



RESILIENCE BAROMETER[®]

ENERGY SECTOR REPORT 2022



Rebuild **Resilience**. Protect **Value**. Deliver **Growth**.

Foreword

The year 2022 represents a critical inflection point in the way we think about energy and the global systems needed to find, produce, deliver and decarbonise it. Significant, era-defining events are happening all around us, all around the world, and all at a breakneck pace – shaping both short- and long-term structural considerations around energy and sustainability.

Russia's invasion of Ukraine has in just a few short months forever altered our view of energy security. Governments, consumers and producers around the world are now scrambling to adjust, even as they continue to face pressure to reduce environmental impacts and deal with a global supply chain crunch. Meeting the goals of reliability, affordability and sustainability is at once more difficult and more important than it ever has been.

At the same time, the realities of climate change are in greater evidence than ever before. As the world emerges from the COVID-19 pandemic, governments and businesses are facing crucial questions about how to best maintain and expand energy access in all corners of the globe in a manner that is sustainable and equitable. Meanwhile, the threats from rising temperatures and a failure to adequately address climate change have intensified. New policy frameworks are emerging that challenge the status quo, creating both risks and opportunities for companies across all industries.

This report delves deeper into those dynamics, drawing on topical insights from a panel of FTI's energy sector experts and findings from FTI's Resilience Barometer® – an annual global C-suite survey that captures major challenges business leaders are facing. Those who are leading the response to these challenges span the energy spectrum, including big-name players and established leaders in the industry as well as up-and-coming companies whose day in the sun is just beginning. Amidst all these challenges, there will be winners and losers, but companies can still shape their own future and determine the path upon which they move forward into that future.

This report captures what some of the largest leading energy firms in the world are thinking about and planning for as they look at the energy transition. As countries look to shore up domestic energy supply chains and meet increasing demand, the decisions companies make today will reverberate for years – even decades – into the future.

We hope this project, along with the findings from our Resilience Barometer®, will provide actionable insights that allow companies and countries to withstand internal and external shocks to the energy system by anticipating and adapting quickly to key energy transition challenges.



**CHRIS
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Global Energy Lead
Strategic Communications
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Introduction

This year in our annual global survey of over 4,000 C-suite executives, the top five boardroom concerns were¹:

1. Surge in energy prices
2. Inflation reaching damaging levels
3. Rising unemployment
4. Global energy shortages
5. Economies failing to tackle climate change quickly

From a micro-economic point of view, all five elements are interconnected: shortages in energy supply (due to, for example, the Russia - Ukraine conflict, or to natural disasters caused by climate change) constrict supply and therefore lead to a surge in energy prices.

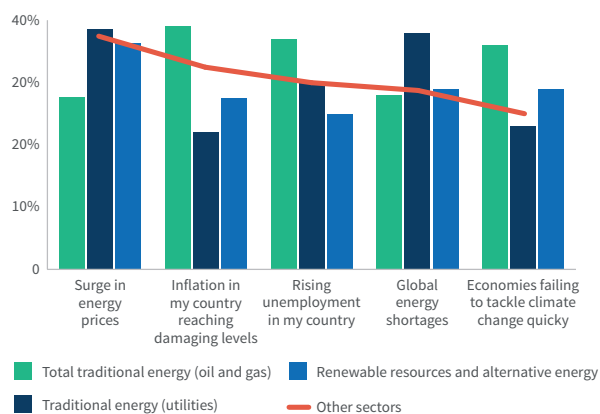
Surges in energy prices will lead to increased input costs for various goods and services and therefore lead to increased inflation. As exemplified by the Philips Curve, there is an inverse relationship between inflation and employment; thus, increased inflation is likely to precipitate a rise in unemployment.

To illustrate, consider how since Russia's invasion of Ukraine, gas and oil prices rose to their highest levels in more than a decade with gas prices jumping to USD\$6.95 a therm on 7 March 2022 and oil reaching USD\$130 a barrel on 8 March 2022². These prices represent over 200% and 50% increases in gas and oil prices, respectively, from their end-of-2021 levels. The implications of this for countries that are net energy importers are immense (see infographic on next page).

Take, for example, the UK, which is a net energy importer with a high degree of dependence on gas to meet its energy needs. Gas and oil together account for 76% of UK energy consumption, compared with the European average of 57%. Given this heavy reliance on gas and oil, petrol prices in the UK have risen 20% over the past six months whilst household energy prices are set to jump by 54% in April 2022.

Consequently, the Office for Budget Responsibility (OBR), a UK economic watchdog, forecasts that if wholesale energy prices remain high, energy bills in the UK will rise another 40% in October, pushing inflation to a 40-year high of 8.7%³.

FIGURE 1. TOP C-SUITE CONCERNS IN 2022



Rising inflation will therefore outpace nominal earnings growth and reduce real household disposable incomes and so reduce household consumption and GDP growth. Cumulatively, the OBR has forecast unemployment to rise from 3.9% to 4.1% over the short term.

The scenario outlined above is likely to be very similar for many other net energy importing countries and will be exacerbated by geo-political manoeuvring such as the recent threat by Russia to interrupt natural gas flows if payments are not made in rubles. Consequently, many countries are re-thinking their strategies to diversify the way they obtain their natural gas.

For example Germany, the EU's largest importer of Russian gas, has begun to move forward with constructing an LNG import facility, whilst other EU countries are exploring their opportunities. The U.S. has offered a crucial life-line by increasing LNG exports to the EU, which should help reduce reliance on Russian natural gas in the short term.

In the long term, what all of this illustrates is how energy independence is becoming an ever-more important national security issue; as such, energy transition, especially to local, renewable sources, is likely to become a key topic for many nation states in the months and years to come.

Energy companies are at the epicentre of this energy transition process. As a result, in this report, we consider the roles and challenges energy companies have in this process. We start by looking at supply- and demand-side economics and finish by discussing infrastructure challenges.

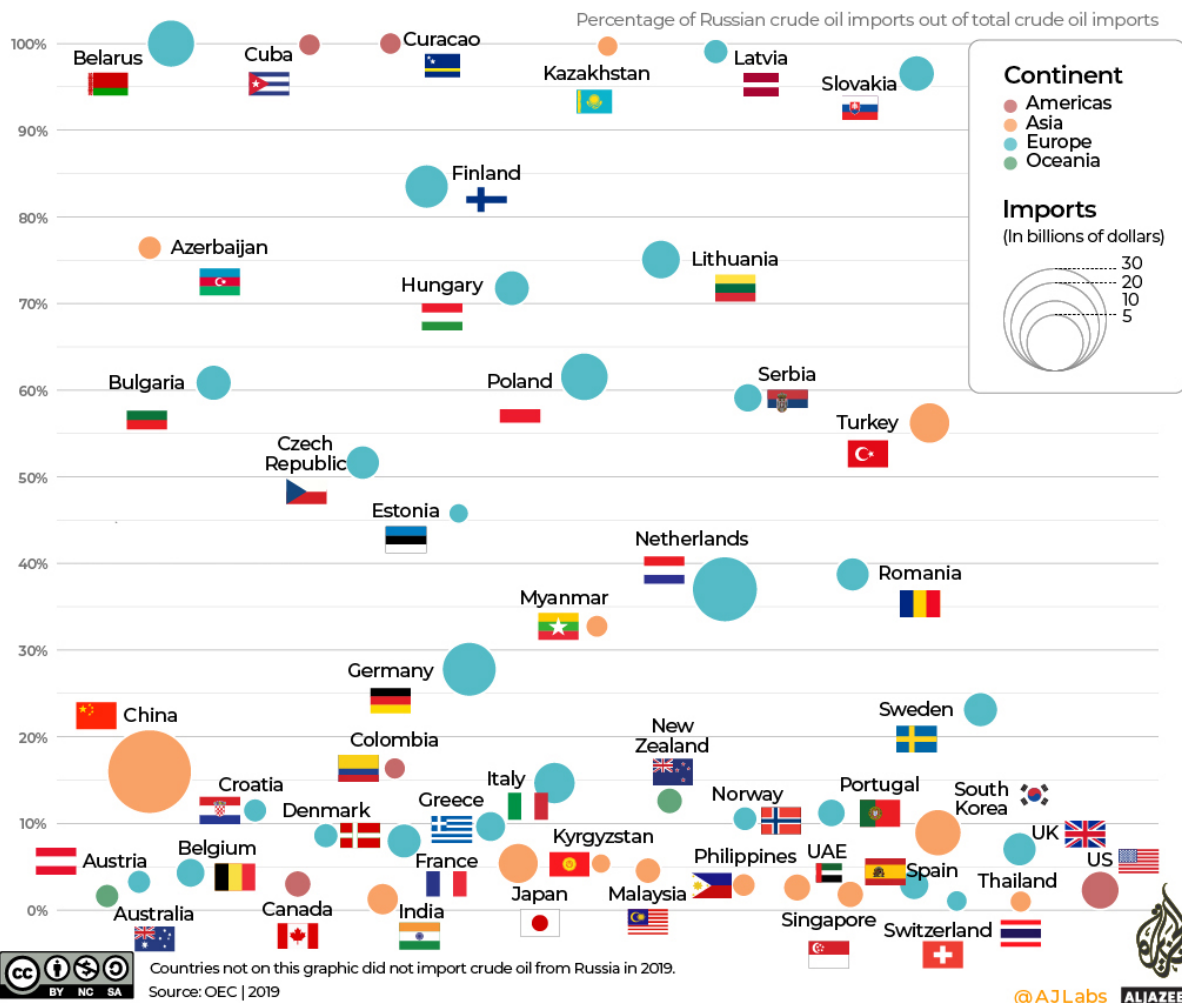
¹ Resilience Barometer®, January 2022

² Bloomberg (2022), Bloomberg Professional [Online]

³ Office for Budget Responsibility, Economic Forecast, March 2022

Which countries rely most on Russian oil?

Russia is the **world's second highest exporter of crude oil**, after Saudi Arabia. In 2019, **48 countries bought Russian crude oil worth \$123bn.**



The infographic above highlights how dependent different countries are on Russian oil. Given the importance of energy on economic development, recent events have made it increasingly obvious that reliance on other sovereign states for energy places dependent countries in very precarious positions.

As a result, many countries are now considering how to transition their economies away from relying on other sovereign states for their energy demands but in a way that provides the most benefit for their own citizens, balancing short term needs (e.g., raising living standards and improving electricity access rates) with long term imperatives (minimising climate change impacts and building the skills and capabilities within their workforce/ economy to benefit from new technologies).

Supply Side

Given the concerted global urgency to reduce carbon emissions⁴ as well as the geo political vulnerabilities highlighted by Russia's invasion of Ukraine, energy transition is now more topical than ever. Energy transition however, is not simply a switch from fossil fuels to renewables, but rather a more profound shift in how we source, transport, store, trade and use energy across the entire global economy.

Energy companies now face two main challenges:

1. Due to the pandemic, investors have realised how catastrophic global crises are for the global economy, so have increased calls to cut carbon emissions and create a more sustainable energy infrastructure.
2. Due to the Russia Ukraine conflict, several nation states have also realised how their reliance on other sovereign states for energy puts them in a very precarious economic and political position.

Taken together, what these elements highlight is that there is now a very clear and present need for energy companies to expedite energy transition.

Increased pressure to improve on ESG and Sustainability

Data from our most recent global Resilience Barometer® highlight that over the next 12 months 45% of energy companies surveyed believe they will face increased pressure to improve on environmental, social and governance (ESG) and sustainability metrics as compared to 36% of companies from other sectors² (figure 2).

“Energy transition will be complex. It will require the deployment of various technologies, across different geographies, on differing timeframes.”



DR. BARRY EDMONSTONE-WEST
Managing Director,
Energy Transition, EMEA



This pressure ranked highest on CEOs' agendas and even outstripped concerns about improving operating performance and increasing market share. The reasons for this are three-fold:

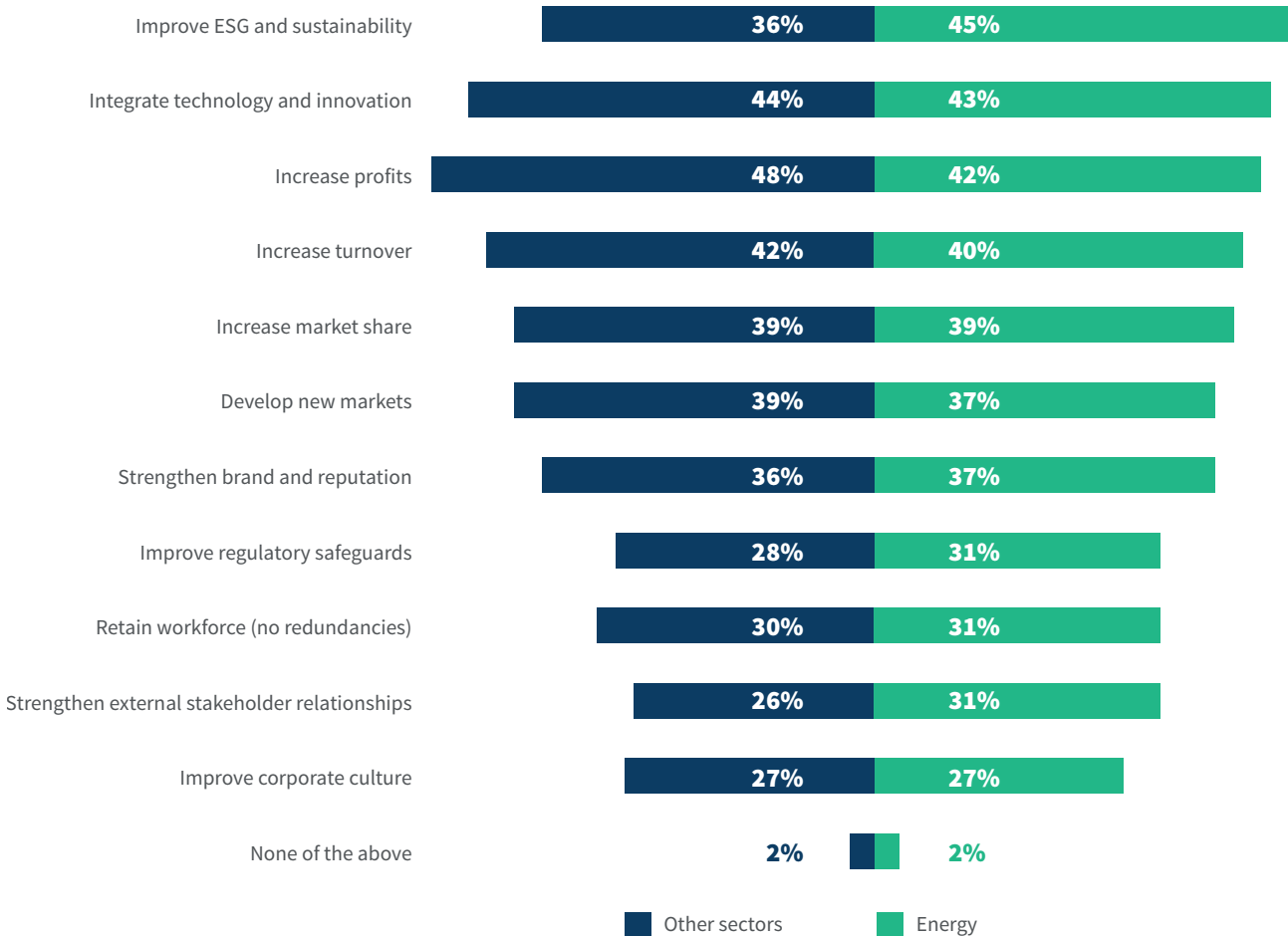
1. As compared to other sectors, energy companies are most likely to report struggling with outdated business models.
2. Comparatively, our analysis shows that more energy companies lost revenue last year due to an inability to keep pace with climate change regulations and attitudes.
3. Energy companies are now facing increased scrutiny from investors, regulators, activists and the media from a financial, environmental and sustainability standpoint².

Investors

It appears that investors are putting their money where their mouth is: Our Resilience Barometer® data shows that more energy companies struggled to secure finance in the past 12 months compared with other sectors². This reflects the increasing pressures that companies in the energy sector are facing around financing.

⁴<https://ukcop26.org/>

FIGURE 2. PRESSURES COMPANIES FACE OVER THE NEXT 12 MONTHS



The energy sector is highly capital intensive and has multi-year investment cycles at the very minimum. Energy companies typically rely on a range of funding mechanisms, and some of them are now finding themselves constrained due to concerns around sustainability.

For example, large institutional equity investors are beginning to set restrictions on their funds’ abilities to invest in coal, oil and gas; those with plans to divest from coal completely include some of the world’s largest energy

investors, whilst both asset managers and sovereign wealth funds exclude companies which derive significant revenue from coal.

Sustainability is not the only driver curtailing financing, as there are also investor concerns driven by financial resilience. In particular, there is the risk of stranded assets, i.e., those assets that become unable to earn an economic return far earlier than was assumed at the point of investment decision.

A confluence of climate-related factors is exacerbating this risk:

- On a cost basis, the downward trajectory of renewable energy costs may render fossil fuels uncompetitive earlier than expected.
- Physically, assets may become inoperable due to changing climatic conditions.
- Regulations may change such that energy projects that are large emitters are forced to stop operating ahead of schedule.

“Energy independence and national security are increasingly becoming enablers of clean technology”



CHRIS LEWAND
Global Power & Renewables and Energy Transition Practice Leader, USA

Lenders

On the credit side, European lenders in particular⁵ are coalescing around commitments to reduce total fossil fuel exposure to align with low-emissions pathways for the climate. There are growing calls to scrutinise lenders to polluting industries more closely. Many of these actions are driven by increasing activist and political pressure against financiers, which are seeking to bolster their own ESG reputation.

Governments and regulators

Thanks to the Paris Climate Accord and pledges made at COP26, governments across the world are increasingly committed to tackling climate change more aggressively. From a regulatory point of view, estimates⁶ suggest that around USD\$900 billion in fossil fuel investments could be lost if governments more aggressively attempted to restrict the rise in temperatures to 1.5 °C.

Other estimates⁷ suggest that in order to remain on a 2 °C pathway, oil prices would need to be within the range of USD\$10-\$18 per barrel, far lower than the breakeven point projected for oil projects in 2040⁸. These risks mount simultaneously with pressure from citizens and politicians to address climate change.

Activism

Whilst energy companies are under increasing scrutiny to improve on their ESG and sustainability, governments and regulators are also increasingly under pressure from a vocal set of environmental groups and concerned citizens alarmed about the slow march of progress when it comes to climate action.



“Getting to grips, rapidly, with the risks and opportunities of our energy exposure is the greatest challenge of the decade. The clock is ticking for the planet and for meeting collective net zero goals. There isn’t a moment to waste.”



ELIZABETH ADAMS
Senior Managing Director,
Energy Transition – Strategic
Communications, UK

The activism also extends to investors and shareholders. Shareholder activism is a key driver of climate action in the energy sector. For example, last year, investors filed hundreds of climate-related resolutions.

The courts have also proven to be a route for activism: A major oil company was ordered to cut emissions faster than it had planned to following a lawsuit by environmentalist groups. Thus, it should be clear that the climate imperative could quickly close the door on investment into new fossil fuel projects.

How energy companies are responding

In response to the increasing pressure to improve ESG and sustainability, energy companies are trying to reduce Scope 3 emissions (which cover emissions from the use of products sold) by investing heavily in renewable energy. For example, TotalEnergies has set itself a target for 100GW in renewable-energy generation by 2030, BP has set a target of 50GW and Eni aims for 25GW of renewable energy generation by 2035⁹. At the national level, the U.S. government has recently also expressed its commitment to producing 30GW of offshore wind energy by 2030.

These targets are having outsized effects on the market for renewable energy: For example, in 2020, 30% of the final investment decisions for offshore wind projects came from big fossil fuel players. Similarly, oil and gas majors dominated bidding for the UK’s Crown Estate Round 4 leasing process, with large bids from BP and TotalEnergies succeeding over bids from more established renewable players, which still do not have the financial heft that oil and gas majors have.

² Bloomberg (2022), Bloomberg Professional [Online]

⁵ IEEFA, Finance exiting oil and gas, 2022, <https://ieefa.org/finance-exiting-oil-and-gas/>

⁶ <https://www.ft.com/content/95efca74-4299-11ea-a43a-c4b328d9061c>

⁷ <https://www.woodmac.com/news/the-edge/what-different-scenarios-tell-us-about-the-future-of-oil-and-gas/>

⁸ IHS Markit research

⁹ Windpower Monthly <https://www.windpowermonthly.com/article/1724832/big-oil-plots-new-path-tide-turns-fossil-fuels>

From a financial perspective, over the past 12 months, energy companies have introduced increased cashflow management strategies and sought forms of operational and financial restructuring to address the market headwinds they face. Findings from our Resilience Barometer® show that last year 34% of energy companies sought operational restructuring as compared to 28% of companies from other sectors¹; equally, 34% of energy companies also sought financial restructuring as compared to 29% of companies from other sectors¹.

Over the next few months, it will become increasingly important to monitor and preserve liquidity as energy companies seek to build sufficient reserves to withstand price shocks in a volatile market environment. The global sanctions environment and fall out from the war in Ukraine is increasing the uncertainty of supply and market volatility.

To this end, the need for scenario planning (and range of scenarios considered in such planning) has been amplified, both from an internal risk management perspective and from the growing requirements of external stakeholders, including lenders and regulators, that are seeking greater clarity and assurances on the financial health and ability of energy companies to withstand market shocks.



Demand Side

Demand side pressure is driven by the rise in energy consumption, which has been on a steady upward trend since 2009, only declining in 2020 due to the pandemic¹⁰. Thus, from a demand-side perspective, energy companies are facing immense pressure due to the not-always-complementary needs to transition from fossil fuels to more renewable sources whilst simultaneously maintaining and in some cases increasing overall energy supply and addressing concerns around affordability and security of supply.

On the demand side, there are two main areas that energy companies are responding to:

1. Transportation and mobility
2. Heavy industry

Transport and mobility

Transport and mobility, which is largely driven by emissions from road vehicles, contributes approximately 20% of global carbon emissions. As a result, decarbonising the transport sector remains a key hurdle in the path to net zero.

“Changes in oil prices are no longer being driven by seasonal considerations — they’re being driven by structural ones.”



CHRIS TUCKER
Global Energy Lead,
Strategic Communications,
USA

Despite the COVID-19 pandemic leading to the greatest reduction in global emissions as economies shutdown and lockdowns spread across the world, the transport sector continued to be a major contributor of carbon emissions (~7 Gt CO₂e in 2020)¹¹.

It is expected that demand for transportation will continue to grow throughout the world as economies recover, populations grow, and incomes expand. The International Energy Agency (IEA) forecasts that by 2070 global transport will have doubled, along with demand for passenger and freight aviation tripling and car ownership rates growing by 60%¹².

These forecasts clearly demonstrate the immediate need for evolution in transportation and mobility. This need for change is reflected in company attitudes, with our data indicating that 75% of respondents in the transport sector agreed that their business model needs to fundamentally change in order to maintain or restore competitiveness².

Heavy industry

Our data highlight that the impact of ESG and sustainability is among the top three threats for heavy industry companies over the next 12 months². Thus, enabling decarbonisation in heavy industry is another major challenge in the energy transition as these sectors have traditionally relied heavily on conventional fuels.

Policy incentives

Governments and regulatory bodies are driving change through the implementation of favourable subsidy schemes and punitive legislation. For example, cities in Spain are providing municipal road tax discounts of up to 75% for electric vehicles.

The effects of policy incentives have already been felt across Europe with the market share of battery electric vehicles (BEVs) increasing from 3.5% in Q2 2020 to 7.5% in Q2 2021. Similarly, plug-in hybrid electric vehicle (PHEV) market share increased from 3.7% to 8.4% in the same period¹³.

¹⁰ BP World Energy Outlook 2020

¹¹ The World Bank, The Pathway to Decarbonizing Mobility, 14 October, 2021, Beijing

¹² IEA (2020), Energy Technology Perspectives 2020, IEA, Paris

¹³ The European Automobile Manufacturers' Association (ACEA), Fuel types of new cars: battery electric 7.5%, hybrid 19.3%, petrol 41.8% market share in Q2 2021, 23 July 2021

In Norway, for example, electric vehicles (EVs) could form 100% of new car sales by April 2022¹⁴, a clear indication that in some ways the transition to EVs is already significantly mature.

Legislation to phase out petrol and diesel vehicles in the next decade shows that responding to an electric-first world for personal mobility will be critical for the entire energy sector. In the U.S., for example, the government has committed to investing USD\$5 billion towards national charging infrastructure¹⁵ and is pushing to having 50% of EV sales by 2030¹⁶.

Key challenges

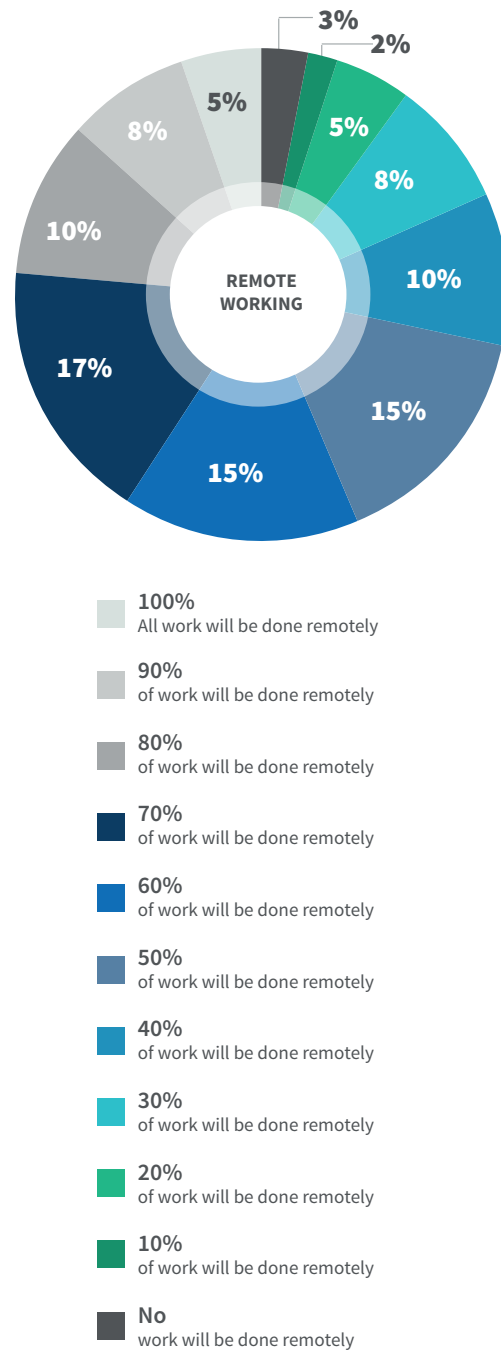
With this growth come many new challenges and opportunities:

1. Electricity demand will rise further, and there is growing acknowledgement that the EV revolution is only as green as the power generation mix from which electricity is produced, adding further pressure to build out renewable energy across the world.
2. Battery development faces significant reputational and commercial risks from its supply chain. Key minerals are often mined in difficult jurisdictions with serious human rights concerns; it is also difficult to scale up the production of some metals like copper without significant long-term investment, leading to skyrocketing prices for “transition” materials.
3. There is a risk of shortage for such minerals on the market. Securing supply for countries and companies will become increasingly important, and organisations will need to be more attentive to the risks that supply chains can create to their business models.

Beyond road vehicles, air transport and shipping are also undergoing major changes driven by decarbonisation. Whilst air transport is a significant contributor to climate change, technological solutions are limited to replace its role in long-haul travel.

Climate activists are focused on reducing flights through “flight-shaming”, and analysts believe that increased remote working will likely depress business aviation in the medium term¹⁷. This has some credence, as evidenced by our own data, which highlight that across all sectors, 44% of companies surveyed anticipate that employees will be working remotely three to five days a week, whilst 56% of companies plan for employees to work remotely one to three days a week² (figure 3).

FIGURE 3. PROPORTION OF WORK TO BE DONE REMOTELY



¹⁴ <https://cleantechnica.com/2021/10/08/evs-could-claim-100-of-new-car-sales-in-norway-by-april>
¹⁵ <https://www.energy.gov/articles/president-biden-doe-and-dot-announce-5-billion-over-five-years-national-ev-charginglt>
¹⁶ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/13/fact-sheet-the-biden-harris-electric-vehicle-charging-action-plan/>
¹⁷ <https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/back-to-the-future-airline-sector-poised-for-change-post-covid-19>

Hydrogen as a potential solution

A versatile energy carrier, hydrogen can help decarbonise the parts of the economy that cannot be addressed by direct electrification. In addition to heavy industry, this may mean applications in transport, power and heating. A molecule that can be stored and moved around in the form of gas or liquid, hydrogen can provide additional flexibility as a back-up capacity and storage solution, complementing the electrical grid.

Key challenges with hydrogen as a solution

Hydrogen's carbon intensity (and therefore decarbonisation impact) depends on the primary energy feedstock and method used to produce it. Carbon capture and storage technologies can help reduce the carbon footprint of hydrogen produced from natural gas. Hydrogen from renewables (often referred to as "green") is seen as the ultimate solution in resource-rich markets, not only responding to domestic needs but also establishing new export opportunities. Other primary sources such as nuclear or biomass may have a role to play in certain markets as well.

To become a viable solution, hydrogen will require substantial government and private capital to ramp up scale and drive down cost. Government policy and regulations in particular will play a vital role, including in establishing ambitious targets, putting in place enabling regulations and providing demand-side incentives. According to the Hydrogen Council, 30+ countries around the world have established national hydrogen strategies with clear goals and funding allocations. The U.S. government, for example, has announced an ambitious USD\$9.5 billion program to bring down cost and spur private investment into at least four domestic "hydrogen hubs".

"Green" hydrogen specifically will require a large buildout of renewable capacity that can be used for hydrogen production. Generating enough renewable power to satisfy both direct electrification needs and indirect electrification with hydrogen may prove to be a challenge. In an effort to cut reliance on Russian gas, the European Union's REPowerEU plan has coupled a push for renewables with a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030.

How the industry has responded

Demand for "green steel", — that is, steel produced using low carbon methods, e.g., via "green" hydrogen — has led steel companies to develop trial facilities and also enter the wind energy market.

Elsewhere, renewable energy OEMs are keen to demonstrate their capabilities in co-located hydrogen production; for example, offshore wind leader Siemens Gamesa has shown it can link turbines and electrolyzers on site.

While renewable energy companies are keen to participate on the generation side for hydrogen, they are also partially dependent on "green" hydrogen for their own supply chains. At the same time, utilities are thinking about how to repurpose existing infrastructure for hydrogen and transport OEMs are placing bets on hydrogen as a fuel, especially in heavy-duty and long-haul applications.

“As seen with wind and solar, scaling up clean energy technologies is a long, complex journey. But it's critical for net zero and it can be done — with decisive policy action, smart investment and strong stakeholder support.”



IVANA JEMELKOVA
Senior Managing Director,
Energy Transition,
Strategic Communications

Infrastructure

The energy transition will not just require the building of new power generation resources, and changing how we transport, store, trade and deploy energy across the economy; it will also require the creation of an entirely new ecosystem of industries and companies that are dedicated to enabling this fundamental shift. This includes seismic changes to the metals and mining sector, to primary industry, to grid infrastructure, and to consumer technology.

Thus, it is clear that the entire supply chain will become a source of opportunity and risk. In fact, results from our annual global survey highlight that 49% of energy companies surveyed plan to conduct reviews of their supply chain and suppliers in the next 12 months in response to anticipated consumer activism².

In this last section we discuss the need for:

1. Trading and risk management capabilities
2. Grid flexibility
3. Monitoring of supply chain risks and challenges

Trading and risk management capabilities required

Energy companies buy supply volumes in wholesale markets and manage price risk on behalf of their customers by trading energy derivatives in wholesale markets. In the

“Market disruptions and the energy transition have put the focus on the need for enhanced risk management and trading capabilities in energy markets.”



ESTHER MAYR
Senior Managing Director,
Economic & Financial Consulting,
UK

“The post-pandemic price surge and the war in Ukraine put the attention back on the energy supply chain, where mitigants to price volatility and supply disruption risk can be developed.”



EMMANUEL GRAND
Senior Managing Director,
Energy Transition,
France

current market environment, such hedging activities carry increasing risks, which puts strain on the financial health of energy traders and their customers.

In Europe for example, corporates which entered fixed price contracts ahead of recent price surges were protected from wholesale market prices in recent months; however, those needing to renew their supply contracts now face steep price increases or are struggling to find a new supplier altogether as energy companies are struggling for liquidity to support their hedging activities.

Unfortunately, this has led to a large number of European energy supply companies collapsing in recent months due to increasing wholesale market prices and volatility, regulatory burden, and a lack of appropriate risk management capabilities.

Due to the variable nature of wind and solar power generation, it is likely that the market landscape will become more complex (and therefore more volatile) in the future as renewable energy occupies a bigger proportion of countries' energy mix.

Moreover, climate change is putting more stress on energy infrastructure, and geopolitical events such as the Ukraine war are driving cataclysmic changes in energy independence and national priorities.

It is therefore vital that energy suppliers and related service providers, such as insurers, banks and energy traders, improve their risk management capabilities. This would require acquiring the right skill-set as well as additional capital to enhance capabilities and meet liquidity requirements.

Grid flexibility

Western European governments have established plans for the retirements of coal and nuclear assets across the region over the next five years. This will result in a flexibility deficit across multiple markets of 20 GW by 2030.

Growth in intermittent generation will create much greater demand for grid flexibility solutions than what has historically been required. Grid flexibility has historically focused on servicing relatively mild fluctuations in peak and off-peak load. Wind seasonally balances solar, but they are uncorrelated within a day; i.e., wind and solar can spike/fall together.

By 2030, 100+ GW swings in renewables output may take place within minutes as sun and wind conditions change. The new swings will lead to structural changes in the “flexibility gap” (demand for intermittent renewables generation) that needs to be filled by dispatchable flexible capacity.

Reduced power demand in Europe caused by COVID-19 had a material impact on wholesale markets, in terms of average pricing and price volatility. Average annualised prices fell by ~20% in 2020 from 2019 levels across Germany, France, Spain and the UK – with Spain experiencing the greatest overall decline (~29%). With increasing share of intermittent renewable energy sources, daily price volatility increased significantly in Q2 2020 when COVID-19 first hit Europe before returning again in Q4 2020.

Price volatility will continue to grow in significance throughout the next decade as the change in generation mix accelerates. For renewable generators with exposure to wholesale prices, this will impact the risk profile of their assets with potential implications for financing and portfolio value. Incorporating effective measures will become an increasingly important consideration when seeking to maximise economic value.

“The pressure to improve ESG now outstrips concerns about improving operating performance and increasing market share for energy companies.”



CHRISTO ROUX
Senior Managing Director,
Energy Transition,
South Africa

“Shocks in energy markets in one part of the world affect us all, making resilience essential to the stability and success of companies.”



MIRIAM WROEBEL
Senior Managing Director,
Energy Transition,
USA

For investors in flexibility services, such as storage, peaking capacity and demand-side response, this increase in volatility will likely mean that energy trading will become an increasingly important component of the value stack, which to date has relied significantly on frequency response, capacity payments or other ancillary services. The growth of renewables on the grid has also increased dialogue around the need for interconnectors that could help balance out the effects of localised weather on electricity generation.

The growing importance of grid flexibility will also create opportunities. Energy storage companies will benefit from higher values placed on balancing the grid; such benefits could even extend to the average consumer of electricity, with vehicle-to-grid trials allowing drivers to use their electric vehicles as batteries that can automatically send electricity to the grid. A more connected electricity system reliant on demand-side response technology could help stabilise portions of the grid. Hydrogen-enabled large-scale seasonal storage may also have a role to play.

Monitoring supply chain risks

With a larger, more interconnected supply chain, energy companies are going to have to monitor supply chain risks. Supplier risks can be seen in many contexts: There are reputational risks, chiefly linked to the potential for supplier conduct to have negative ramifications for the customer; there are commercial risks due to pricing and security of supply concerns; and there are risks from cybersecurity breaches that can cascade further to the business.

The fast integration of ESG and sustainability factors into investment decision-making and regulations carries with it a new set of considerations around supplier behaviour. The UK, for example, is planning to institute mandatory disclosure in line with Task Force on Climate-Related Financial Disclosures standards across the economy. Additionally, human rights, labour issues and climate performance of suppliers are coming under scrutiny.

Thus, vetting suppliers will become more significant in the short term, but in the long term it will become important to develop engagement with key suppliers to ensure that there is a collaborative effort to move forward on key issues like emissions: Without greener feedstock, companies will be unable to reduce their own emissions.

Commercial challenges

From a commercial perspective, supply chain failures across industries have been widely publicised — take for example the shortage of microchips, which has had knock-on effects across industries. For the energy sector, there will be increased strain on the supply of vital commodities, from basic resources like copper and rare earth materials to processed goods like steel and cements.

Ensuring continuous supply of affordable feedstock will become more and more important, and price rises have already created financial hurdles for renewable energy OEMs and by extension, developers and utilities.

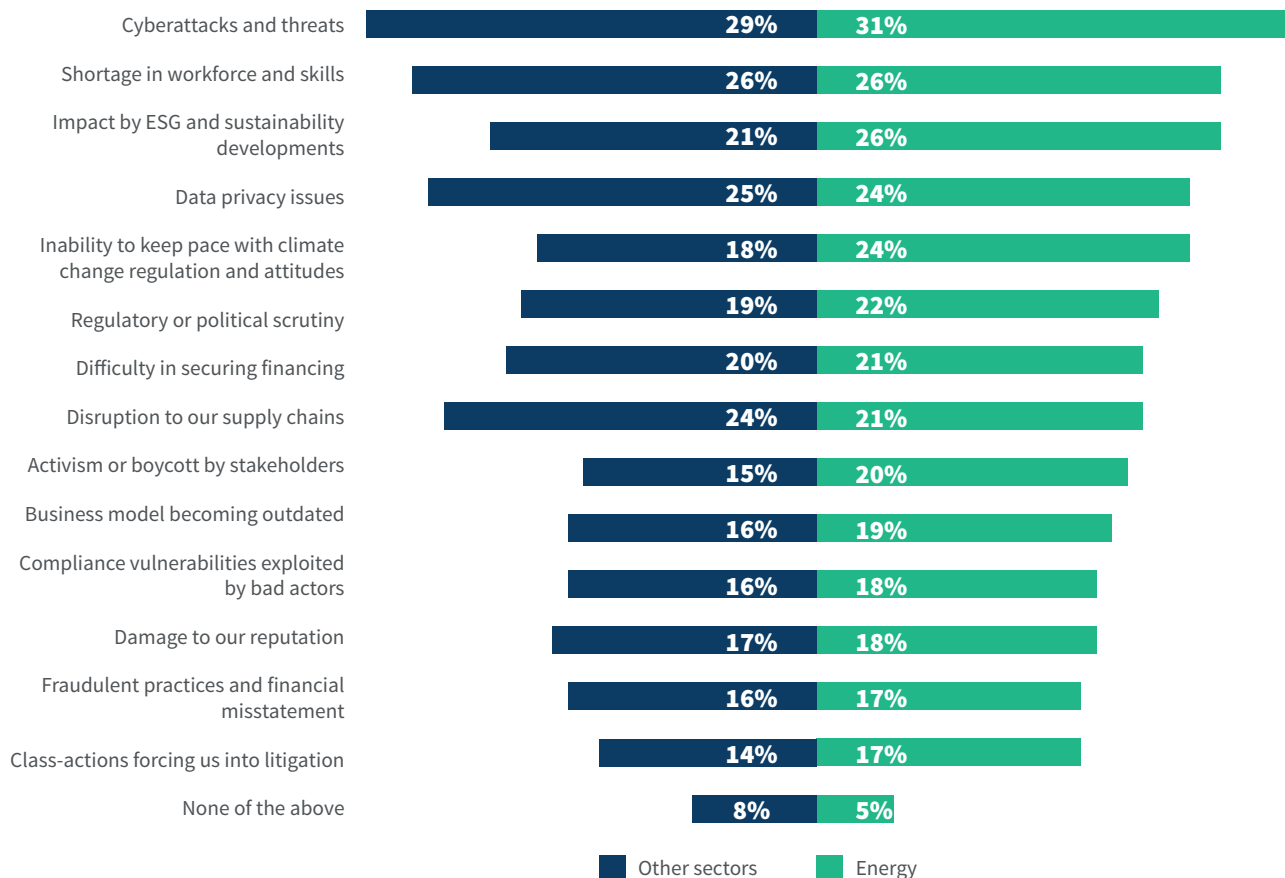
The world’s largest wind turbine manufacturers have raised prices for turbines after suffering losses due to a sharp increase in raw materials prices¹⁸; this will have a knock-on effect on prices for the industry as a whole.

Industry figures have estimated that copper, a critical component for wiring across applications, will need a 50% rally in supply to meet demand¹⁹. This will require costly investments in mines across the world and in the interim will serve to increase the price of the metal further.

Security challenges

Cybersecurity is a growing concern in the energy sector, as electricity systems and grid infrastructure become more digital and the transition towards renewables advances. Data from our annual global survey highlight that cyber attacks and threats are the elements energy companies believe will harm them the most over the next 12 months²⁰ (figure 4).

FIGURE 4. ELEMENTS COMPANIES BELIEVE WILL HARM THEM IN 2022



¹⁸ Hydrogen Council/McKinsey 2021 - <https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021-Report.pdf>

¹⁹ <https://www.bloomberg.com/news/articles/2021-05-05/vestas-posts-surprise-loss-as-pandemic-amplifies-supply-concerns>

²⁰ Ivan Glasenberg, ex-CEO of Glencore - <https://www.ft.com/content/beeb325f-1d39-456b-a4fc-22cd50429fbb>

The reason for this is simple: Energy systems are increasingly becoming interconnected as more systems become digitised and electrification expands (e.g., EV, energy storage, smart meters), and there are more opportunities for threat actors to launch cyber attacks. The threat is significant, as an attack against a nation's energy infrastructure can cause massive disruptions.

The potential for widespread disruptions to electricity systems is growing, as grid stability will be heavily reliant on distributed sources of power. In January 2021, system separation triggered by a disturbance in the high-voltage European grid demonstrated that control over 3 GW is enough to wipe out the whole European grid²¹.

Further complicating the threat is that in today's corporate environment, it is commonplace to outsource business operations functions to third-party suppliers for increased efficiency and to optimise internal resources. However, the outsourcing benefits also carry significant cyber risk, as these connected entities can serve as an access point for cyber actors.

Third-party cyber risk is a unique issue. Many organisations are aware of this threat, yet are unsure of how to properly manage risks that originate outside of their internal own systems and networks.

“Energy companies need to ensure that they create risk mitigation frameworks to assess and ultimately reduce third-party risk by assessing both their unique threat profile and the vulnerabilities of their digital ecosystem.”



THOMAS HUTIN
Head of Cybersecurity,
France



²¹ Energy Monitor, Cybersecurity threats escalate in the energy sector, 17 February 2021

Conclusion

FTI Consulting's Resilience Barometer® provides a unique snapshot of the views of more than 4,000 executives at what is indeed the most critical inflection point in the energy industry's history. The COVID-19 pandemic, war in Ukraine and threat of catastrophic climate change each pose a unique challenge to the global energy system. But collectively, they mean that the industry is tasked with addressing not one, but three "once in a lifetime" crises. And it must do so, almost simultaneously.

Framed another way, the question of how we resolve the energy trilemma, balancing security of supply and its cost and environmental impact, is as relevant as it has ever been. Helpfully this report not only provides a clear-eyed assessment of the issues facing the industry, but also details increasing alignment around some of the solutions needed. While the road to transition is precarious, the views of respondents show that it is still feasible.

In the immediate term, the cost of energy, and with it the security of supply, is at the forefront of the industry's mind. If the linkage between the two were ever in doubt, the conflict in Ukraine has shown once and for all how closely connected they are. Even nations like the United States and the UK, which have traditionally benefited from secure supply, have seen domestic prices impacted by the global marketplace. And those price rises have led to significant reverberations across the entire economy.

If climate is seen by most, but certainly not all, as the least immediate of the three prongs of the trilemma, this is only by the barest of margins. The most recent [Intergovernmental Panel on Climate Change](#) report has again reminded us that the clock is approaching one minute to midnight and the climate emergency is truly pressing.

This report highlights the significant and mounting environmental pressures facing the industry, including the threat of regulatory action and assets becoming stranded before the end of their operational life; pressure from investors and reduced access to capital; and activists leveraging every available tool, from the courts through to the corporate governance system, to influence companies.

Perhaps the clearest indication of the unique pressures facing the industry is that environmental concerns not only are at the top of respondents' agenda, but also mark the biggest differential from their counterparts in other sectors. Some 45% of energy leaders believe they face increased pressure to improve their ESG and sustainability performance, against 36% generally. It is truly a sign of how seriously the industry is taking this issue that it ranks higher than a focus on increasing profits (42%).

Elsewhere the threat of cyberattacks, a reflection of the increasingly connected nature of power grids and pipelines, tops the list of issues that leaders believe may harm them over the next 12 months. The industry is moving quickly to respond to these, but threats will continue to evolve at warp-speed, reinforcing the necessity of investing heavily in enhanced preparation and resilience capabilities.

Set against this backdrop, the complexity of fundamentally overhauling the global energy system can all too easily lead to paralysis and infighting over the benefits of one solution against another. Helpfully, the barometer also suggests that a degree of consensus may be beginning to emerge on some of these solutions.

Decarbonising the road transport system will require a huge expansion in global electrification and in turn a huge investment to transform our grid. The 21st-century grid will need to overcome not inconsiderable challenges relating to intermittency, inertia, directional flow and pricing volatility.

But even as we face these challenges, significant opportunities will open for those innovating in the flexibility services space. Enhanced storage, peaking capacity and demand-side response measures will all have an important role to play, as will building new interconnector capacity between nations.

Similarly, the deployment of hydrogen as an energy carrier offers huge potential to decarbonise at scale emissions that are otherwise hard to abate. Critically, we must avoid being distracted by factional and internecine arguments over the benefits of different hydrogen "colours" and instead focus on bringing down cost, building out infrastructure and minimising the environmental consequences of using hydrogen.

In addition to providing a stark indication of the once-in-a-generation challenge facing all parts of the energy industry, this report is a clear reminder of the centrality of energy to modern life. The war in Ukraine has shown in the clearest terms what energy, and its absence, means for the global economy.

Perhaps the logical extension of this point is that addressing the pandemic, international conflict and climate change will require a collective response from all parts of society, government and the private sector. And the energy industry, and its ability to not only finance but complete highly complex, technically challenging projects, will need to be at the very heart of the process.

In this light, efforts both to demonise different technologies which have the potential to advance transition and to undermine the industry's social license risk being dangerously counterproductive. The barometer shows all too well the scale of the challenge and the urgency with which it must be met.



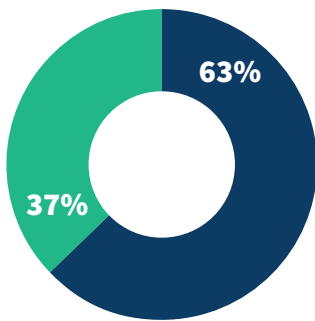
Research methodology

The FTI Consulting Resilience Barometer® incorporates views from 4,100 decision makers in large companies¹ globally across 11 industries. The research was conducted via online survey from 26 October to 10 November 2021. Results are weighted so that each country represents a similar proportion of the results.

Eighty percent of respondents are from G20 countries. For G20 respondents, the average global turnover of companies is USD\$12.7 billion and the average global headcount of companies is approximately 18,400.

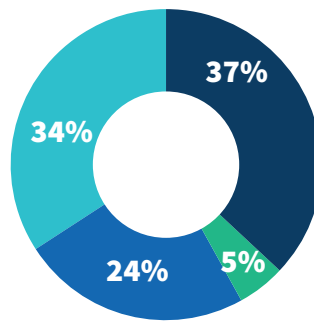
This report focuses on energy industry respondents. The composition of the data is as follows:

ORGANISATION TYPE



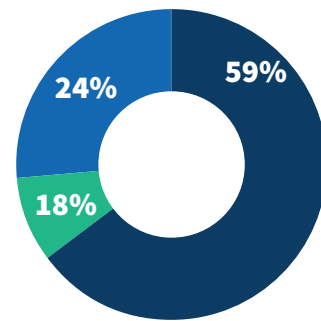
- Privately owned
- Publicly listed

COMPANY POSITION



- Board member (non-exec)
- Senior management
- Board member
- C-suite

ENERGY SECTOR COMPOSITION



- Renewable resource & alternative energy
- Utilities
- Oil & gas

¹ Large companies are defined as annual global turnover of >\$50m and/or headcount of >250 and/or balance sheet of >\$43 million

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