

CLIMATE-ENERGY FUTURES:

Stress Test Scenarios for Global Uncertainty

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INTRODUCTION

What is the future of energy amid global efforts to respond to climate change? Over recent years there has been a growing consensus and willingness amongst states, cities, and businesses to take decisive action in their response to climate change. Transitions towards net-zero emissions by 2050 were a central aspect of the 2015 Paris Accord and efforts to reach this goal have gained considerable traction despite ongoing challenges both political and economic. The Russian invasion of Ukraine saw high inflation and supply chain disruptions trigger a full-blown energy crisis (particularly in Europe). Energy insecurity has emerged as a business and policy priority and many institutions are unsure how to effectively manage and respond to the associated risks.

This paper applies a strategic foresight framework and provides stress test scenarios to possible outcomes of net-zero pathways in an environment of energy insecurity. It is divided into two sections. Section I offers plausible scenarios of strategic foresight and Section II offers a discussion and provides contextual overview of global challenges surrounding Energy Futures. Strategic foresight is an attempt to broaden the “boundaries of perception” and expand the awareness of emerging issues and situations.ⁱ This approach offers a range of extreme but plausible futures that could arise and opportunities and challenges they would present. This analysis can serve as a basis for risk managers to consider their institutional exposures.

SECTION I - STRATEGIC FORESIGHT SCENARIOS

What are the possible outcomes of net-zero energy transitions? This section offers three plausible extreme scenarios — *Security First*, *Fund the Future*, and *Accelerating Green Transition*. These scenarios can help conceptualize the distribution of conceivable pathways. Risk managers can use these scenarios as part of their strategic risk frameworks to help quantify their institutional exposures and know when to execute mitigation plans according to provided early warning indicators.

Scenario 1: Security First

External factors drive government and investor retrenchment to fossil fuels as a source of energy security at the expense of net-zero transition.

Overview

This is a scenario in which concerns for energy security instigate a public policy shift in major economies toward the prioritization of short-term access and supply over long-term climate risks. This change triggers the decoupling of net-zero goals from the business case for a green transition and further entrenches existing fossil fuel energy systems. Accompanying new regulatory signals are changes to market incentives and actions. Investors redirect more capital away from higher-risk green assets, for which early-phase government supports are curtailed, and toward traditional fossil fuel

ⁱ Leigh, Andrew. “Thinking Ahead: Strategic Foresight and Government.” Australian Journal of Public Administration 62, no. 2 (2003).

industries with more predictable future returns. Sustained conditions of high inflation and interest rates, driven in part by fractional deglobalization and labour market tightening, further incentivize the shift toward non-renewables, as investors value short-term fundamentals over prospects for longer-term green growth.

Detailed Scenario Narrative

The rush to secure fossil fuel resources, when coupled with persistent macroeconomic and geopolitical pressures, far outpaces global supply capacity and forces up traded prices over the medium-term, yielding sustained average benchmark crude rates of >\$100 per barrel and Liquefied Natural Gas (LNG) rates of >\$30 per Million British Thermal Units (MMBtu). The energy price shocks amplify inflationary pressures, given the higher costs for goods and services across supply chains. Proven clean electricity technologies like hydroelectric and nuclear are increasingly deployed, but low-cost piped gas, LNG and coal-fired production still provide the bulk of global baseload capacity. The deployment of market competitive solar/wind technologies continues, but the share of these technologies in the total electricity mix is curtailed by their intermittency, which remains an under-addressed technical challenge in an investment climate less favourable to clean energy R&D. Major energy importers respond to the insecurity of supply with new investments in fossil fuel infrastructure, cementing additional consumption over the long term. The shift marginally increases the diversity of total global supply of tradeable energy and restricts the market power of any individual producer. In Europe, the deployment of floating regasification terminals gives way to more permanent onshore facilities and transit pipelines for LNG. In South, East, and South-East Asia, the imperative to eliminate energy poverty and keep pace with rapidly growing demand, combined with domestic resource endowments, sustain and even spark growth in coal-fired generation as a baseload energy source.

In the U.S. the future of domestic oil/gas production remains divisive. Should Donald Trump retake the White House in the 2024 presidential election, and the Republican Party gains full control of Congress, the U.S. are more likely to withdraw from multilateral climate negotiations, repeal aspects of the Inflation Reduction Act, and deregulate numerous clean energy initiatives all enacted during the Biden Administration. The Republican Party does not consider policy proposals aimed at reducing climate change a major platform concern. Republican lawmakers are more likely to exert more pressure on institutional lenders and investors over climate and sustainable finance practices, condemning ESG as an unnecessary market intervention. Federal public pension funds are pressured to exclude ESG principles in their investment strategies. A wave of new subsidies and deregulation of the oil and gas industry are justified on national security grounds, and more federal lands are opened to private exploration and drilling.

Political debates over climate action grow more intense, with risks of intensified politicization and violent clashes. Intergenerational divides widen between Generations Z and Alpha, and their predecessors, over the pace of action. For the former group, the seeming lack of policy progress engenders widespread climate anxiety and political disillusionment. In their psychosocial effects, these factors contribute to downward trends in education, social mobility and fertility rates among younger cohorts. The resulting demographic squeeze and skills deficits present long-term challenges for labour markets and pension sustainability.

The reprioritization of energy security ahead of the net-zero transition slows and even reverses progress on global emissions reduction, at least over the near to medium-term. The physical risks posed by climate change-related extreme weather events intensify and expose the property/casualty insurance and reinsurance sub-sectors to systemic contagion. National governments are positioned as the “insurers of last resort” when more frequent and intense loss-events threaten private-sector insolvencies. Military and other government

resources are increasingly redirected toward disaster response.

International capital flows toward wealthy states with greater fiscal bandwidth to fund climate resiliency and adaptation, draining resources away from those developing countries more susceptible to extreme weather events. Multilateral attempts at “loss and damage” provisions fall short, and climate exposures in poorer countries are left unaddressed. Beleaguered states in the developing world grapple with the consequences of increased desertification and soil acidification, resource conflicts (e.g., over access to fresh water and arable land), internally displaced populations and outbound migration flows, among other disruptions. Populist and nativistic political movements gain significant traction in destination states for climate refugees, including the United States and Western Europe.

While *Security First* precludes an orderly net-zero transition in energy production, limited emissions mitigation occurs parallel to increased fossil fuel consumption via carbon capture, utilization and storage (CCUS) technologies. Meanwhile, research into solar geoengineering accelerates. The shift in focus toward climate adaptation in wealthy states encompasses food systems, buildings, civil infrastructure and transportation systems. Lenders and institutional investors find new financing opportunities in real assets linked to climate resilience, like sea walls, electricity grid improvements and desalination facilities. These projects require workers and skills training, and in so doing, strain the labour market.

Table 1: Scenario 1 - Security First Summary of Stress Test Scenario Metrics

Key Tracking Metrics	
Global benchmark price of crude per barrel	>\$100 average over medium time horizon
Global benchmark price of LNG per MMBtu	>\$30 average over medium time horizon
U.S. fossil fuel subsidies	≥ historical trend over short to medium time horizon
Fossil fuel infrastructure/clean tech investment growth	↑ over medium time horizon
Average winter temperatures in Europe	↓ trend in 2022-23 and 2023-24
2024 U.S. election	Republican sweep of White House & Congress
Climate adaptation/mitigation investment growth	↑ over medium to long-time horizon
Coal-fired/clean electricity capacity growth in India & China	↑ over medium time horizon

Table 2: Scenario 1 - Security First Summary of Early Warning Indicators

Warning Indicators
Government Subsidies Across Energy Sector – Public support to the energy sector will offer an important signal. Persistent and/or increased subsidization of fossil fuel production, even if coupled with some new commitments to clean energy development and adoption, will preface this scenario.
Infrastructure Investments – Private-sector investment in energy infrastructure will be an important signpost. A definitive and sustained focus on fossil fuel assets relative to higher-risk clean energy development and adoption (i.e., not just deployment of existing market competitive solutions) would be a guiding trend. A significant retrenchment to carbon-intensive base-load expansion in the Global South (developing countries), in particular coal-fired generation, would be another noteworthy indicator here.
Political Developments – Popular sentiment and leadership changes will prove a critical factor. If the winter of 2023-24 proves severe, the popular reaction to the strains of sustained high oil/gas prices in Europe will influence the political willingness and investor appetite to increase supply and embed future emissions. Furthermore, a Republican landslide in the 2024 U.S. presidential and congressional elections may preface a significant pullback from the green transition and a recommitment to legacy fossil fuels.

Scenario 2: Fund the Future

Energy insecurity influences policy adjustments to fill acute disruptions to supply, with policies to build up a state “warchest”, as a temporary diversion along a newly invigorated transition pathway to net-zero.

Overview

This is a future scenario in which geopolitical pressures drive a “two steps forward, one step back,” approach to the green transition in light of acute energy insecurity. The immediate supply gap in the market for oil and gas creates a wave of short-term investment to boost production and fulfill the demand for bridge fuels, while also spurring a rise in clean energy investments over the medium-term. States take advantage of the disruption of energy markets to build up a fund for future green investments. The more volatile and complex the decarbonization trajectory, the greater the market uncertainty, sending contradictory signals to lenders and institutional investors.

Detailed Scenario Narrative

In the *Fund the Future* transition, banks are more likely to balance lending to energy companies with longer-term commitments to clean energy alternatives. Failures to communicate the strategic rationale informing this broad approach exacerbates the activist backlash, allegations of inconsistent ESG practices or “greenwashing,” and associated reputational and liability risks, which ultimately prove a disincentive to new commercial lending. For pension funds, returns are limited by the volatility of the projected transition, making a longer-term investment strategy more difficult. Some institutional investors face similar stakeholder criticism and reputational damage over a perceived lack of adherence to net-zero commitments, and more robust stakeholder calls for fossil fuel divestment. This situation influences some investors to increase their positions in fossil fuel extraction, including financing green transitions, while remaining committed to longer-term decarbonization objectives.

The ongoing energy crisis and supply chain re-orientation in Europe drives a wave of oil and gas investment in both net consumer and producer nations. New floating and onshore reception terminals for LNG are constructed along the German coast, while major exporters like Qatar and the U.S. increase their output and break ground on new liquification facilities. The OPEC+ group of countries increase crude production to near full capacity, affirmed in their policy shift by a moderated global recession and China's post-Covid economic normalization. As the EU's pivot away from Russian piped and sea-bound energy continues, a persistent supply gap in energy has a real but moderated effect on medium-term prices when compared to the *Security First* scenario, as unserved energy demand is somewhat met with surges in rapid deployment of market-competitive, clean energy technologies. Average global benchmark prices for crude fall between \$80-100 per barrel; for LNG, between \$20-30 per MMBtu. These rates eventually start to decline as new production, refinement, and transportation infrastructure comes online. The long-term moderation in fossil fuel prices helps both the EU and other major economies bridge the transition to clean energy alternatives.

The addition of new fossil fuel infrastructure projects raises concerns that 2030 targets for carbon mitigation may be out of reach. Persistent higher inflation and interest rates combine with uncertainty to constrain private investments in emerging climate technologies, so governments are compelled to increase public financing early along the risk curve to drive the innovations necessary for a quicker transition to net-zero. Obligatory public support includes subsidies for early-stage and/or pre-scale technologies, including small modular reactors (SMR), green/blue hydrogen, and carbon capture usage storage (CCUS). They also include support for an accelerated rollout of proven clean energy systems like wind and solar. The rapid fiscal expansion so required in major economies to steward higher-risk green transition assets, parallel to short-term non-renewables and better

adaptation to existing climate change effects, adds to already massive post-pandemic debts in major economies, the management of which grows more constraining in an environment of sustained higher interest rates. Importantly, the public sentiment supports "windfall taxes", levied against oil and gas companies that reap increased profits from higher prices, and providing a revenue source to reduce the fiscal burdens.

In the United States existing commitments under the 2022 Inflation Reduction Act and the 2021 Infrastructure Investment and Jobs Act are the primary support for climate mitigation, adaptation and early-stage funding for technological development over the next decade. A divided Congress is more likely to preclude new initiatives on the same scale. In Asia, advanced economies and emerging economies are more likely to follow a similar course of mitigation, adaptation and innovation-based financing for climate change. However, for the latter group, and their lower-income peers in the region, the alleviation of acute energy poverty remains a policy priority, inducing further development of non-renewable sources.

Intergenerational tensions rise over the direction and pace of climate transition. Stakeholder pressure and shareholder activism endure against firms deemed to ignore or underperform with respect to climate goals. The labour market effects of a more "disorderly" transition are an even more significant cause of social disruption. The immediate need for new oil and gas supplies requires commensurate workforce training and capacity. However, the sharp pivot planned toward green energy deployment rapidly dislocates specialized talent in the fossil fuel industry while requiring massive reskilling to feed new clean energy sub-sectors. Local economies dependent on non-renewables are particularly susceptible to labour market scarring. The shock to workers generates political pressure for government to step in with dedicated support programs; the options include green adjustment insurance mechanisms similar to those applied in response to international trade liberalization.

Fund the Future in the short-term benefits major fossil fuel producing states, including highly sanctioned producers like Russia, Iran and Venezuela that remain capable of extracting and covertly exporting oil and gas to willing buyers. As the quick pivot toward greener alternatives cuts non-renewables from the global energy mix, high-cost producers are driven from the market, leaving low-cost producers in OPEC+ with a relatively greater share of the remaining markets for crude and LNG. Simultaneously, bottlenecks in the clean energy supply chain, like those pertaining to critical minerals mining and refinement, grow more significant in terms of their potential implications for the global economy. States with control of critical nodes gain geopolitical clout and leverage over net mineral consumers. Multilateral efforts at loss and damage financing and support for climate adaptation in highly vulnerable developing states

yield some progress, as wealthy states commit to bolder action at home and abroad. Yet, the human costs from environmental loss, food and water crises, and migration are significant, and increase domestic and international political tensions.

The green pivot and rapid uptake in clean energy adoption over the medium to long-term promises to curtail the impacts of severe environmental events. However, the delayed and then rushed efforts at mitigation may not prevent the onset of an intervening tipping point, after which damages escalate beyond systems of emergency response and risk-sharing, and trigger systemic crises. This presents an even higher transition risk given the level of pathway uncertainty. This challenge proves a drag on new energy sector investment across the board.

Table 3: Scenario 2 - Fund the Future Summary of Stress Test Scenario Metrics

Key Tracking Metrics	
Global benchmark price of crude per barrel	\$80-100 average over medium time horizon
Global benchmark price of LNG per MMBtu	\$20-30 average over medium time horizon
Fossil fuel infrastructure/clean tech investment growth	↑ over short time horizon; ↓ over medium time horizon
Brown-to-green transition funds	Rapid growth over short to medium time horizon
Bottlenecks in clean energy supply chain	↑ over medium to long time horizon
Transition risk premia for fossil fuel assets	↓ over short time horizon; ↑ over medium time horizon
Shareholder activism over net-zero	↑ over medium time horizon; ↓ over long time horizon

Table 4: Scenario 2 - Fund the Future Summary of Early Warning Indicators

Warning Indicators
<i>Institutional Investment Allocations</i> – The reaction of long-term investors will point towards the transition pathway uncertainty characteristic of this scenario. Expect investment strategies that maintain significant fossil fuel positions, with parallel commitments to long-term reallocations toward a net-zero portfolio, including through transition financing.
<i>Green Energy Subsidies</i> – A significant increase in government financing for higher-risk clean energy technologies over the medium-term, like energy storage, CCUS, blue/green hydrogen and SMRs, will mark a decisive green pivot that materializes over the medium to long-term.
<i>Stakeholder Polarization</i> – Rising disunity over net-zero commitments and tradeoffs between stakeholder constituencies for institutional lenders and investors will point to the characteristic of an energy transition in this scenario.

Scenario 3: Accelerating Green Transition

Polymakers prioritize an expedited transition to net-zero, and the mitigation of the worst effects of climate change. It presumes the demand for energy has been met.

Overview

This is a future scenario in which the exogenous shocks to fossil fuel markets and the return of energy insecurity trigger an immediate and all-encompassing launch toward a clean energy future. Governments re-commit to existing net-zero targets while limiting or outright prohibiting new investments in fossil fuel production to fill ongoing supply gaps. Policy makers in advanced economies judge the long-term climate risks associated with additional fossil fuel investment and production to be greater than the direct economic costs from near-term higher energy prices, when alleviated through redistributive policies. This calculus amounts to a tactical curtailment of short-term demand on the road to long-term green growth with the confirmation of the decoupling of GDP from carbon emissions. Efforts are further underpinned with sustained technology and wealth transfers from the Global North (developed countries) to cover historical loss and damage, carbon mitigation and climate adaptation.

Detailed scenario narrative

Existing oil/gas production is not everywhere subject to binding limits under **Accelerating Green Transition**, but regulatory measures like aggressive carbon pricing, electric vehicle mandates and purchase incentives, bans on short haul aviation, and caps on industrial energy consumption, are passed across wealthy economies to curtail total energy usage, as a necessary step to meet carbon abatement goals while the rapid deployment of clean solutions proceeds. Governments continue to incentivize green innovation while favouring demand over supply-side interventions to mitigate the economic pain inflicted by high energy prices. Distributional methods such as means-tested emergency transfer payments alleviate upward pressures on the cost of living without incentivizing significant increases in aggregate energy consumption. All these provisions require a massive fiscal expansion in most countries and add to existing post-pandemic debt accumulation and servicing costs. While the ongoing strains of gas market restructuring, and aggressive supply cuts by OPEC+, keep short-term energy prices elevated, cost competitive green alternatives help to alleviate the pressure on fossil fuel importers. Over the medium-term, global benchmark crude and LNG prices fall to averages below \$80 per barrel and \$20 per MMBtu respectively.

The push for *Accelerating Green Transition* creates an unprecedented surge in available public and private funding for research, innovation and deployment of assorted clean energy technologies. Cost-competitive solar and wind capacity is continually expanded in mature and emerging markets alike and coupled with the scaling-up of energy storage solutions like battery storage systems, pumped storage hydroelectricity, and green hydrogen. Investments skyrocket in the supply chains for battery powered electric vehicles and fuel alternatives for aviation, rail and shipping. Public supports also rise for nuclear power generation, including the construction of small modular reactors and investments in fusion research. Critically, natural and artificial carbon capture via reforestation, CCUS and direct-air capture and storage, all receive much greater focus. The drive to mass electrification exerts major stress on legacy energy grids in wealthy states and further highlights the substantial infrastructure deficits in many developing countries. In both cases, the escalating burdens on electricity systems demand the far quicker mobilization and deployment of capital to finance expanded capacity for transmission and distribution.

Accelerating Green Transition presents a range of local and global opportunities for institutional lenders and investors. However, they are tempered with accompanying risks. Banks, insurance companies, and pension funds struggle to navigate the significant uncertainties from unproven gains over the long-term. For some organizations, the consequences for fiduciary duty instigate a stakeholder backlash. The sheer scale of public and private-sector attention and commitments feed a hyper-optimistic narrative around the green transition that increases the likelihood of asset overvaluation and poor due diligence. Furthermore, existing regulatory pressures for better climate disclosure and reporting intensify. Institutions are challenged by the overwhelming emphasis on climate mitigation in public policy.

The breadth, depth, and expediency of the *Accelerating Green Transition* exacts social and labour market disruptions. The meaning of a “just transition” grows ever more salient as the push to net-zero wreaks acute dislocation on local economies tied to fossil fuels, and to sectors requiring significant carbon abatement, like agriculture, transportation and heavy industry. Political resentments grow among oil and gas producing states and regions that are the most detrimentally affected. In federated jurisdictions like the U.S. and Canada, inter-governmental tensions rise. Policymakers face immense political pressure to cushion the disruptions through climate adjustment insurance mechanisms, income transfers and worker retraining programs.

The augmented timeline for net-zero aggravates the emerging “geopolitics of green.” States compete for market share in key technologies, the resources, processes and intellectual property involved in their production, and the global economic clout they confer. The massive rollout of solar/wind electricity generation, energy storage and electric vehicles requires significant increases in the availability of copper, lithium, nickel, rare earths, and related commodities. Many governments look to expedite national resource development projects in response through subsidization and regulatory change.

Physical risks linked to accumulated historical emissions remain a significant challenge, where policymakers in wealthy states respond with equivalent financing to support greater adaptation. Developed countries couple new spending on resilient infrastructure with dedicated public insurance mechanisms to backstop against systemic risks from climatic disaster events. The impressive strides taken on carbon mitigation pay dividends over the medium to long term, however, holding average global temperature rises below 2°C and limiting the most severe climactic effects.

Table 5: Scenario 3 - Accelerating Green Transition Summary of Stress Test Scenario Metrics

Key Tracking Metrics	
Global benchmark price of crude per barrel	<\$80 average over medium time horizon
Global benchmark price of LNG per MMBtu	<\$20 average over medium time horizon
Demand-side restrictions on carbon	Immediate ↑ and acceleration over short to medium time horizon
Fossil fuel infrastructure/clean tech investment growth	↓ is near immediate and sustained over a long time horizon
Green asset inflation	↑ of >10% per year over short to medium time horizon
Inter-values conflicts when investing ("E" vs. "S" vs. "G")	↑ over short to medium time horizon
Bottlenecks in green supply chain	↑ over short to medium time horizon
North-to-South loss/damage, mitigation and adaptation investment flows	↑ over short to medium time horizon

Table 6: Scenario 3 - Accelerating Green Transition Summary of Early Warning Indicators

Warning Indicators
Energy Demand – The course of total demand for fossil fuels in major developed states will be a key signpost for this scenario. Substantial policy measures to cap and reduce total consumption, and a high degree of popular consent for these policies, will indicate a decisive boost in momentum behind the green transition.
Clean Energy Cost Surge – A medium-term surge in absolute prices for clean energy production and electricity generation will be an important marker, indicative of overstretched capacity in the green supply chain.
Green Asset Bubble – Hyper-optimistic investor narratives feed the growth of an asset bubble in the market for so-labelled “green” assets. The likelihood of a significant market correction rises significantly.

SECTION II – DISCUSSION OF THE GEOPOLITICS OF CLIMATE CHANGE

Why has energy insecurity re-emerged in recent years? The private sector and financial institutions had all committed to net-zero targets by 2050 and decarbonization emerged as a top priority for the financial sector. However, the economic and political volatility triggered by the war in Ukraine have instigated policy shifts and, in some cases, slowed transition agendas.ⁱ State decarbonization strategies have been disrupted by efforts to increase energy security, with immediate priorities shifting away from climate action to providing affordable and reliable energy, particularly in Europe.ⁱⁱ

Macroeconomics, Policy and Challenges

Macroeconomic policy over the past few years has undergone a major shift and governments face an ongoing dilemma—support policies to dramatically cut emissions or face volatility in energy. Existing critiques on macroeconomic policy are that they haven't fully factored climate change into their growth calculus.ⁱⁱⁱ The fear that strong climate action will sap short-term economic growth partly contributes to the neglect by macro-economic policy. The direction policy makers may take in responding to climate change despite ongoing energy insecurity is unclear and they face a difficult policy tradeoff. According to the IMF's economic update, "To address energy security concerns, some economies have scaled up reliance on fossil fuels, setting back the green transition."^{iv}

Overall policy makers have been at a crossroads amid these difficult policy tradeoffs. Monetary policy has been tightened amongst G20 economies in order to fight inflation while states have enacted countervailing fiscal measures to ease cost-of-living pressures. These include policies to address energy needs, leading to some economies scaling up the usage of fossil fuels.^v

Geopolitical Motives

Prior to the war in Ukraine, European countries were largely dependent on Russian fossil fuels. European dependency on Russian fossil fuels began in the 1970s during the period of eastward normalization. Following the Russian invasion of Ukraine, NATO countries began the process of decoupling. The U.S and Canada banned all Russian oil imports, whilst European states began the process of phasing out Russian oil imports. In September 2022, the G7 and European Union sought to set a cap on Russian energy revenues and limited their access to shipping and insurance for crude oil. Table 7, below, provides an overview of Russian energy exports globally in 2021 (prior to the Ukraine War).

Russia continues to export oil and gas to emerging markets unencumbered by sanctions (figure 1), albeit at discounted prices. As a result, the Kremlin has still reaped significant net revenues from its energy trade.

i ["Emissions Gap Report 2022: The Closing Window — Climate Crisis Calls for Rapid Transformation of Societies."](#) United Nations Environment Programme (UNEP). October 27, 2022.

ii European Banking Federation and EY, ["Are Volatile Geopolitics and Macroeconomics Disrupting the Path to Net Zero?"](#) *European Banking Federation*, November 9, 2022.

iii Thomas, Vinod. "Mainstream Economic Policy Must Factor Climate Change into Its Growth Calculus." *Brookings*.

iv "G-20 Background Note on the Macroeconomic Impact of Food and Energy Insecurity." International Monetary Fund, March 2023.

v "G-20 Background Note on the Macroeconomic Impact of Food and Energy Insecurity." International Monetary Fund, March 2023.

Table 7: Russian Energy Exports 2021

	OECD Europe	Rest of World	Asia and Oceania
Crude Oil and Condensate	49%	13%	38%
Natural Gas	74%	13%	13%
Coal	32%	13%	53%

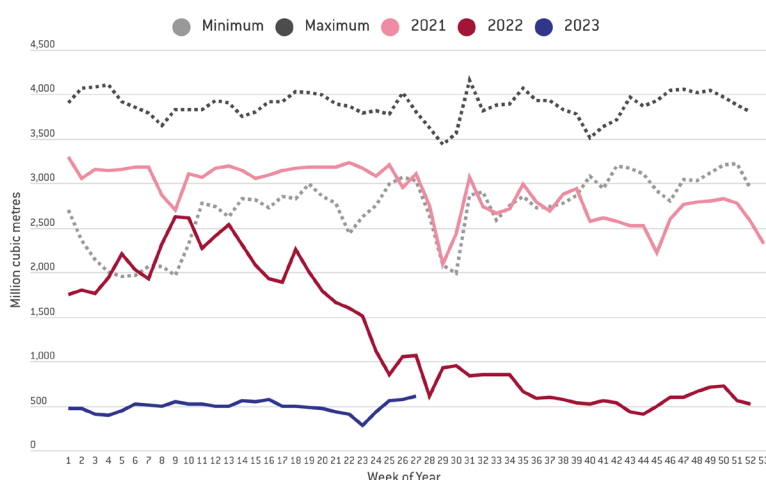
Data source: U.S. Energy Information Administration, based on Russia's export statistics and partner country import statistics published by Global Trade Tracker

Table 8: Average Russian Energy Exports to Europe

	2nd-3rd Quarters 2017-2021	2nd-3rd Quarters 2022-2023
Natural Gas	35.2%	19.9%
Petroleum Oil	29.2%	2%
Coal	38.7%	25.7%

Data Source: Eurostat

Figure 1: Russia Energy Exports Between 2021-2023



Note: Minimum and Maximum lines are prior to 2021

Data Source: Bruegel

Climate Change Explanations

Global and National Level Commitments

The central aspect of the 2015 Paris Accord was to limit global warming to 1.5°C. Member surpass and exceed commitments and countries are free to take risks on how they set their commitments. Global greenhouse gas (GHG)

emissions would need to be reduced by 45% by 2030 in order to reach net-zero levels by 2050.ⁱ

Green energy policy in Europe and North America has undergone a shift and a renewed policy response has emerged to manage climate change and energy insecurity. In 2022, the U.S. Congress passed the Inflation Reduction Act, offering significant

ⁱ Helen Thompson, "The Geopolitics of Fossil Fuels and Renewables Reshape the World," *Nature*, March 11, 2022

incentives for investment in clean energy in the U.S.ⁱ The bill invests in domestic energy production and manufacturing and aims to reduce carbon emissions by 40% by 2030. Additionally, it offers tax incentives for consumers and corporations. Corporations are eligible for energy and climate funding in the form of tax credits, with an estimated \$216 billion worth of tax credits.ⁱⁱ

As a response to the Inflation Reduction Act, the Canadian government will spend \$1.2 billion in 2023 and approximately \$20 billion over five years to compete for clean energy. The Federal government released a plethora of incentives in the form of tax credits, clean electricity grid, and the carbon tax to spur the transition to a clean economy and counter vast subsidies rolled out by the United States.ⁱⁱⁱ

In Canada, natural gas offers a barometer to Canada's choices going forward. To achieve our net-zero emissions targets we may be required to reduce the domestic production of fossil fuels. Canadian lawmakers face a multi-faceted conundrum: move away from natural gas and forego the financial windfalls while facing the risks from further energy volatility and uncertainty in clean energy technology not tested at commercial scales.^{iv}

CONCLUSION

Strategic foresight is a tool to inform decisions and actions through scenarios derived from potential driving forces. Two such competing driving forces the world faces today are the often-competing concerns of energy security and the actions needed to mitigate climate change. This paper presents three plausible, but extreme, views of the way these forces may shape the future.

Organizations should examine their current corporate strategies under a wide distribution of future scenarios to ensure resilience, and keep an eye out for the early warning indicators that lead to these future conditions, as that becomes the signal that a strategic pivot is required.

Scenario planning will be a requirement of OSFI's Guideline B-15: Climate Risk Management. It is already considered an essential component in managing climate risk by the ISSB and OSFI. Regardless, a systemic perspective can capture complex uncertainties such as global shift to a low-carbon energy system within a period of high macroeconomic stress. It allows risk managers to build more flexible and resilient plans and creates the capacity to withstand the unexpected.

i Inflation Reduction Act, 2022.

ii Ibid, Inflation Reduction Act, 2022.

iii "Fiscal Incentives for Canada's Clean Economy: Highlights from the 2023 Federal Budget." Global Risk Institute, March 2023.

iv Leach, Cynthia, Yadhullah, Hussain. "Canada's Conundrum: Three Ways To Address The World's Gas & Climate Crises." *Royal Bank of Canada-Climate*, April 24, 2023.