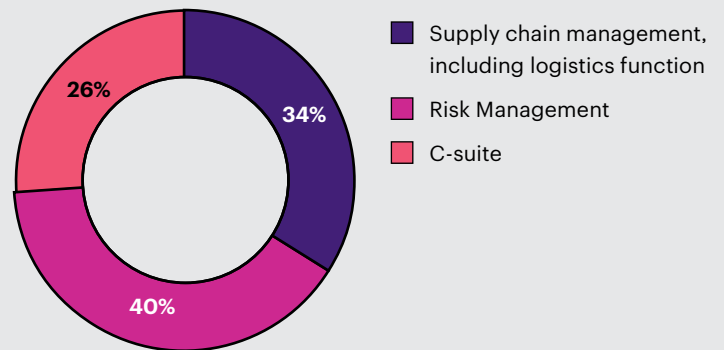
### Geography



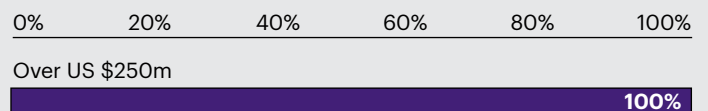
### Decision-making



### Role



### Company revenue





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