FOREIGN AFFAIRS

The Age of Energy Insecurity

How the Fight for Resources Is Upending Geopolitics

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As recently as 18 months ago, many policymakers, academics, and pundits in the United States and Europe were waxing lyrical about the geopolitical benefits of the coming transition to cleaner, greener energy. They understood that the move away from a carbon-intensive energy system that relied on fossil fuels was going to be difficult for some countries. But on the whole, the conventional wisdom held that the shift to new sources of energy would not only aid the fight against climate change but also put an end to the troublesome geopolitics of the old energy order.

Such hopes, however, were based on an illusion. The transition to clean energy was bound to be chaotic in practice, producing new conflicts and

risks in the short term. By the fall of 2021, amid an energy crisis in Europe, skyrocketing natural gas prices, and rising oil prices, even the most optimistic evangelist of the new energy order had realized that the transition would be rocky at best. Any remaining romanticism evaporated when Russia invaded Ukraine in February 2022. The war revealed not only the brutal character of Russian President Vladimir Putin's regime and the dangers of an excessive energy dependence on aggressive autocracies but also the risks posed by a jagged, largely uncoordinated scramble to develop new energy sources and to wean the world off old, entrenched ones.

One result of this turmoil has been the revival of a term that had come to seem anachronistic during the past two decades of booming energy supplies and utopian visions of a green future: energy security. To many Americans, that phrase is redolent of the 1970s, conjuring images of boxy sedans and wood-paneled station wagons lined up for miles, waiting to fill their tanks with gasoline at sky-high prices thanks to the Arab oil embargo of 1973 and the Iranian Revolution of 1979. But energy security is hardly a thing of the past: it will be crucial to the future.

Energy security has historically been defined as the availability of sufficient supplies at affordable prices. But that simple definition no longer captures reality; the risks the world now faces are both more numerous and more complicated than in earlier eras. To handle these new challenges, policymakers must redefine the concept of energy security and develop new means of ensuring it. Four broad principles should guide this process: diversification, resilience, integration, and transparency. Although these principles are familiar, the traditional methods of applying them will prove insufficient in this new era; policymakers will need new tools.

There is no reason to despair just yet. After all, the oil crisis of the 1970s sparked a great deal of innovation, including the development of today's

wind and solar technologies, greater efficiency in vehicles, and new government and multilateral institutions to make and coordinate energy policy. The policies and technologies that now seem old and outdated were once shiny and new. Today's crisis may likewise lead to novel ideas and techniques, as long as policymakers fully grasp the new realities they face.

THE FUTURE ARRIVED EARLY

The events of the past year and a half have dramatically revealed the many ways in which the energy transition and geopolitics are entangled. Dynamics that were once seen as theoretical or hypothetical are now concrete and evident to even the casual observer.

First, the past 18 months have highlighted the "feast before famine" dynamic facing traditional producers of oil and gas, whose power and influence will increase before it wanes. In 2021, for example, Russia and other oil and gas producers had a banner year in terms of revenue as extreme weather and the world's emergence from pandemic slowdowns boosted demand for natural gas. Such shocks had outsize impacts in a market with a meager cushion. In previous years, poor returns, uncertainty about future demand for energy, and pressure to divest from fossil fuels all contributed to diminished investment in oil and gas, resulting in inadequate supplies. Russia took advantage of these tight energy markets by draining its European gas storage sites and slashing spot gas sales even as it met long-term contractual commitments. Average natural gas prices tripled from the first half to the second half of 2021. Combined with rising oil prices, these developments granted Russia a feast of annual revenues that were 50 percent higher for oil and gas than the Kremlin had expected.

The past year and a half also demonstrated that some oil and gas producers were still prepared to use their energy prowess to ruthlessly advance their political and geostrategic objectives; hopes that the world

had moved beyond such behavior were dashed with the brutal Russian invasion of Ukraine in February 2022. In the months that followed, Russia gradually cut its pipeline gas deliveries to Europe by more than three-quarters, triggering a crisis that led European governments to spend a staggering 800 billion euros shielding companies and households from higher energy costs. The world's dependence on Russia for energy initially weakened the global response to the invasion: for many months, Russian oil flows were exempt from European sanctions. To this day, the EU has not sanctioned Russian gas sales; indeed, its members continue to import significant volumes of Russian liquefied natural gas. Tight energy markets allowed Russian oil and gas revenues to soar and gave Moscow a potential means of dividing a newly united Europe.

By last year, the mismatch between declining supplies and rising demand had already tightened the oil market. Prices leaped even further, to a 14-year-high, on market fears that the delivery of millions of barrels per day of Russian oil would be disrupted even as demand surged. At the beginning of the war in Ukraine, the International Energy Agency (IEA) predicted that Russian production would decline by three million barrels per day. Fears of supply shocks drove up oil prices and boosted both the income and the geopolitical heft of major oil producers, particularly Saudi Arabia. The United States had thought its days of begging Saudi Arabia to increase oil output had passed. But in the face of high prices, old patterns reasserted themselves, as Washington pleaded—mostly in vain—for more output from Saudi Arabia, the only country with any meaningful spare oil production capacity.

The tremors of the last 18 months also illustrate how the geopolitical environment can affect the pace and scope of the transition to clean energy. Before the Russian invasion of Ukraine, European countries and the United States were committed to transforming their economies to achieve net-zero carbon emissions in the coming decades. The brutality of

Russia's actions and the knowledge that those actions were funded by fossil fuel receipts reinforced the determination among many in Europe and the United States to move away from oil, gas, and coal. In Washington, one result was landmark climate legislation in the form of the Inflation Reduction Act. Europe also expedited its green plans, notwithstanding some small near-term increases in coal use.

Many American officials worry, however, that a more accelerated energy transition will necessarily involve greater dependence on China, given its dominance of clean energy supply chains. U.S. Senator Joe Manchin, a Democrat from West Virginia, warned that he did not want to have to wait in line to buy car batteries from China the way he waited in line in the 1970s to buy gasoline made with oil from the Middle East. Such fears led Congress to create incentives for the domestic production, refining, and processing of critical minerals now centralized in China. Rather than praising Washington for finally passing meaningful climate change legislation, however, much of the world resented these moves as acts of U.S. protectionism, stirring talk of climate-provoked trade wars.

Finally, the energy crisis of the last 18 months has widened the rift between rich and poor countries. Many countries in the developing world became more strident in objecting to pressure to diversify away from fossil fuels, noting the rise in food and energy costs emanating from a European war. Developing countries have also denounced what they perceived as the hypocrisy inherent in how the developed world has responded to the crisis: after years of citing climate change as a reason to avoid funding natural gas infrastructure in lower-income countries, for example, European countries were suddenly racing to secure new supplies for themselves and building new infrastructure to accept them. Making matters worse, as Europe bid up the price of gas, demand for coal spiked in Asia and drove prices to record levels, leaving developing and emerging-market countries, such as Pakistan and Bangladesh, struggling

to afford energy in any form. These tensions were on full display at the UN climate conference in Egypt in November 2022. Biden arrived to take a victory lap over the passage of a historic domestic climate law but found that poorer countries were unimpressed. Instead, they asked why the United States was not doing more to finance climate-change adaptation and clean energy outside its borders and demanded that their richer counterparts compensate them for the damage that climate change has already caused to their cities, agriculture, and ecosystems.

The energy crisis may have eased in recent months, but it is still far too early for complacency. The vast majority of Europe's reduction in gas demand last year arose from unusually warm weather and the idling of industrial production, as opposed to intentional conservation that can be sustained. Moreover, Europe may not be able to rely on much, if any, Russian gas to refill its storage facilities over the coming year. The flow of piped Russian gas into Europe throughout 2022, albeit in shrinking volumes, has now halted and seems unlikely to resume; the Russian liquefied natural gas still flowing to Europe could come under pressure and be curtailed in the months ahead.

Meanwhile, with growing risks to Russian oil output, global demand is expected to rise nearly twice as much as supply in 2023, according to the IEA. Washington's primary tool for cushioning supply disruptions, the U.S. Strategic Petroleum Reserve, is vastly diminished. If prices begin to soar again, Western countries will have few options but to turn once more to Saudi Arabia and to the United Arab Emirates, which also has some spare capacity. Ironically, by the time the UAE hosts the next major UN climate conference, at the end of 2023, the world may well also be turning to Abu Dhabi not just for climate leadership but for more oil.

SOURCES OF STRESS

Driving the new energy insecurity are three main factors: the return of great-power rivalry in an increasingly multipolar and fragmented international system, the efforts of many countries to diversify their supply chains, and the realities of climate change.

Russia's invasion of Ukraine and its broader confrontation with the West offer a striking example of how the ambitions of a single leader can create energy insecurity for broad swaths of the world's population, and the war serves as a reminder that great-power politics never really went away. The U.S.-Chinese contest, however, may ultimately prove more consequential. The intensifying desire of the United States and China to not rely too much on each other is remaking supply chains and reinvigorating industrial policy to a degree not seen in decades. Even with redoubled efforts to produce more clean energy at home, the United States and others will still depend on China for critical minerals and other clean energy components and technologies for years to come, creating vulnerabilities to Chinese-induced shocks. For instance, in recent months, China has suggested that it may restrict the export of solar energy technologies, materials, and know-how as a response to restrictions that Washington imposed last year on the export of high-end semiconductors and machinery to China. If Beijing were to follow through on this threat or curtail the export of critical minerals or advanced batteries to major economies (just as it cut off rare earth supplies to Japan in the early 2010s), large segments of the clean energy economy could suffer setbacks.

Traditional energy heavyweights are also recalibrating their positions in response to the changing geopolitical landscape in ways that increase energy security risks. Saudi Arabia, for instance, now sees its global stance differently than it did in the decades that followed the famous "oil for security" bargain struck by U.S. President Franklin Roosevelt and Saudi King Abdulaziz ibn Saud on Valentine's Day in 1945. Riyadh is now far less concerned with accommodating Washington's requests, overt or

implied, to supply oil markets in ways consistent with U.S. interests. In the face of a perceived or real decrease in U.S. strategic commitment to the Middle East, Riyadh has concluded it must tend to other relationships —especially its links to China, the single largest customer for its oil. The kingdom's acceptance of China as a guarantor of the recent Iranian-Saudi rapprochement bolsters Beijing's role in the region and its global status. Relations with Moscow have also become particularly important to Saudi Arabia. Regardless of the invasion of Ukraine, the Saudi government believes that Russia remains an essential economic partner and collaborator in managing oil-market volatility. It will therefore be extremely reluctant to take positions that pit the Saudi leadership against Putin.

The new energy insecurity is also shaped by forceful moves many countries have made to domesticate and diversify their supply chains since the invasion of Ukraine and the global pandemic. Such moves are understandable, and even wise, given the now evident risks of excessive dependence on certain countries, notably China, in this new geopolitical era. Yet an interconnected global energy system remains the cornerstone of energy security; markets are still the most efficient way to allocate supplies. Increased self-sufficiency may give countries an increased sense of resilience but could also make them vulnerable; an interconnected global market can ease disruptions caused by extreme weather or political instability. More segmented energy markets will inevitably have fewer options to tap in such circumstances. The U.S. Inflation Reduction Act and Europe's Green Deal industrial plan are intended to accelerate the drive to net-zero emissions, and they reduce energy insecurity in some ways by curbing dependence on globally traded hydrocarbons exposed to geopolitical risks. Yet they also increase insecurity, since promoting domestic industries runs the risk of stoking protectionism and fragmentation, both of which can make economies less energy secure.

Finally, climate change will be a major threat to energy security in the coming decades, posing risks to infrastructure old and new. Warmer waters and more severe droughts will make it harder to cool power plants, transport fuels, and rely on hydropower. In 2022, California lost half its hydroelectric output because of drought, and Brazil was nearly forced to ration electricity after losing much of its hydropower. These kinds of events will become more common as the world decarbonizes because an energy system less reliant on hydrocarbons will depend more heavily on electricity; the cheapest way to decarbonize sectors such as transportation and heating will be to use electricity instead of gasoline engines or natural gas boilers. The IEA estimates that if the world is to reach the goal of net-zero carbon emissions by 2050, 50 percent of global energy consumption will need to be met by electricity, up from only 20 percent today. And nearly all that electricity will need to be produced from zero-carbon sources, up from only 38 percent today.

Climate change will place much of the infrastructure for this electricity generation, transmission, and distribution at greater risk, since fragile grids and overhead wires are often more vulnerable to extreme weather, wildfires, and other climate-related risks. Climate change can also have a negative impact on renewable sources of electricity, with the UN Intergovernmental Panel on Climate Change projecting that by 2100, average global wind speeds could fall by 10 percent as climate change reduces the differences in atmospheric temperatures that generate wind.

DIVERSIFICATION DILEMMAS

One solution to these problems is to diversify supply. Diversification remains as central to energy security as it was in 1913, when Winston Churchill, then the first lord of the Admiralty, declared that "in variety, and in variety alone" would the United Kingdom find a solution to vulnerabilities created by his decision to shift the British navy from a reliance on Newcastle coal to less secure sources of oil from Persia.

In the long run, the clean energy transition will lead to improved energy security in many cases by diversifying fuel sources and suppliers. For example, transportation, most of which currently runs on oil, will be less vulnerable to fuel supply disruptions in a world where roughly two-thirds of vehicles are electrified, since electricity can be generated from multiple energy sources. And because most electricity is produced close to where it is consumed, a more electrified world will also be less subject to import disruptions caused by disputes among countries.

Yet as the transition progresses and consumers diversify away from fossil fuels, new vulnerabilities and threats to energy security will arise. Even as oil use wanes, geopolitical risks may increase as global production becomes further concentrated in countries that can produce at low cost and with low emissions, many of which are in the Persian Gulf. In the IEA scenario in which the world reaches net-zero carbon emissions by 2050, the share of global oil supply from OPEC producers rises from around one-third today to roughly one-half. The oil giant BP anticipates an even greater global dependence on these producers, estimating that by 2050, they will account for close to two-thirds of global oil supply. In the long run, that will be a large share of a tiny pie, but for decades, oil demand will remain very high and consequential even if annual demand is falling.

U.S. policymakers may well ask themselves how comfortable they would feel if global oil production were to be even more heavily concentrated in OPEC countries than it is today. Faced with that outcome, they might consider a number of options, such as extending the increasingly popular concept of "friend shoring" to oil by more actively supporting production at home and in countries such as Norway and Canada, which are perceived as less risky than, say, Iran, Libya, and Venezuela. Some officials might even advocate penalizing less friendly oil sources through import taxes or even sanctions.

Taking such measures to subvert the market and bolster oil production in preferred locations would carry significant risks, however. It would undermine the benefits that come from the ability to reroute oil supplies in case of disruption. It would also risk backlash and retaliation from major global oil producers in OPEC, which can send prices higher by restricting output. Subsidizing domestic supply would also run counter to efforts to encourage consumers to move away from fossil fuels. A better approach would be to embrace global markets but boost defenses against inevitable shocks and volatility with larger, not smaller, strategic oil reserves.

Meanwhile, diversifying the inputs of clean energy will be even more difficult than doing so for fossil fuels. The sources of the requisite technology and components, notably the critical minerals needed for batteries and solar panels, are even more heavily concentrated than oil. The world's largest supplier of lithium (Australia) accounts for around 50 percent of global supply, and the leading suppliers of cobalt (the Democratic Republic of the Congo) and rare earths (China) each account for around 70 percent of those resources. In contrast, the world's largest producers of crude oil—the United States, Saudi Arabia, and Russia—each account for just 10 to 15 percent of global supply. The processing and refining of these minerals are even more concentrated, with China currently performing around 60 to 90 percent of it. Meanwhile, Chinese companies manufacture more than three-quarters of electric vehicle batteries and a similar proportion of the so-called wafers and cells used in solar energy technology.

U.S. policymakers have recently awakened to these vulnerabilities and the fact that they will become more acute as the transition progresses. The Inflation Reduction Act encourages the production of critical minerals in the United States and elsewhere by providing tax credits and loan guarantees for domestic producers, among other measures. The Biden

administration recently signed agreements with Congo and Zambia that are intended to increase U.S. imports of their clean-energy minerals. And the U.S. International Development Finance Corporation (DFC) has pursued debt transactions to support the development of solar cell manufacturing outside China. But to get more of the minerals it needs from more of the countries it prefers, Washington will need to strike many more bilateral and multilateral trade agreements and sharpen instruments such as the U.S. Export-Import Bank, which can fund overseas mining operations in friendly countries such as Indonesia. For its part, the U.S. Congress should increase the DFC's authority and expand its ability to make investments.

Another area that badly needs more diversification is enriched uranium, which will become more important as the use of nuclear power increases globally to meet low-carbon electricity needs. Russia's role as a dominant supplier of nuclear fuel services to many countries, including the United States, is a source of great discomfort and vulnerability, given the current geopolitical realities. Boosting uranium production, conversion, and enrichment in the United States and among its Western allies and substantially ramping up their fabrication of the fuel assemblies for Russian-made reactors will be critical to maintaining the existing nuclear fleet and keeping decarbonization goals within reach.

BUILDING RESILIENCE

A secure energy system must be able to withstand and bounce back quickly from unexpected shocks and disruptions. At the most fundamental level, reliable energy infrastructure is the key to that sort of resilience. Governments and private companies have long worked to protect energy infrastructure from dangers of all kinds, from terrorist attacks to hurricanes. As the transition proceeds, they will need to step up such efforts. Moreover, as the clean energy economy becomes more digitized and electrified, it will be exposed to a growing threat of

cyberattacks. Private companies and governments will need to coordinate and cooperate to deter and respond to threats such as the 2015 cyberattack that took out large swaths of the grid in western Ukraine.

Resilience also requires flexibility, which in the energy sector is measured by the ability of every part of a system to cope with losses in other parts. Because renewable sources such as solar power and wind are highly variable, the energy they generate needs to be either stored or backed up by other sources, with delivery systems making minute-by-minute adjustments. That is already a difficult task, and it will become even harder in a grid with more intermittent sources of energy and more variable electricity demand. According to the IEA, the global power system's need for flexibility—measured as the amount the rest of the system needs to adjust to handle changes in demand and in solar and wind output—will more than quadruple by 2050 if all countries fulfill their climate pledges. Today, plants that run on coal or gas perform most of these adjustments. But as the transition progresses, the number of such plants—and thus their ability to serve as backstops—will progressively diminish.

To counteract that dynamic, U.S. policymakers should take steps to make sure that the increasing share of renewable energy on the grid is matched by adequate balancing resources and storage capacity. Doing so will require structures such as so-called capacity markets, which pay generators to be available to meet peak demand even if they are idle much of the time. Such mechanisms can help ensure that companies whose resources are needed only infrequently nevertheless stay in business and support a reliable electricity supply even as their utilization rate falls as the grid decarbonizes.

Officials can also make use of new tools to manage demand for energy without massively inconveniencing consumers or creating political headaches. For instance, digital technology can help consumers

shift energy-intensive activities to low-demand times of the day (such as running dishwashers and clothes dryers overnight) or prompt them to save energy by lowering thermostats in unoccupied rooms. Artificial intelligence will also play a growing role—for example, by reducing the amount of time that energy systems are down for maintenance, by forecasting demand, and by improving storage. Such tools would have come in handy in December 2022, when grid operators in Texas badly underestimated how much electricity customers would need and the state barely avoided widespread blackouts. Finally, officials should avoid the early retirement of fossil-fired electricity sources that can balance the grid and ensure reliability before alternatives are fully capable of providing the necessary level of service.

A resilient system must also be able to weather unexpected shocks and supply disruptions. For decades, policymakers have relied heavily on two types of buffers: the spare capacity of oil-producing countries (especially Saudi Arabia) and strategic stockpiles, which members of the IEA are required to hold as part of an agreement forged after the Arab oil embargo in the 1970s. These historical buffers will still matter as the transition unfolds—even more so if, as seems likely today, declines in energy supply and investment are not synchronized with declines in demand, leading to less slack in the system to handle unexpected shocks and more volatility. Moreover, it is clear that Riyadh has become far less willing to dip into its spare capacity whenever Washington demands it. As coal generation declines in a decarbonizing economy, there will be less opportunity for power generators to toggle between natural gas and coal, as many do now. This new reality could result in more volatility in natural gas prices. And recent turmoil in the refining sector that contributed to skyrocketing gasoline and diesel prices in the United States was a reminder that limited refining investment can bite consumers before vehicle electrification causes fuel use to drop sharply. For those reasons,

other strategic stocks of all kinds will become more important—not just those that hold oil but also ones that hold natural gas and oil products such as diesel fuel and gasoline.

The United States will also need strategic stockpiles of the building blocks of clean energy, working with its allies to amass critical minerals such as lithium, graphite, rare earths, and nickel. Such coordination would be enhanced if the IEA had a hand in negotiating agreements, assessing which countries are best positioned to contribute to which stockpiles, and regularly monitoring whether the composition of stockpiles fits current needs. The IEA has played this role admirably for oil and oil products and could do so again with critical minerals if its members chose to expand its mandate.

INTEGRATION AS INSURANCE

A desire for greater security has spurred the decades-long quest for "energy independence" in the United States and elsewhere. And because of the shale revolution, the United States has become energy self-sufficient in net terms. Nevertheless, the country continues to be vulnerable to geopolitical risks because in a global market, supply shocks anywhere affect prices everywhere. Proponents of the transition to a net-zero carbon system have long heralded the greater insulation from geopolitics that would likely result from the end of the fossil-fuel era. But at least for the next few decades, energy security will be advanced not through more autonomy but through more integration—just as it always has been.

Interconnected and well-functioning energy markets increase energy security by allowing supply and demand to respond to price signals so the entire system can better handle unexpected shocks. In 2005, when Hurricanes Katrina and Rita disrupted much of the U.S. Gulf Coast's vast production and refining operations, energy companies were able to avert

fuel shortages by quickly importing supplies from the global market. Similarly, after the Fukushima nuclear disaster in 2011, Japan was able to temporarily shut down its nuclear power sector because it could import other sources of fuel from the global market.

But maintaining and cultivating interdependence in today's environment is more difficult than at any time in recent memory, as countries around the world are embracing industrial policies that involve increased state intervention in markets. Although those efforts can deliver benefits, such as minimizing markets' vulnerability to the whims of geopolitical adversaries, many policymakers want to go further, promoting such policies as a means to boost domestic jobs and build political coalitions in support of stronger action on the environment. Indeed, although climate diplomacy has been premised for years on the assumption that progress depends on transnational cooperation, some efforts to advance climate action paradoxically risk undermining cooperation by fueling the forces of fragmentation and protectionism.

The case for energy integration has suffered as a result of Europe's urgent need to decouple from Russian energy during the war in Ukraine. Nevertheless, although shocks may be felt more broadly in an integrated system, they are also felt less intensely. Integration is a form of insurance that spreads the risk of energy supply disruptions among many parties. And even if more autonomy were preferable to more integration, it would not be possible to expand clean energy at the scale and speed needed if each country sought to produce and consume only within its own borders. According to the IEA, the value of global trade in critical minerals will need to triple to achieve net-zero emissions by 2050. Global trade in low-carbon fuels such as hydrogen and ammonia will also need to grow exponentially. For the United States, energy security will require fewer trade barriers and more trade agreements with allies, as well as with other countries that meet certain environmental standards. Washington should

also eliminate tariffs on goods and technologies related to clean energy and help finalize the Environmental Goods Agreement, which would reduce tariffs on goods that benefit the environment to lower their costs and increase their trade.

WHAT YOU DON'T KNOW CAN HURT YOU

One of the reasons that the United States, Canada, Japan, and several European countries created the IEA in 1974 was that a lack of accurate, reliable data on prices and supplies had made it hard for governments to craft policies and respond to crises. The lesson was clear: good data allows markets to function, prevents panic, and deters the speculation that exacerbates price spikes, volatility, and shortages. Over the decades, IEA data, along with data assembled by the International Energy Forum, has underpinned decision-making about production levels and guided actions such as coordinated releases of stockpiled oil.

A clean energy economy will need the same kind of transparency. Inadequate data in nascent markets, such as those for green ammonia and hydrogen, can cause supply disruptions, a lack of liquidity, and poor availability of spot price assessments, all leading to pronounced price fluctuations. The energy transition will also depend heavily on the market for critical minerals, such as nickel. But investors were reminded of how market opacity can trigger extreme volatility when the price of nickel on the London Metal Exchange almost quadrupled over just two days in early 2022, owing to massive short-selling caused in part by a lack of price transparency.

Currently, some private companies have good information on prices, but no single entity gathers broad industrywide data and makes it publicly available. The IEA is the clear candidate to fill that role. Ideally, the agency would ask governments to share consumption and production data on minerals and make informed inferences about inventory levels. Such

data sharing would be especially important to ensure compliance if governments agreed to create strategic stockpiles, as they do with oil. For such a system to work, however, the IEA would have to bring in countries that are not members of the organization but produce or consume significant amounts of those minerals, which in turn would require a new legal framework for the agency. Meanwhile, to help prevent market manipulation and speculation, national regulators such as the U.S. Commodity Futures Trading Commission should require greater transparency in the pricing and trading of commodities.

SECURITY AND THE CLIMATE

The importance of energy security never diminished; it had simply been taken for granted in a world of abundance and integrated, well-functioning global energy markets. Policymakers now have the opportunity to look at energy security and climate security afresh, to accord appropriate weight to both, and to appreciate that neither can be achieved in the absence of the other.

This effort requires recognizing that energy security is not a static concept but one that has evolved a great deal since the crises of the 1970s. Policymakers must grasp the new risks to energy security and modernize their toolkits to combat them. Doing so is not a distraction from addressing climate change but central to it; without this shift, energy crises might derail the drive to net-zero emissions. In the not-so-distant past, officials and experts thought that excessive fears about energy security might hinder the fight for the climate. Today, the opposite is true: as the transition to a net-zero world proceeds, the bigger danger to the climate will be insufficient attention to energy security.

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