

STRATEGIC FORESIGHT TOOLKIT FOR RESILIENT PUBLIC POLICY

*A Comprehensive Foresight Methodology to Support
Sustainable and Future-Ready Public Policy*



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PREFACE

In a rapidly changing world characterised by high uncertainty, the need for evidence-informed anticipatory policy making is greater than ever. The increasingly interconnected nature of global systems means that disruptions in one system can cause flow-on shocks in several others. Understanding possible future disruptions, and how they might interact with environmental, technological, economic, social and governance factors, is crucial to effective policy making.

Strategic foresight offers a methodology for anticipating, exploring and shaping the future in a structured and systematic way. It is vital for effective decision-making on complex issues. The OECD's long-standing commitment to strategic foresight reflects the importance the Organisation places on anticipating trends, risks and emerging challenges and opportunities, and using these to broaden thinking about the future.

This toolkit is designed to support countries and organisations in using strategic foresight to design and prepare public policies for a range of possible futures. Underpinned by research and analysis on possible future disruptions, the toolkit provides (i) a practical methodology to bolster the resilience of policy strategies, (ii) background research on possible disruptions to the global policy landscape, and (iii) facilitation guides to assist foresight practitioners in using the toolkit. This work aims to reduce the risks of costly resource misallocation or counterproductive efforts, as well as optimise opportunities for more effective and efficient public policy.



Mathias Cormann

OECD Secretary-General

FOREWORD

The Strategic Foresight Toolkit for Resilient Public Policy (“the toolkit”) presented in this report is designed to help policy makers evaluate the future-readiness of long-term strategies and policies. It was initially conceived as a tool to help governments and organisations develop and/or stress-test their long-term climate strategies, but as the research process advanced it has been expanded to consider a range of policy areas outside the environmental sphere. Recognising that long-term policy objectives require horizontal rather than siloed policy making, the OECD identified several factors – environmental, technological, economic, social and governance – that could, if they materialised, significantly alter the policy landscape in the coming decades. After extensive research, this report proposes 25 such factors (termed “disruptions”).

A tailored process was developed to assist governments and organisations in exploring each of these disruptions, first individually and then in various combinations, to help design and assess policies and strategies against a range of possible futures as part of a structured foresight methodology. This toolkit guides policy makers through the foresight process and provides briefings on the 25 disruptions, giving them all the tools to evaluate the robustness of current policies and strategies to future changes.

ACKNOWLEDGEMENTS

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The OECD sincerely thanks everyone who contributed to the funding and initial discussions, refinements and piloting of this toolkit. Its content was improved by editorial assistance from Romy de Courtaÿ (external editor), figures by Andrew Esson (Baseline Arts) and inputs from OECD colleagues at the Centre for Entrepreneurship, SMEs, Regions and Cities (CFE); Directorate of Communications (COM); Centre for Tax Policy and Administration (CTP); Directorate for Financial and Enterprise Affairs (DAF); Development Co-operation Directorate (DCD); Development Centre (DEV); Economics Department (ECO); Directorate for Education and Skills (EDU); Directorate for Employment, Labour and Social Affairs (ELS); Environment Directorate (ENV); Directorate for Public Governance (GOV); Global Relations and Co-operation Directorate (GRC); Sahel and West Africa Club (SWAC); Centre for Skills (SKC); Statistics and Data Directorate (SDD); Directorate for Science, Technology and Innovation (STI); Trade and Agriculture Directorate (TAD); Centre for Well-Being, Inclusion, Sustainability and Equal Opportunity (WISE); and the International Energy Agency (IEA). We sincerely thank collaborators who shared their expertise in targeted bilateral discussions, and through participation at a number of OECD events. The disruption briefings and the methodology in particular benefited from the feedback of colleagues from the European Environment Agency including Ana Jesus and Vadim Kononenko, the Government Office for Science in the United Kingdom under the leadership of Jack Snape, the government of New Zealand including Huong Nguyen, Cathy Swanson and Katherine Silvester, and Policy Horizons Canada under the leadership of Kristel Van der Elst including Avalyne Diotte, Christopher Hagerman, Evan Larmand, Julie-Ann Turner, Marcus Ballinger, Pierre-Olivier DesMarchais and Steffen Christensen. We also thank pilot partners from the government of New Zealand, the National Economic Development Authority in the Philippines, the Climate Advisory Committee of the City of Calgary, National Development Planning Agency of the Republic of Indonesia and the Lithuanian Government Strategic Analysis Centre, STRATA. Finally, the document was presented to and benefited from feedback from several OECD Committees, Working Parties and bodies, including the Centre for Educational Research and Innovation Governing Board, the Committee for Agriculture, the Committee on Financial Markets, the Committee on Statistics and Statistical Policy, the Corporate Governance Committee, the Development Assistance Committee, the Education Policy Committee, the Employment, Labour and Social Affairs Committee, the Executive Committee, the Environment Policy Committee, the High-Level Risk Forum, the Working Party No.1 on Marco-Economic and Structural Policy Analysis, the Working Party on Biotechnology, Nanotechnology and Converging Technologies, the Trade Committee, the Working Party on Responsible Business Conduct, and the Working Party on Private Pensions.

For further information on strategic foresight at the OECD, you can consult <https://www.oecd.org/en/about/programmes/strategic-foresight> or email foresight@oecd.org.

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EXECUTIVE SUMMARY

In an increasingly complex world, governments and organisations must proactively stress-test their long-term policies and strategies against possible future scenarios. Successful policies and strategies must be designed to thrive under many different possible contexts, and in circumstances where many currently held assumptions are no longer valid. Planning across such timelines is an inherently speculative activity. There is no data about the future. What is known for certain is that the future will be different in surprising ways. It is the duty of governments and other stakeholders to be adequately prepared for the full range of possibilities.

The toolkit provided here is one model for governments and organisations to engage in future-focused public policy. It draws on multisectoral research which could be useful to many foresight and strategic planning teams. The toolkit can help smaller foresight teams undertake far more complex and mature futures work to support robust public policy and lay the foundation for the ongoing integration of anticipatory governance into modern-day operations throughout government.

The toolkit was piloted with government partners in New Zealand, the Republic of the Philippines, Canada, Indonesia and Lithuania, to ensure it has broad applicability across diverse policy domains. It was found to enable governments and organisations to carry out rigorous foresight processes to enhance the resilience of their long-term strategies.

Specific policy opportunities were provided to individual partners, however, to give an example of the types of recommendations that might arise from following this process, we present here a selection of the policy recommendations that arose from these pilots on the topic of net-zero transition policies which feature in the synthesis report of the OECD project Net Zero+: *Climate and Economic Resilience in a Changing World* (OECD, 2023^[1]). These are presented below in two parts: 1) a description of a possible future context that could occur in response to some of the disruptions explored; and 2) potential actions that governments could take to prepare for or prevent these possible futures. This list is not exhaustive or definitive: the takeaways included here are examples of possible futures and policy responses that could be underestimated or overlooked in conventional policy making in the absence of strategic foresight processes.



HIGH-INCOME COUNTRIES SHOULD AVOID CREATING WALLED-OFF GREEN GARDENS

Possible future:

High-income countries successfully achieve net zero domestically, but in ways that undermine sustainable development in low- and middle-income countries. Circular economies boom in advanced economies, with green innovations transforming the landscape of cities in high-income countries. However, firms in low- and middle-income countries are not able to meet environmental standards and lose access to some markets as a result, and green technology transfer is limited. Meanwhile, low- and middle-income countries bear the brunt of extreme weather events and sea-level rise. The result is a large divide between the green and prosperous high-income countries and the strained countries that struggle to cope with climate catastrophes.

Potential policy response:

Governments should integrate a global systems approach throughout climate policies. They should assess the upstream and downstream implications of initiatives to lower domestic emissions in high-income countries, to ensure they do not cause undue hardship in low- and middle-income countries and that net-zero transitions do not leave them behind.



NET-ZERO TRANSITIONS MUST BE INSULATED FROM GEOPOLITICAL CONFLICT

Possible future:

Geopolitical confrontations lead to a breakdown of multilateral co-operation. Separate economic spheres emerge, with little-to-no trade between major economies – even in critical raw materials – and limited technological interoperability. Markets for green technologies shrink and innovations cannot be shared from one sphere to another. Strategies cannot be co-ordinated globally, and countries and spheres blame each other for collective failures to reduce emissions.

Potential policy response:

Given the possibility of serious challenges to multilateralism, governments should strive for global commitments to preserve co-operation in key areas for net zero (i.e. technology transfer) while preparing safety nets (i.e. sufficient redundancy in or stockpiles of critical inputs and functions) in case of a breakdown in global trade. While interconnected economies are highly preferable and countries should be careful not to encourage protectionism, due diligence is necessary to prepare for circumstances where supply chains may collapse.



PROTECTING THE INFORMATION ECOSYSTEM FROM FALSE AND MISLEADING CONTENT ONLINE IS CRUCIAL

Possible future:

Net-zero transitions and other long-term economic development strategies are targeted by misinformation and disinformation campaigns co-ordinated by private actors and authoritarian states, especially those that export fossil fuels. Digital technologies, such as AI language processors, including AI-enabled “deepfakes”, increase the quantity and quality of conspiracy content. The result is a nearly complete democratic paralysis as consensus on most issues becomes impossible without a shared fact base. Polarisation within societies is driven to an extreme where democratic compromise is no longer possible.

Potential policy response:

Given the possibility that information campaigns could target climate strategies, governments should integrate misinformation and disinformation risk assessments into all major climate initiatives and implementation plans. To mitigate the risks, governments should invest proactively in communications plans for climate initiatives to push the widespread adoption of sustainable products and behavioural changes.



URGENT AND UNPRECEDENTED BEHAVIOURAL CHANGE MAY BE NECESSARY

Possible future:

Worsening storm surges and heat waves wreak havoc on large parts of the global population. The destruction of infrastructure and interruption of supply chains create the need for drastic changes in lives and lifestyles, including relocation and a substantial reduction in consumption. Governments are forced to mandate strict and unprecedented behavioural changes to manage the climate emergency and have begun to face a substantial backlash for these measures, bringing a heightened worry of societal breakdown.

Potential policy response:

Governments must be prepared to take rapid large-scale action to meet climate targets or respond to catastrophic weather events, exploring ways to grow their legitimacy to act in case large-scale behavioural change policies are needed. Buy-in and understanding could be built through tools such as citizens’ assemblies, and supported through a public narrative focusing on green jobs and the wartime-like mobilisation necessary to address the climate emergency.



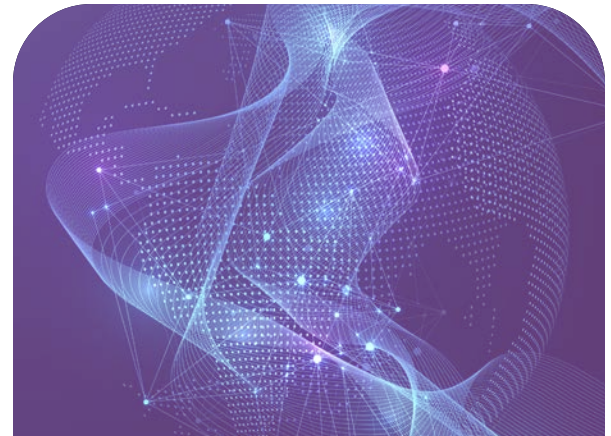
SAFE AND TRUSTED AI DEVELOPMENT IS KEY

Possible future:

AI is deployed with great success in the fight against climate change, leading to breakthroughs in green technologies; better co-ordination of climate policies; and a far greater capacity to monitor climate conditions, emissions and weather patterns, as well as numerous other areas related to climate mitigation, adaptation and financing green technologies. The efficiency gains enabled by AI have brought substantial increases in job losses due to automation, invasive surveillance to suppress democratic engagement in and beyond authoritarian states and unexplainable or unpredictable errors that perpetuate biases and socio-economic harms by black-box algorithms charged with governing complex socio-economic systems.

Potential policy response:

Given that AI will likely play an important role in facilitating net-zero transitions, governments need to proactively address the social impacts and technical safety risks associated with advanced AI systems. AI safety and controllability mechanisms need to keep pace with advances in AI systems, to ensure there will be adequate trust and reliability to adopt such systems in key infrastructure and other areas critical to reaching climate goals.



PROMOTE COMPETITION RATHER THAN MARKET CONCENTRATION

Possible future:

Massive investment in the green and digital transitions benefits only a few incumbent companies, concentrating considerable market and political power and resulting in accusations of profiteering from populations experiencing significant hardship due to climate change. In this scenario, extreme corporate concentration could lead to situations where some corporations or individuals exercise nearly complete control over quasi-essential services or infrastructure, giving them incredible leverage to shape public policy to suit their interests at the expense of broader societal benefit.

Potential policy response:

To prevent net-zero strategies from creating harmful inequalities of opportunity, governments should design strategies that promote competitive markets (particularly in sectors that are highly reliant on government investment) and ensure that returns on public investments are widely distributed to safeguard social cohesion and public support. This may include the need for returns that factor in the price of non-pecuniary outcomes related to social cohesion. In instances where concentrations of power cannot be avoided, transparent processes for engaging and negotiating with the most powerful non-state actors to secure their co-operation throughout the just transitions could become a crucial factor in the success of net zero.

REFERENCES

OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, <https://doi.org/10.1787/da477dda-en>.

READER'S GUIDE

This toolkit contains three parts designed to guide governments and organisations to carry out a rigorous foresight process to enhance the resilience of their long-term policies and strategies.

PART 1. APPROACH AND METHODOLOGY

The first part of the report provides the methodology developed to support multidisciplinary public-policy processes. The toolkit methodology features five modules, which guide organisations to (i) identify their core assumptions about the future, and how they might be challenged by possible disruptions; (ii) explore the consequences of multiple different disruptions occurring simultaneously; (iii) create reference scenarios; (iv) use scenarios to stress-test long-term strategies and policies; and (v) develop future-ready action steps for today, to increase long-term resilience and the chances of meeting policy objectives. The five modules are designed as sequential steps in a comprehensive foresight process. They can also be unbundled and run as stand-alone sessions, increasing the utility of this toolkit by allowing organisations to select different components to suit their individual needs when developing long-term strategies.

The report then presents case studies of the application of the toolkit to current public-policy challenges.

PART 2. POSSIBLE FUTURE DISRUPTIONS

The second part of the report provides briefings on each of the 25 disruptions that make up the toolkit's core building blocks. Disruptions are grouped across the six domains: environmental, social, technology, economic, green technology and geopolitical. Given its importance for policy futures, "green technology" was added as a separate domain. Each disruption represents a plausible extreme development which, should it occur, would significantly change the policy landscape in the 2030-50 timeframe. Short briefings on each disruption were drafted in consultation with OECD subject-matter experts, futurists and leading foresight practitioners from around the world. Each disruption briefing describes the current context and the emerging evidence that this disruption could grow in importance. The briefings then look to the future, imagining how differently the world might look between 2030 and 2050 should this disruption be pushed to its plausible extreme. Finally, the briefings feature an analysis of possible policy options relevant to this disruption, both in terms of actions that could be taken today to ensure better preparedness, and future responses or contingency plans that could become necessary should this disruption unfold.

PART 3. FACILITATION GUIDES

To assist foresight practitioners in using the toolkit, the report provides detailed facilitation guides for each of the five modules. These present suggested agendas, discussion questions, and guidance on factors such as the optimal number of participants and how to ensure a productive flow of discussions.

ABBREVIATIONS AND ACRONYMS

| | |
|-------------------------|--|
| <i>AI</i> | Artificial intelligence |
| <i>AR</i> | Augmented reality |
| <i>BRICS</i> | Brazil, Russian Federation, India, People's Republic of China (hereafter "China") and South Africa |
| <i>CCU</i> | Carbon capture and utilisation |
| <i>CO₂</i> | Carbon dioxide |
| <i>ESG</i> | Environmental, social and governance |
| <i>EU</i> | European Union |
| <i>EUR</i> | Euro |
| <i>IEA</i> | International Energy Agency |
| <i>IFCMA</i> | Inclusive Forum on Carbon Mitigation Approaches |
| <i>IPCC</i> | Intergovernmental Panel on Climate Change |
| <i>NDC</i> | Nationally determined contributions |
| <i>NZE Scenario</i> | Net Zero Emissions by 2050 Scenario |
| <i>OPEC</i> | Organisation for Petroleum Exporting Countries |
| <i>PESTLE</i> | Political, economy, society, technology, legal and environment |
| <i>R&D</i> | Research and development |
| <i>SME</i> | Small and medium-sized enterprise |
| <i>STEEG</i> | Society, technology, economy, environment and governance |
| <i>UK</i> | United Kingdom |
| <i>UN</i> | United Nations |
| <i>US</i> | United States |
| <i>USD</i> | United States dollar |
| <i>VR</i> | Virtual reality |
| <i>WHO</i> | World Health Organization |
| Units of measure | |
| <i>Gt</i> | gigatonne |
| <i>GW</i> | gigawatt |
| <i>Min</i> | minute |
| <i>Mt</i> | million tonnes |



APPROACH AND METHODOLOGY



Strategic foresight is an approach that involves thinking about the future systematically and proactively developing strategies in the present to prepare for long-run uncertainty. It allows policy makers to **move beyond extrapolating from current trends** and consider instead how they would deal with often radical changes in global systems. Strategic foresight is used by a number of organisations globally (Box 1.1). **It does not attempt to predict a single most likely future, but rather, to explore a range of possible futures.** By imagining and then rehearsing for multiple different possible futures, policy makers can sharpen their understanding of the assumptions underlying their current strategies and anticipate how these might be exposed to various disruptions.

Planning for public policies that might be implemented over the very long term is a challenge that is ideally suited to the use of strategic foresight. Policies will need to evolve over multiple decades and will have flow-on implications beyond the sector for which they are designed. The world in 2030, 2040 and 2050 will look vastly different from the present, often in surprising ways that are not easy to predict – hence the need to design policies in the present that will be readily effective in a wide range of potential future contexts. The 2030–50 timeframe was selected because it allows exploring an emerging future possibility that would be still under development. This enables discussions on the internal tensions and conflicts that might emerge should this future come to bear.

BOX 1.1. *Foresight around the world and at the OECD*

Interest in foresight for public policy is increasing globally. In 2019, the European Commission nominated a vice president in charge of strategic foresight and asked each Member State to designate a “Minister for the Future”, supported by the work of the European Union (EU)-wide Foresight Network, which operates at both political and administrative levels, acknowledging the need to embed strategic foresight and long-term thinking in EU policy making (European Commission, 2017^[1]). The United Nations (UN) Secretary-General’s Our Common Agenda report lists strategic foresight among the quintet of capabilities that will guide the evolution of the United Nations over the coming generation and held the “UN Summit of the Future” in 2024.

The OECD has long championed the use of strategic foresight to inform and improve public policy. Pioneering futures-related work by the OECD in the 1960s and 1970s included significant efforts to explore alternative scenarios for the economy and environment, societal change, development and international collaboration. This work laid the foundation for the creation of the International Futures Programme in 1990, which aimed to help decision-makers in government and industry assess the economic, social and technological trends shaping the future. This involved conducting influential foresight studies in areas of common global concern and led to the establishment of important new areas of work for the Organisation.

Over the past decade, the OECD has expanded foresight practices across many areas of its mandate. Significant foresight and futures-focused initiatives have supported the work of many directorates and committees, including in development and development co-operation, education, employment, environment, migration, cities and rural areas, policy innovation, science and technology, tax, tourism and transport.

The [OECD Strategic Foresight Unit](#) is embedded in the Office of the Secretary-General. It helps drive the adoption of strategic foresight across the Organisation and brings a stronger “futures focus” to the global dialogue on key policy issues. The Unit leads collaborative foresight processes with OECD directorates and committees on cross-cutting futures-related issues relevant to multiple policy areas and develops common foresight outputs to support OECD member countries.

The [OECD Government Foresight Community](#), led by the OECD Strategic Foresight Unit, brings together leading foresight practitioners from governments and international organisations around the world to exchange experience and best practices, build awareness of the importance of foresight for policy making and strengthen best practices.

USING STRATEGIC FORESIGHT TO SUPPORT PUBLIC POLICY RESILIENCE

The Strategic Foresight Toolkit for Resilient Public Policy (“the toolkit”) was developed by the OECD Strategic Foresight Unit through a participatory multi-stakeholder process. The toolkit guides countries and organisations through a set of possible future disruptions. It then takes participants through a set of five modules (Figure 1.1) where the individual disruptions act as building blocks for developing a set of scenarios in which different combinations of disruptions occur, presenting different policy challenges and opportunities.

This methodology encourages policy makers to explore how the various possible disruptions might co-occur and interact in sometimes counterintuitive ways. It then guides them through the process of designing a contingency plan not just for the expected future, but for a variety of potential futures.

The evidence-informed building blocks supporting the toolkit are 25 disruptions with broad socio-economic implications beyond a single policy area (Figure 1.2). Pushed to their plausible extreme, these disruptions could radically alter the policy landscape over 2030-50, influencing the ability to meet long-term policy goals. The disruptions identified are not exhaustive of all possible future changes and may be updated over time as new drivers of change begin to emerge.

The disruptions were identified and developed with inputs from relevant OECD directorates, expert foresight practitioners and thematic specialists. A preliminary list of disruptions was developed in consultation with OECD experts and members of the OECD Government Foresight Community, and further explored during expert interviews and thematic workshops. Both workshops and expert interviews helped frame the disruptions and explored the most important policy implications globally. Early versions of the toolkit were improved through a piloting process with several national and local governments in both OECD member countries and non-member economies.

Developing future-ready public policies requires exploring possible future disruptions, but awareness alone is not enough. Strategic foresight processes must seek to convene the necessary components of the system under investigation. Since the toolkit aims to stress-test existing public policies, participants should be key policy and/or thematic experts who can discuss the topic in detail. During this process, participants are invited to reflect on how existing policies might perform in the radically different futures presented in the toolkit and discuss ways these might need to be adjusted to address each of these futures. Taking a holistic view of the adaptations needed across a series of plausible futures, while always being grounded in data and metrics to the greatest extent possible, allows policy makers to perceive common factors and tensions they might not otherwise have noted. The ultimate aim is to develop a policy that is robust to the broadest range of possible futures and explicit about the future conditions under which the policy might need to be revisited.

There exist many different foresight methodologies and toolkits (Box 1.2). The toolkit presented here provides detailed instructions, facilitations guides and background briefings on one approach designed to allow policy makers to evaluate how robust their current policies and strategies are to possible future changes.

Each of the disruptions presented in the toolkit illustrates how a specific uncertainty in one sector could plausibly play out, with surprising implications for many other policy areas. The disruptions include uncertainties related to the environment and green technology, changes in societal norms and values, geopolitics, climate, technology and the economy. Each disruption draws on evidence of emerging developments and explores what their exponential growth or extreme manifestations could look like in the coming decades. The disruption briefings include a synthesis of some of the notable implications identified in the workshops, although these are not comprehensive.

FIGURE 1.1.

Five-module foresight process to stress-test public policy



FIGURE 1.2.

Disruptions that could change the policy landscape in 2030-50

ENVIRONMENT

HOTHOUSE EARTH

Multiple cascading environmental tipping points are crossed, shifting the focus from climate mitigation to emergency adaptation

SILENT SPRING

Large-scale species loss drives ecosystem collapse

SEA-LEVEL RISE

Runaway ice sheet collapse leads to significant sea-level rise and the displacement of millions of coastal and island residents.

HEAT WAVES

Hundreds of millions of people experience deadly heatwaves on a nearly annual basis, making some regions uninhabitable

CLIMATE DESPAIR

Concern about climate change creates a global mental health crisis

TECHNOLOGY

BIOTECH BREAKTHROUGH

Advances in biotechnology alter scarcity dynamics, means of production and dependence on fossil fuels

ARTIFICIAL INTELLIGENCE LEAP

More rapid than expected advances in AI lead to transformational new capabilities with impacts across all elements of society

CYBER SLOWDOWN

Cyberattacks and other factors lead to a general distrust and rejection of technology

VIRTUAL WORLDS

The metaverse goes mainstream and most people's waking lives now take place in virtual reality

GREEN TECH

GREEN TECH FAILURE

Technological progress on green tech disappoints, placing greater pressure on behaviour changes to address climate crisis

CAPTURED CARBON

Carbon capture, use and storage technology advances faster than expected, changing carbon reduction dynamics

TRANSPARENT ENVIRONMENT

Large volumes of environmental data from real-time sensors are made publicly available globally, enabling far reaching oversight

ECONOMY

WELL-BEING ECONOMIES

Development models focusing on psychological well-being supplant those based on material consumption while youth select life paths that prioritise fulfilment over personal profit

ACCELERATED CONVERGENCE

The diffusion of technological infrastructure leads to global upskilling and significant leapfrogging by low and middle-income countries, closing the gap in incomes with the developed world

ENVIRONMENTAL-INDUSTRIAL COMPLEX

The global economy becomes inseparably linked to green technology companies, which have become the world's largest

CRYPTO CENTURY

Digital technologies like AI and blockchain break down the advantages of large organisations enabling highly decentralised forms of governance and value chains

GEOPOLITICS

TECH TITANS

A small number of global technology companies function as one-stop shops for every aspect of life and play a central role in global governance

REGIONAL CONFLICTS

Several regional conflicts flare up on multiple continents simultaneously and require urgent global action to resolve

DIVIDED WORLD

West-China tensions accelerate dramatically and split the world into two separate digital and economic ecosystems forcing the rest of the world to choose a side

MULTITRACK WORLD

Several parallel country clusters emerge each with their own digital, social, and economic ecosystems leading to a large-scale movement away from globalisation

RISING AUTHORITARIANISM

Popular anxiety at the state of the world, exacerbated by social media, sees authoritarians rise to power in multiple Western democracies

SOCIAL

CONSPIRACY CHAOS

Conspiracy theories grow substantially in uptake, undermining democratic functioning

INDIGENOUS REIMAGINING

Indigenous-led social movements change philosophical paradigms in several countries, including giving nature equal status to humans under law

CRUELTY-FREE SOCIETY

A major ethical shift in humanity's relationship to animals occurs, leading to large-scale shifts in food consumption, production, and land use

GREEN RADICALISATION

Disenchanted environmental activists undertake escalating disruptive actions globally, including targeted destruction of property and occasional violence

BOX 1.2. Other foresight toolkits and resources

Many organisations around the world regularly publish strategic foresight toolkits, which can complement the approach proposed here. The OECD “Observatory of Public Sector Innovation Toolkit Navigator” (OECD_[2]) is an online compendium of toolkits dedicated to public-sector innovation and transformation which provides a comprehensive overview of available resources.

The European Commission publishes a series of Strategic Foresight Reports. Its Competence Centre on Foresight has developed a horizon-scanning project identifying emerging issues, weak signals of change, and events that could lead to changes in behaviour, strategy or policy, as well as a scenario-exploration system. The Commission’s Megatrends Hub (European Commission’s Competence Centre on Foresight, 2022_[3]) provides summaries of key megatrends; the related Megatrends Assessment Tool can be used to examine how systemic change could impact the future of a chosen policy area. Among the topics covered are diversifying inequalities, the increasing significance of migration, aggravating resource scarcity, the growing influence of new governing systems, continuing urbanisation, increasing demographic imbalances, climate change and environmental degradation, the diversification of education and learning, the changing nature of work, accelerating technological change and hyperconnectivity, growing consumerism, shifting health challenges, the expanding influence of east and south, and the changing security paradigm. Finally, decision-makers can use Reference foresight scenarios: Scenarios on the global standing of the EU in 2040 (Vesnic Alujevic, Muench and Stoermer, 2023_[4]) to heighten their organisations’ preparedness under increasingly unpredictable circumstances.

Singapore’s Driving Forces Cards (Centre for Strategic Futures, 2022_[5]), developed by the Centre for Strategic Futures, is an extensive collection of materials that offer alternative ways to think about what the future might look like in 2040. The collection features 17 “driving forces cards”: superpowers in motion, globalisation and growth, financial fragility, the geopolitics of the energy transition, the redistribution of (un)natural endowments, global demographic shifts, mind the metropolis, firms in flux, labour interrupted, families we choose, the augmented self, shifting knowledge infrastructure, data and digital connectivity, alt-networks, weapons of mass disorientation, tribal world and the evolution of governance. In addition, there are five wild cards on events with potentially transformative implications: 20 000 minerals under the sea, geological reckoning, advances in immortality, solar superstorm of the century and biological chaos.

In Finland, Sitra’s Megatrends 2023 (Dufva and Rekola, 2023_[6]) reviews five thematic areas and where they could be headed in the future: eroding nature’s carrying capacity, growing well-being challenges, intensifying battle for democracy, gearing up competition for digital power and cracking economic foundations. The report also includes a section on practical tips for engaging with these megatrends and integrating them into strategic thinking in different settings.

Global Trends 2040 (National Intelligence Council, 2021_[7]), a publication of the US National Intelligence Council, assesses the trends and uncertainties that will shape the strategic environment for the United States to help prepare policy makers for an array of possible futures over the next two decades. The report begins by examining structural forces in demographics and human development, environment, economics and technology. It then analyses how these structural forces and other factors, combined with human responses, affect emerging dynamics in societies, governments and the international system. It concludes by identifying five plausible scenarios for 2040: the renaissance of democracies, a world adrift, competitive coexistence, separate silos, and tragedy and mobilisation.

The UK Government Office for Science’s Net Zero Society: Scenarios and Pathways (UK Government Office for Science, 2023_[8]) explores how societal changes could affect the United Kingdom’s path to net zero. The Net Zero Society project and the OECD’s work on the Strategic Foresight Toolkit for Resilient Public Policies began at similar times, and the project teams for both discussed their complementary approaches at length. The Net Zero Society project develops four scenarios covering differing levels of economic growth, technological change, institutional trust and social cohesion: atomised society (high growth due to technology change, low trust); self-preservation society (low growth and technological change, low trust); slow-lane society (low growth and technological change, high trust); and metropolitan society (high growth and technological change, high trust).

Sources:

(OECD^[2]), "Observatory of Public Sector Innovation Toolkit Navigator", https://oecd-opsi.org/toolkits/?toolkit_discipline_or_practice=strategic-design

(European Commission's Competence Centre on Foresight, 2022^[3]), European Commission Megatrends Hub, https://knowledge4policy.ec.europa.eu/foresight/tool/megatrends-hub_en

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The toolkit presents a five-module strategic foresight process, in which policy makers can reflect on how each of the disruptions could affect their domains of expertise and then build reference scenarios against which current policies can be stress-tested.



MODULE ONE

In Module One, participants explore a diverse set of possible future disruptions. This allows them to immerse themselves in different possible futures and reflect on the wide-ranging implications of each.



MODULE TWO

In Module Two, participants are led through a cross-impacting exercise examining the possible interactions between pairs of disruptions. They then identify some of the core strategic assumptions guiding policy thinking within their organisation and discuss which of the disruptions (or disruption pairs) could undermine those assumptions.

Not only do modules one and two build familiarity with relevant disruptions, but they also allow exploring possible changes more broadly (Box 1.3, Case study 1). They are expansive exercises where participants imagine a multitude of ways in which the future could be different from what they expected. These exercises also help participants become familiar with the domains covered in the disruptions, and how they may relate to their areas of expertise and even their personal lives.



MODULE THREE

Once participants are comfortable exploring the future, Module Three returns to the foundational assumptions as the basis for scenario co-creation. Collections of disruptions that could be expected to co-occur in ways that undermine each assumption become the core thread for a scenario-building exercise. The participants weave the various disruptions together into a coherent and plausible narratives about the future. This part of the process helps participants identify vulnerabilities or limitations of the assumptions guiding policy in their domain (Box 1.3, Case study 2).



MODULE FOUR

In Module Four, participants develop an action plan for each specific scenario. The session begins with participants identifying the specific challenges and opportunities each scenario could bring in various key areas. Participants then discuss what actions they would take today if they knew this future was going to unfold. This is the first time that participants begin proposing actions and solutions. This delay helps limit the tendency towards proposing surface-level technical solutions to challenges that might require a more foundational shift to solve. Participants take the time to internalise what is different about the specific future, and what might need to change in their approach to policy making (Box 1.3, Case study 3). The scenario-specific strategy articulates how an organisation could achieve its best-case scenario under difficult

possible circumstances. This builds conceptual resilience by helping participants see what they can do and achieve, even in uncomfortable hypothetical situations. The scenario-specific strategies include high-level goals as well as sector-specific recommendations for action today.



MODULE FIVE

Developing strategies for a single scenario only is insufficient for future-ready policy making, because there is no way of knowing which of the scenarios – if any at all – will play out. **The purpose of Module Five, therefore, is to develop recommendations for action steps that can be taken today and are scenario-agnostic.** Participants go through the process of comparing and contrasting the scenario-specific strategies. They then assess whether the recommended actions in each of these would be negatively affected should a different scenario play out. If not, then these actions are deemed to be ‘no-regrets’ policies and endorsed as contingency plans for a range of possible futures (Box 1.3, Case study 4).

If there are conflicts between the optimal approaches for two or more scenarios, participants must develop a “good bet” strategy where they weigh the trade-offs between approaches and decide how best to position themselves despite the uncertainty. This involves making a subjective assessment of the plausibility, assessing the potential impact and the level of uncertainty of one outcome or another, and determining which variables could be monitored to assess whether the likelihood of one scenario or another is increasing. This often takes the form of contingency plans for potentially challenging scenarios that policy planners may not yet have adequately considered (Box 1.3, Case study 5).

At the end of the modules, participants should have a clearer understanding of which policy options are best equipped to be robust and resilient across a wide range of possible futures. This process can both help identify innovative policy actions that had not yet been as strongly considered or validate that existing ideas within the organisation were well-equipped to withstand disruption. The results of the process should be written up in a concise and accessible final report highlighting the key findings, insights and policy implications. The report should include a brief overview of the methodology, emphasising challenging assumptions and scenario co-creation.

BOX 1.3. *Case studies and policy outcomes from piloting the toolkit*

The toolkit was successful in identifying novel policy opportunities when piloted with partners in New Zealand, the Republic of the Philippines, Canada, Indonesia and Lithuania. Full summaries of these pilots, and the policy opportunities arising from them, have been provided to the partner countries and are not given here.



CASE STUDY 1. *Inclusion and well-being pay off in New Zealand*

In February 2022, a group of 60 participants drawn from ministries across the New Zealand Government participated in the first pilot test of the toolkit. The exercise helped raise the profile of the issues covered by the disruptions and across governmental areas. It also allowed the consideration of academic and civil-society perspectives in the government’s long-term strategic thinking. The workshops focused in particular on the knock-on effects of greater integration of well-being and indigenous knowledge into economic and environmental policy making in New Zealand, including how this could help build resilience to a wide range of challenging future scenarios.



CASE STUDY 2. *Foresight increases buy-in for implementation of the climate strategy in Calgary, Canada*

In February and March 2023, the OECD worked with the Climate Advisory Committee of the City of Calgary in Alberta (Canada) to stress-test the implementation plans for the Calgary Climate Strategy. After exploring disruptions and building scenarios, participants highlighted insufficient awareness among policy makers and the public about the potential scale of investment required to deliver a green transition in some of the more challenging economic scenarios, as well as the potential for large deviations from the city’s assumptions about its future population in different possible futures. Participants identified a need for collective reflection on the city’s identity and discussed the possibility of creating spaces for participatory processes to explore various visions for the future of Calgary, ensuring greater buy-in for the implementation of its Climate Strategy.



CASE STUDY 3. *A green economy masterplan for the Philippines*

In August 2022, the National Economic Development Authority of the Philippines partnered with the OECD Strategic Foresight Unit to engage in a strategic foresight process using the toolkit to support the drafting of the Philippine Development Plan. The process involved 70 civil servants from several departments and agencies within the Philippine government, as well as representatives from several domestic regions with roles in shaping medium- and long-term strategy development for the Philippines. Participants identified several policies that would better position the Philippines in the long run, including mainstreaming sustainability and resilience in forward-looking policy evaluation. A discussion on the economic implications of the “artificial intelligence (AI) leap” disruption raised discussions about the possibility of a substantial decline in jobs related to business-process outsourcing, a major industry in the Philippines. The need to diversify economic opportunities and take advantage of the country’s biodiversity and natural capital led to a recommendation to adopt a master plan for the green and blue economy.



CASE STUDY 4. *Nature-based solutions for cost-effective sustainable development in Indonesia*

In March 2023, the OECD Strategic Foresight Unit partnered with the Ministry of National Development Planning (“Bappenas”) to run an exercise to future-proof Indonesia’s National Long-Term Development Plan, a comprehensive national development planning document for 2025-45. This ambitious plan aims to help Indonesia become the world’s fifth-largest economy and take major steps towards reaching net-zero emissions by 2060. The process involved a multi-stakeholder group of participants from Bappenas and key ministries involved in infrastructure for transportation, industry and the economy. Participants highlighted the important role nature-based solutions could play in ensuring environmental resilience in cost-effective ways in the event of worst-case climate scenarios as well as in more positive futures. Supporting nature-based solutions was a clear example of a “no-regrets” policy option to better position the country for the long run.



CASE STUDY 5. *Anticipating skills needed by future civil servants in Lithuania*


In November 2023, the OECD Strategic Foresight Unit partnered with the Lithuanian Government Strategic Analysis Centre, STRATA. STRATA is an expert institution that provides the Lithuanian government and ministries with an independent, research-based information required to make evidence-based public policy decisions. The toolkit methodology was used to support the civil service in identifying the skills that might be needed by future civil servants in Lithuania. The foresight process was designed to provide direction on how future disruptions might influence all elements of the nation, including government, society and the business community, and how these changes might alter citizens’ expectations of government service delivery. This process helped participants to reflect on unexpected possible futures, such as those where accelerated AI-driven automation brings abundance that helps meet the material needs of citizens but causes increased unemployment. This led to discussion of ways to promote meaning and fulfilment among Lithuanian citizens in a world where demand for labour drops off far beyond conventional expectations. Participants worked to develop strategies for skills development that could account for this radically altered future without jeopardising the development of skills needed for the economy today.

ADAPTATION AND REPORTING

Although the five-module toolkit methodology is a series of complementary steps, practitioners should feel free to experiment and adapt the methodology to suit their context and purposes. For example, Module One or Two can be used as standalone modules to build strategic foresight capacity in a “learning-by-doing” approach under time constraints. Organisations that have existing scenarios may be able to use these and begin the process at Module Four.

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- Vesnic Alujevic, L., S. Muench and E. Stoermer (2023), *Reference foresight scenarios: Scenarios on the global standing of the EU in 2040*, Publications Office of the European Union, <https://doi.org/10.2760/11879>. [4]



POSSIBLE FUTURE DISRUPTIONS

OVERVIEW

Each of the disruptions outlined in this part was the result of an extensive strategic foresight research process that included horizon scanning and interviews with policy experts, foresight analysts, futurists, science fiction writers and thematic specialists. Their implications were refined through expert workshops and consultations within the OECD and with the OECD Government Foresight Community. Each disruption illustrates a plausible extreme in one domain and explores some of its most important potential implications in other policy areas. None of these disruptions are predictions: they are evidence-informed possibilities that warrant consideration and potential contingency planning by policy makers. This work makes no judgements about which disruptions are most likely or should be prioritised by policy makers.

EACH OF THE DISRUPTIONS INCLUDES SIX SECTIONS:

1. **“Possible 2030-50 disruption”** gives a brief description of a possible future in which a large-scale disruption has occurred.
2. **“Context”** highlights the major uncertainties related to the domain explored in the disruption.
3. **“Emerging evidence”** identifies signs in the present that the disruption is plausible and, in some cases, may already be occurring at a small scale.
4. **“Possible future”** synthesises some of the ways in which the disruption could reshape the world, highlighting sectors that could be especially impacted. The possible implications of the disruptions highlighted here are inherently speculative and not comprehensive. Readers are encouraged to think of other knock-on effects that could stem from these individual disruptions. Many more possible implications for each of these disruptions were raised during the workshops.
5. **“Policy options in the future in the event of this disruption”** explores hypothetical reactions governments could take in the future should a disruption occur. This section is an inherently speculative look, based on consultations with experts and participants in foresight exercises, at possible government responses in a hypothetical future.
6. **“Policy options today to be better prepared for this possible disruption”** supports better policy making today, underpinned by the evidence-informed policy advice identified in the research process. This section is mainly based on OECD analysis of potential actions to ensure countries are better prepared to seize the opportunities and mitigate the risks associated with each of the disruptions.



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POSSIBLE FUTURE DISRUPTIONS
ENVIRONMENT



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Crossing climate tipping points fuels an environmental catastrophe

POSSIBLE 2030-50 DISRUPTION

The planet crosses multiple, cascading environmental “tipping points”, thresholds beyond which the Earth’s system reorganises in abrupt and irreversible ways. Dangerous warming is inevitable regardless of any further human action to reduce greenhouse gas emissions, and the short timeframes over which the change occurs defies the ability of human societies to adapt to environmental pressures. The global focus has shifted from avoiding climate change to bracing for, and adapting to, a near-worst-case scenario over the coming decades.

CONTEXT

Current international agreements and mitigation plans are predicated on the assumption that irreversible tipping points will not be crossed. When the Intergovernmental Panel on Climate Change (IPCC) initially introduced the concept of “large-scale discontinuities” two decades ago, it was thought they were only likely to occur at over 5 degrees Celsius (°C) of global warming relative to pre-industrial levels. Recent research suggests that some tipping points could be crossed at far lower temperatures, and current levels of global warming (~1.1°C) are already within the range of uncertainty for 5 of the 16 climate-system tipping points identified (Figure 2.1): Greenland ice sheet collapse, West Antarctic ice sheet disintegration, low-latitude coral reefs die off, Boreal permafrost abrupt thaw and Labrador Sea convection collapse (OECD, 2022^[1]) (McKay et al., 2022^[2]). While the implications of crossing tipping points are not fully understood, the effects could be catastrophic and last from centuries to millennia (Lee et al., 2021^[3]).

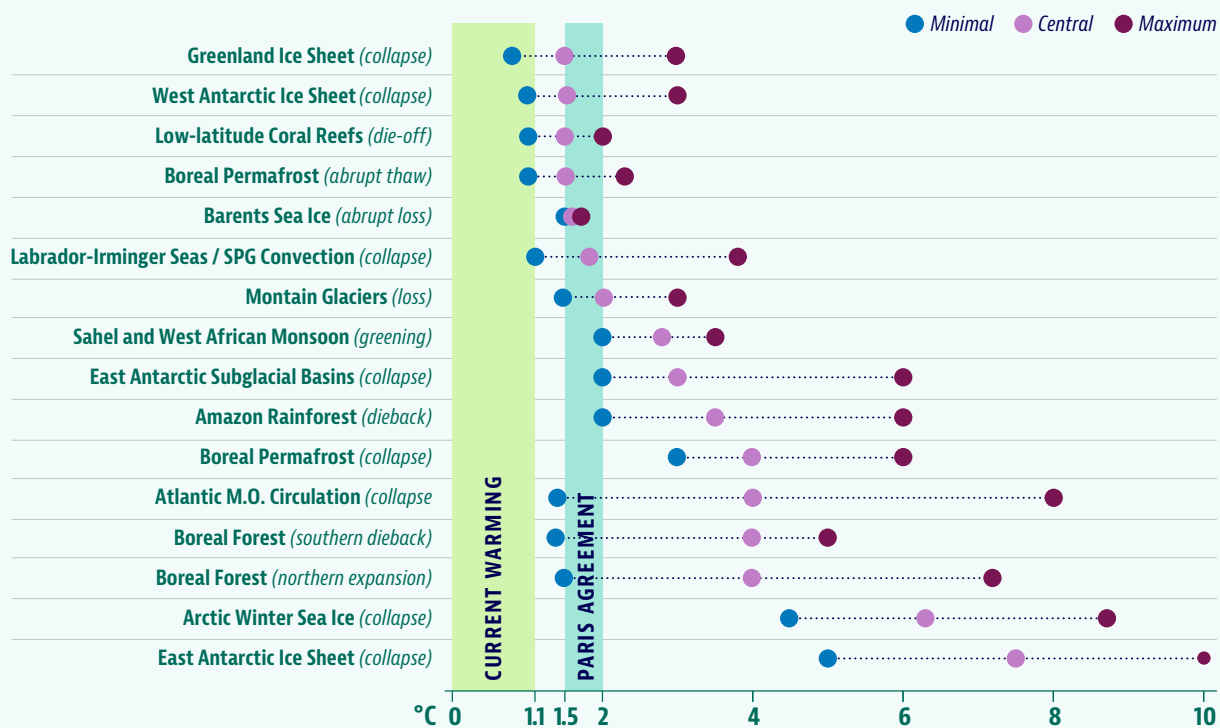
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EMERGING EVIDENCE

- » The slowing of the Atlantic Meridional Overturning Circulation (AMOC), which circulates water and warmth to different areas of the globe, has been occurring for the last two decades (Good et al., 2018^[4]). The AMOC is now the slowest it has been in over a millennium (Caesar et al., 2021^[5]; Boers, 2021^[6]).
- » The Amazon rainforest, historically an important carbon sink, has become a net-carbon emitter in recent years. This is thought to be due to the intensification of the dry season and an increase in deforestation that generates ecosystem stress, causes increases in fire occurrence and results in higher carbon emissions (Gatti, 2021^[7]). There are indications that the effectiveness of other forests as carbon sinks is also declining (United Nations Economic Commission for Europe, 2023^[8]).
- » Research suggests the Amundsen Sea embayment in West Antarctica might have passed a tipping point, with the line where ice, ocean and bedrock meet retreating irreversibly. Modelling suggests that if this ecosystem collapses, it could destabilise the entire West Antarctic ice sheet (Meredith, 2019^[9]).
- » In 2023, the White House released a report that highlights the need for research on the impacts and consequences of, as well as the need for international collaboration on, solar radiation modification (Office of Science and Technology Policy (OSTP), 2023^[10]). That same year, the European Commission announced it would support international efforts to assess the risks and uncertainties of geoengineering, including solar radiation modification and promote discussions on a potential international framework for its governance, but more recently advised that the EU's position should be to not deploy these technologies (European Commission, 2024^[11]).

FIGURE 2.1. Risks of crossing climate tipping points are rising

Threshold estimates affecting environment elements by type of effect, in Celsius (°C), relative to pre-industrial levels



Source: (McKay et al., 2022^[12]) in (OECD, 2022^[13]), *Climate Tipping Points: Insights for Effective Policy Action*, <https://doi.org/10.1787/abc5a69e-en>

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POSSIBLE FUTURE



Floods, storm surges and rising sea levels may make some coastal areas nearly uninhabitable, and droughts, forest fires and crop failures could drive similar effects elsewhere.

A significant portion of the Earth's land surface may become uninhabitable, either due to the impacts of local changes or those occurring elsewhere (for example, air pollution caused by wildfires in neighbouring regions). Many people could be forced to leave their homes, especially across Africa, South and Southeast Asia, and Latin America. Small island developing states risk disappearing altogether. Populations in areas less exposed to climate impacts may turn against those forcibly displaced because of climate change if social and community services are not resourced to accommodate large inflows of people. Vulnerable populations will likely bear a disproportionate impact of these changes, especially those due to higher food prices. Widespread desperation may spark mass protests, political turmoil and instability in many countries.



In many countries, infrastructure not designed for repeated extreme weather events or changing climatic conditions may become unreliable or fail.

Changing patterns of rainfall could mean that many countries reliant on hydropower become energy-insecure without additional resilience measures, with major consequences on economic stability and food production (IEA, 2020_[14]) (IEA, 2021_[15]). Intermittent breakdowns in essential services may occur, especially in countries that are unable to afford expensive retrofits and diversify to other power sources. Global production of some staple food crops would fall owing to a combination of decreasing geographical ranges suitable for food production, desertification and crop damage due to extreme weather events. There may be significant increases in food insecurity and famine globally.



Global weather systems become destabilised, and most people will experience extreme climate events.

Deadly heat waves may occur annually, with hundreds of millions of people exposed to heat levels that are deadly for vulnerable populations, including women, who are 14 times more likely to die than men during a disaster (OECD, 2023_[12]), and those without access to cooling. Temperature extremes could prevent many forms of manual labour for large parts of the day. While emerging and developing countries would be most vulnerable to these climate disasters, high-income countries could be significantly affected as well. The slowing of the AMOC would increase hurricane activity, causing bouts of extreme cold temperatures in places like the United Kingdom and Northern Europe (OECD, 2019_[13]).



Geoengineering technologies, including solar radiation modification, could be increasingly viewed as necessary to prevent accelerated climate degradation.

The deployment of technologies designed to slow or reverse climate warming introduces the risk of causing an additional change to the Earth's biophysical system, with consequences that are not well understood. Significant efforts would be needed to ensure that the risk, moral, ethical and cultural assessments of geoengineering are considered and included in governance frameworks for managing the changes in global systems.

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POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to resort to emergency measures to respond to extreme weather events and more frequent natural disasters. Engaging in public consultation when urgent actions are needed and supporting the continued functioning of electoral democracy may prove difficult, especially if trust in the government falls owing to its inability to protect citizens from climate disasters.

Frequent mass casualties resulting from weather events could lead some countries to engage in geoengineering interventions (e.g. solar radiation modification) to alter environmental processes in ways that affect the Earth's climate, without a clear understanding of unintended consequences and adequate international governance. Governments may need to implement shared global safety standards and regulations or develop ways to deter countries from unilaterally experimenting with large-scale geo-engineering – or to encourage them to do so in ways that adhere to internationally agreed safeguards.

Governments would need to uphold global co-operation and multilateralism at a time when many countries could engage in self-interested actions that provide their citizens with short-term relief at the expense of long-term sustainability. Shortages in food, water and emergency supplies could lead some countries to hoard resources, increasing the risk of conflict in certain regions. Crucially, countries would need to co-ordinate their emergency adaptation strategies and ensure their long-term compatibility to avoid exacerbating an already challenging possible future.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Make all possible efforts to avoid overshooting the 1.5°C warming threshold. This action would limit the risk of crossing climate-tipping points as much as possible, requiring rapid decreases in greenhouse gas emissions in the next decade (OECD, 2022_[11]).



Strengthen nationally determined contributions (NDCs) by 2025. Near-term policies in line with current NDCs would not limit global warming to 1.5°C, thereby increasing the risk of crossing tipping points (OECD, 2022_[11]).



Build resilience to climate impacts by favouring transformational adaptation, especially through rehabilitation of ecosystem services and nature-based solutions. Transformational adaptation changes the characteristics of human and natural systems to increase their capacity to cope with potential hazards (IPCC, 2022_[16]). It is often the responsibility of cities, regions and territories, which require funding and capacity-building to prepare for worst-case climate scenarios; prioritise identifying and implementing “no-regret” adaptation policies, such as investing in rehabilitating ecosystems and ecosystem services, which are beneficial even in cases where tipping points are not eventually crossed (OECD, 2022_[11]). Healthy ecosystems will be best placed to deal with climate threats and deliver important services like providing clean fresh water, sequestering carbon, filtering the air and lowering air temperatures. The development and mainstreaming of methodologies to analyse and economically value ecosystem services would help in this process.



Invest in methods to promote safe, orderly and regular migration. Develop formal strategies to manage migration, and address factors such as trafficking in persons and migration smuggling. Include provisions for unaccompanied minors or separated children and undertake migration-awareness and information campaigns. Ensure systems are capable of reporting visa overstays and administering pre-arrival authorisation controls (OECD, 2022_[11]).



Invest in technologies for climate monitoring, modelling and remote sensing to improve the detection of early warning signals. Research is essential to characterise how climate-related hazards resulting from the crossing of climate-system tipping points may evolve over time and space. This information is key to building adequate risk-management strategies (OECD, 2022_[11]).



Invest in research on technologies to reduce and manage the risks of crossing climate-tipping points and the capacity to use these technologies to generate actionable insights. Carbon dioxide removal (CDR) technologies play a key role in all climate models that limit global warming to 1.5°C (IEA, 2022_[17]). These technologies are needed to achieve early and deep emission reductions during the first half of the 21st century (Riahi et al., 2021_[18]). The potential risks of employing CDR technologies (including a business-as-usual approach to

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environmental degradation under the assumption that technologies are the solution) must be better understood and balanced with the risks of crossing climate-system tipping points if CDR technologies were not employed (Creutzig et al., 2021_[19]) (OECD, 2022_[11]).



Invest in credible science on the risks and benefits of geoengineering technologies and the most appropriate governance mechanisms to oversee these technologies. Studies should seek to understand the opportunities and risks associated with different geoengineering technologies. International mechanisms could be established to govern whether – and how – such technologies should be deployed if required.



Promote resilience and agency in young people. Preparing education systems for likely extreme events, and co-constructing strategies for resilience and responsiveness, is key to protecting young people and enhancing their trust in democratic processes. This should include designing responses to the direct consequences of more frequent extreme events, such as the destruction of infrastructure and disruption of learning, as well as indirect social and health consequences, such as anxiety, disengagement, strikes and violent protests (OECD, 2021_[20]).



Empower women to become agents of change for a climate-resilient world. Climate change affects women disproportionately, but women can be empowered to be key agents of change in mitigation and adaptation strategies. Twenty-five percent of women’s employment is in agriculture, but women are often excluded from decision-making in this sector. Empowering women with resources on sustainable agriculture practices could increase production and resilience. Similarly, women can be powerful agents of change in terms of disaster preparedness and strengthening the move to renewable energy sources (OECD, 2023_[12]).



Invest in research and design of “multilateral emergency levers”. While individual climate disasters will remain local, the effects of large-scale disasters can quickly take on global dimensions. Recent global food price crises, for example, have been caused by a combination of climate and other factors. The global community should have access to internationally agreed, specific emergency measures to react. These could include measures to bring down food prices through co-ordinated market action, reducing biofuel mandates and preventing export restrictions (OECD, 2022_[21]).

SILENT SPRING

Cascading extinctions threaten vital ecosystem services

POSSIBLE 2030-50 DISRUPTION

Cascading species extinctions have led to ecosystem collapse, destroying the ecosystem services upon which humanity relies. The loss of ecosystem services, such as water filtration, pollination, air purification and protection from extreme weather events, disrupts nearly every industry, threatening global food and water supplies and crippling livelihoods.

CONTEXT

Wide-scale species extinctions are occurring across the globe (Figure 2.2), driven by changes in land use, pollution, altered biological interactions and climate change (OECD, 2021^[22]). These developments have led experts to argue that the world's sixth mass extinction event may already be underway (Cowie, Bouchet and Fontaine, 2022^[23]). This level of species loss may ultimately lead to a series of cascading extinctions which, in turn, could cause ecosystems to collapse, compromising their ability to provide important ecosystem services like water filtration and provision, direct and indirect food sources, nutrient cycling, and carbon sequestration and storage (Borrvall, Ebenman and Jonsson, 2000^[24]).

HOTHOUSE EARTH

SILENT SPRING

SEA-LEVEL RISE

HEAT WAVES

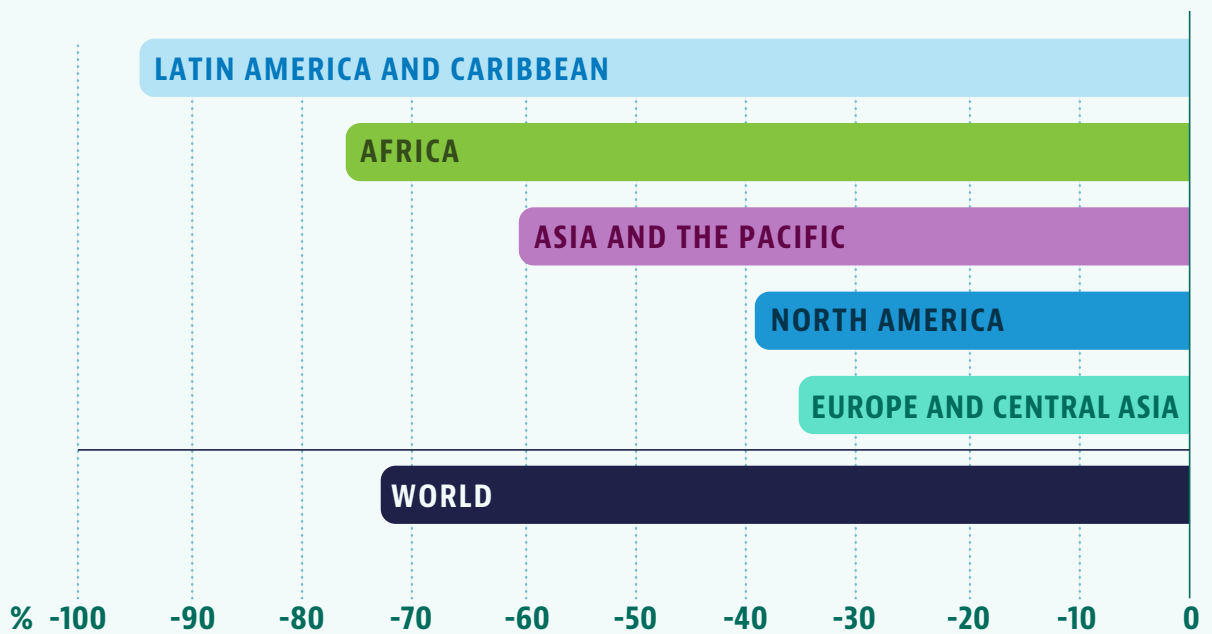
CLIMATE DESPAIR

EMERGING EVIDENCE

- » Almost half of the world’s fish stocks are considered to be overfished and 8% are on the brink of collapse, with less than 10% of their pre-fishing populations remaining (Minderoo Foundation, 2021_[25]). The capacity of coral reefs to provide ecosystem services, including protection of coastal areas from storm surges, food provision, livelihoods and carbon sequestration has fallen by half since the 1950s (Eddy et al., 2021_[26]).
- » Worldwide, over 40% of insect species are thought to be threatened (Sánchez-Bayo and Wyckhuys, 2019_[27]). Global insect population declines pose a risk to human health, human survival and critical ecosystem functioning owing to insect-mediated ecosystem functions such as nutrient cycling, soil formation, decomposition, water purification, pest control, pollination and food web support (van der Sluijs, 2020_[28]).
- » Current extinction rates and land-use changes are driving a climate of “extreme risk” to humans, and future infectious disease outbreaks which could be far worse than COVID-19 (Dasgupta, 2021_[29]). Cross-species transmissions of viruses are likely to increase, even in scenarios where warming stays below 2°C (Carlson et al., 2022_[30]). The World Health Organization (WHO) found a 63% increase in zoonotic outbreaks in Africa in the decade 2012-22 compared to 2001-11 (WHO, 2022_[31]).

FIGURE 2.2. Biodiversity losses across world regions have been high

Living Planet Index by region, 1970 = 100%, 1970 – 2020



Note: The Living Planet Index® measures the average relative decline in monitored wildlife populations. The index value measures the change in abundance in 34,836 populations across 5,495 species relative to the year 1970.

Adapted from (WWF, 2024_[32]) processed by Our World in Data, Living Planet Index by region [dataset], <https://ourworldindata.org/grapher/living-planet-index-by-region>

- HOTHOUSE EARTH
- SILENT SPRING
- SEA-LEVEL RISE
- HEAT WAVES
- CLIMATE DESPAIR

POSSIBLE FUTURE



Crop failures due to the loss of critical pollinators and depleted fish stocks could threaten the global food supply and cripple livelihoods.

Massive increases in the price of food owing to crop and fisheries failures may drive widespread instability. The prevalence of food insecurity may increase globally, causing deaths and long-term health issues. Large-scale protests and food riots may erupt in some countries, while large waves of outward migration may occur in others as food-insecure citizens seek better conditions elsewhere.



Disease outbreaks may be more common due to the extended range of some disease-causing organisms and increased contact with wildlife as human settlements encroach further into former wildlife habitats.

Novel disease outbreaks may become more frequent and pose challenges for their effective identification and monitoring, as well as an increased likelihood of deadly pandemics. This could lead to deaths of humans and livestock as well as trigger economically disruptive lockdowns required to limit the spread of novel diseases.



The loss of ecosystem services may cause price increases across nearly every industry.

Changes in rainfall patterns mean that water resources will be increasingly scarce. Industries that rely heavily on functioning ecosystem services (including agriculture and tourism) may face substantial hardship, with dramatic flow-on impacts to associated communities. The need for transportation of water and wastewater treatment may cause price increases across an even broader suite of industries. Industry and community groups may begin to lobby for ecosystem restoration to relieve financial stress. Ecosystem failures could lead to rushed restoration efforts which may not be carried out with sufficient care and this could bring unintended consequences that further destabilise ecosystems.

HOTHOUSE EARTH

SILENT SPRING

SEA-LEVEL RISE

HEAT WAVES

CLIMATE DESPAIR

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may face tremendous public pressure to make the preservation of ecosystems a core policy priority to prevent mass food insecurity. Large-scale restoration of damaged ecosystems may not be possible at worst; at best, it could be labour-intensive and require specific skills that countries may need to address through new training programmes.

Governments may need to scale up economic support for industries (such as agriculture and tourism) severely affected by biodiversity loss and mitigate the negative impact of the higher cost of living, straining government budgets and increasing debt levels. Rapid dietary changes could be necessary in event of crop failures and other stresses on food systems due to biodiversity loss. Plant-based diets and other forms of sustainable consumption would become even more important under these strained agricultural conditions. Governments may need to increase spending on public health and pandemic prevention to contain microbial outbreaks. They may struggle to put in place safeguards that do not impose too large a burden on industries or disrupt global trade at a time when the cost of living may already have increased significantly.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Prioritise ecosystem restoration and other nature-based solutions for biodiversity, climate change and other global objectives. In some areas, nature-based adaptation may be more cost-effective, with the added benefit of maintaining ecosystem health (OECD, 2019^[13]). It is also important to identify and prioritise adaptation policies that provide investments in, and incentives for, restoring or protecting biodiversity and ecosystem services (OECD, 2022^[1]). Scaling up the protection and restoration of wetlands and forests, natural soil and vegetation, as well as marine ecosystems, might lessen many of the impacts of climate change and contribute to carbon sequestration.



Ensure the sustainable management of land (including areas under agriculture), forests and fisheries. This implies considering a broader application of economic instruments, such as taxes, fees and penalties, to price environmentally damaging practices and encourage investment in sustainable practices (OECD, 2020^[33]). For example, the Australian Government's Nature Repair Act, which came into force on 15 December 2023, established a framework for a world-first national, voluntary biodiversity market (Australian Government, 2023^[34]). The draft legislation will recognise landholders who restore or manage local habitat, and grant them biodiversity certificates which can then be sold to other parties. Similarly, the French Climate and Resilience Law (2021) has set a target of zero-net artificialisation (or "zero-net land take") by 2050 to reduce the harmful environmental, social and economic effects of urban sprawl.



Ensure coherence in policies that impact land use, such as those related to agriculture, biodiversity, climate, health and development, to identify potential synergies and misalignments. One important step could be to create a cross-departmental steering group and a national consultation process to ensure engagement from all relevant ministries, levels of government and stakeholders (OECD, 2020^[33]). Further steps would include driving biodiversity-inclusive spatial planning, encouraging plant-based diets and reassessing the desired balance between different ecosystem services derived from land (e.g. food provision, water filtration, carbon sequestration and biodiversity). Work should be done to ensure policy coherence with long-term goals (IPCC, 2022^[35]), including through coherent NDCs, as well as national biodiversity strategies and action plans.



Expand the use of credible carbon credits to promote the preservation of ecosystems. Carbon credits and other conservation-based revenue schemes can help protect natural preserves while generating income for local communities. With citizen oversight, these funds could be a source of investment in economic diversification and sustainable livelihoods (Forbes, 2002^[36]).

SEA-LEVEL RISE

Flooding and storm surges threaten lives and livelihoods

POSSIBLE 2030-50 DISRUPTION

Sea levels have risen by nearly half a metre by 2050 and are on track to approach two metres by 2100, due to a combination of thermal expansion (the warming and expansion of the ocean) and runaway collapse of ice sheets in West Antarctica, the Wilkes Basin in East Antarctica and Greenland. Storm surges cause coastal flooding and erosion, putting the lives and livelihoods of coastal communities at risk and making many coastal areas nearly uninhabitable. Hundreds of millions of people face floods annually. Tens of millions of people could be displaced globally because of rising tides bringing storm surges that inundate housing and infrastructure in coastal areas.

CONTEXT

Sea levels are rising due to melting glaciers and ice sheets, the volume of water expanding as oceans warm, the slowing of the Gulf stream and, to a lesser extent, land subsidence and a decline in the amount of liquid water on land due to groundwater pumping. The major threats to lives and livelihoods come from coastal flooding and erosion caused by episodic storm and wave surges (Kirezci et al., 2020^[37]), which may become an annual event by 2050 (IPCC, 2022^[38]).

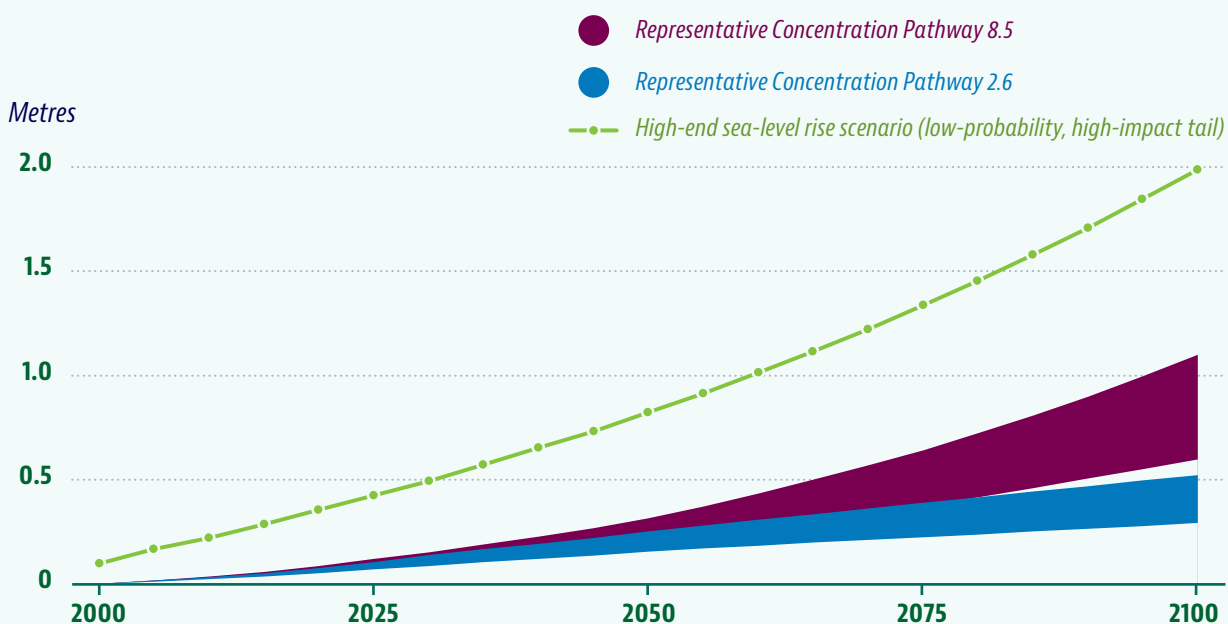
Today, over 600 million people inhabit low-elevation coastal zones (coastal regions less than 10 metres above sea level) that are vulnerable to sea-level rise (Hauer et al., 2021^[39]). More common coastal flooding and storm surges could have devastating impacts, causing damage to property and infrastructure, destructive erosion, aquifer and wetland flooding, and salt contamination of low-lying agricultural land.

EMERGING EVIDENCE

- » Global mean sea levels are projected to rise 0.61 metres by 2050 in the worst case-scenario (Bamber et al., 2019_[40]), between 0.43 metres and 0.84 metres by 2100 relative to 1986–2005, and are expected to continue rising for centuries (Oppenheimer et al., 2022_[41]). Some high-end estimates suggest a sea-level rise of about two metres by 2100 (Figure 2.3) since higher-than-expected ice-shelf loss could increase projected rises and exacerbate associated challenges.
- » As noted above, research suggests the Amundsen Sea embayment in West Antarctica might have passed a tipping point, with the line where ice, ocean and bedrock meet retreating irreversibly (Meredith, 2019_[9]). If this ecosystem collapses, it could destabilise the entire West Antarctic ice sheet (Meredith, 2019_[9]).
- » The degree of sea-level rise will vary regionally. Subsidence caused by human activities, including groundwater extraction, is currently the most important factor in determining the regional rate of relative sea-level rise (Oppenheimer et al., 2022_[41]).
- » Coastal communities tend to underestimate the extent of projected sea-level rise compared to scientific projections (Garner et al., 2023_[42]). Up to 340 million people currently live on land that is projected to flood annually by 2050 (Kulp and Strauss, 2019_[43]) and more than 1 billion people are expected to live in low-elevation coastal zones by 2060 (Neumann et al., 2015_[44]).

FIGURE 2.3. *Sea levels could continue rising*

Sea-level rise scenarios with respect to mean sea level in 1985–2005 (reference period), in metres, 2000–2100



Source: (OECD, 2019_[13]), *Responding to Rising Seas: OECD Country Approaches to Tackling Coastal Risks*, <https://doi.org/10.1787/9789264312487-en>

- HOTHOUSE EARTH
- SILENT SPRING
- SEA-LEVEL RISE
- HEAT WAVES
- CLIMATE DESPAIR

POSSIBLE FUTURE



Relocating entire cities, particularly those built on river deltas, could become necessary.

Estimates suggest that the global economic costs to cities from rising seas and inland flooding could amount to USD 1 trillion by the middle of the century (UCCRN Technical Report, 2018^[45]). As organisations and governments relocate to safer areas, citizens left behind could face the combined threats of diminishing economic opportunities and more frequent severe weather events. The loss in economic productivity and employment would disproportionately impact vulnerable segments of the population, including the young, the elderly and those with disabilities. Displaced communities could experience a loss of history, culture, traditional livelihoods and sacred places, and a disruption of social and community bonds. Extended families may end up being resettled in different parts of the world, often in places where they do not speak the language and may struggle to integrate successfully. Cultural traditions may be hard to maintain, with knock-on effects on mental health and social cohesion.



Sea-level rise can threaten energy infrastructure located in coastal areas.

In particular, refineries and liquefied natural gas plants tend to be located in coastal areas for shipping and may experience greater risk from storm surges and coastal floods due to sea-level rise, coupled with intense tropical cyclones. Around one-third of refineries are located in low-elevation areas less than ten metres above sea level (IEA, 2022^[46]). Floods and storms could drive up energy prices globally.



Sea-level rise could become a driver of climate-induced migration and displacement.

Larger-than-expected migration flows could strain social support and infrastructure. There may be increased risks of backlash against migrants if integration programmes are under-resourced and struggle to cope with the volume of displaced people.

HOTOHOUSE EARTH
 SILENT SPRING
 SEA-LEVEL RISE
 HEAT WAVES
 CLIMATE DESPAIR

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Premeditated and planned relocations may be required alongside emergency humanitarian responses to permanently relocate some coastal populations. Governments may need to co-ordinate the relocation of climate refugees and displaced people. Negotiations about how to equitably respond to humanitarian crises caused by sea-level rise and house migrants could be tense, and delays in implementation could exacerbate harm.

Coastal living may become unsustainable as insurance companies deem whole areas uninsurable owing to sea-level rise. As fiscal sustainability becomes an increasingly key concern, governments may be called upon to fund models of financial liability for coastal communities. The balances between loss bearing (where the victim is responsible for losses), loss sharing (where the losses are shared between the government and the victim), or compensation (where the government provides financial assistance for victims affected by coastal hazards) would need to be investigated, and a sustainable model determined. This would occur at a time of extremely strained government finances as gross domestic product (GDP) per capita could drop 10% by 2050 due to climate change (OECD, 2021_[47]), and funds would have to be redeployed for emergency measures to tackle the impacts of rising sea levels.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Incorporate resilience to sea-level rise in planning. Assessments of risks to energy infrastructure from sea-level rise can be mainstreamed to better protect power plants and refineries in coastal areas (IEA, 2023_[48]). In urban planning, this could be done by including guidelines and standards on building evaluation, foundation design, moisture entrapment and damage from debris (OECD, 2019_[13]) (OECD, 2017_[49]) (OECD, 2010_[50]).



Prioritise nature-based adaptation solutions. In some areas, nature-based adaptation may be more cost-effective, with the added benefit of maintaining ecosystem health, while some hard solutions may damage ecosystems and reduce amenity value (OECD, 2019_[13]). Identifying and implementing “no-regret” adaptation policies, such as investing in rehabilitating coastal ecosystems to protect against storm surges, would be also an important step forward (OECD, 2022_[1]).



Embrace a whole-of-society approach to risk management that actively involves relevant stakeholders in the policy-making process. This could be done by (i) providing tailored and accessible risk information to communities, industries and international actors; (ii) combining targeted communication with incentives and tools to support communities in building resilience and taking responsibility for self-protection; (iii) informing households about threats to underpin the debate about the need for prevention, mitigation and preparation; and (iv) promoting resilience by educating citizens in advance about emergency measures (OECD, 2019_[13]).

HEAT WAVES

Too hot to live

POSSIBLE 2030-50 DISRUPTION

Fatal heat waves have become common in large parts of the world. Hundreds of millions of people are exposed to dangerous heat waves on an annual basis, with the very young, the elderly, pregnant women and low-income people particularly vulnerable. These developments have made some parts of the world effectively uninhabitable for several months of the year for those without access to cooling. Wet-bulb temperatures (a measure that combines heat and humidity) are climbing towards lethal levels beyond the upper limit the human body can handle (35°C) in some areas of the globe, raising the possibility of an unprecedented heat-related mass mortality event that could rival the worst natural disasters in history.

CONTEXT

Increasing global temperatures and the urban heat island effect are increasingly impacting public health, economies, urban infrastructure and ecosystems. Excessive heat in both urban and rural environments is currently recognised as a serious health threat in many parts of the world (Vicedo-Cabrera et al., 2021_[51]) and could worsen considerably due to climate change, including in areas not accustomed to dealing with extreme heat. The significant increase in human mortality observed during heat waves has resulted in many countries having heat plans triggered by the onset of hot weather and designed to reduce the health impacts of excessive heat (Keith, Meerow and Wagner, 2019_[52]). New urban development models are being enacted to reduce the urban heat island effect and make cities more liveable (Keith, Meerow and Wagner, 2019_[52]) (OECD, 2010_[50]). However, whether these measures will be sufficient to counteract increases in extreme heat events due to climate change is not clear (Figure 2.4). Much remains to be done in investigating how to protect outdoor workers from excess heat.

HOTHOUSE EARTH

SILENT SPRING

SEA-LEVEL RISE

HEAT WAVES

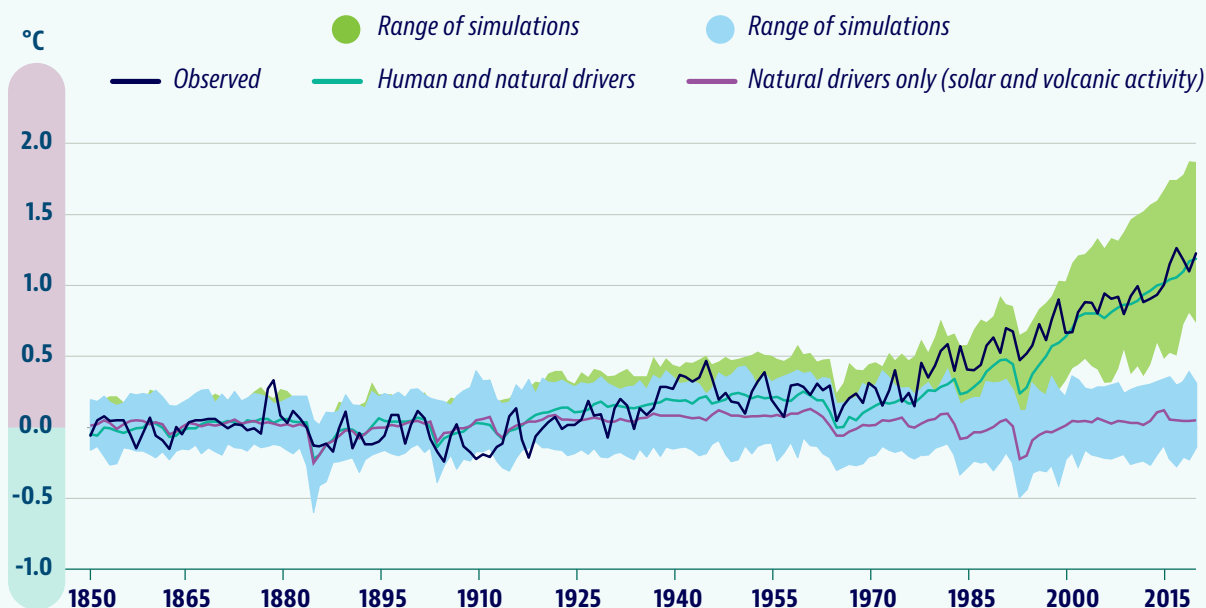
CLIMATE DESPAIR

EMERGING EVIDENCE

- » Cooling by air conditioners and electric fans accounts for nearly 20% of the total electricity used in buildings around the world today, a share that is expected to increase. By 2050, around two-thirds of the world's households are projected to have an air conditioner, with China, India and Indonesia together accounting for half of the total number (IEA, 2018_[53]).
- » Heat extremes are associated with increases in emergency-room admissions (Liss and Naumova, 2019_[54]), deaths from cardiorespiratory diseases (Cheng et al., 2019_[55]), mental health emergencies (Thompson et al., 2018_[56]) and health-care costs (Liu et al., 2019_[57]). Higher mean temperatures are associated with increased rates of stillbirths and pre-term births, and lower birth weights (Chersich et al., 2020_[58]), especially among vulnerable people who are not able to protect themselves from the heat.
- » Average evening temperatures are rising faster than average daytime temperatures. This is significant because warm evenings are more strongly correlated with excess mortality than maximum temperatures throughout the day (He et al., 2022_[59]).
- » Even if global warming is kept below 1.5°C, population growth will mean the number of people exposed to dangerous heat in African cities by the end of the century will rise by as many as 20-50 times (Rohat, 2019_[60]). By 2100, without urban heat island effects, over 300 million urban Africans may be exposed to 15-day heat waves over 42°C. When urban heat island effects are included, exposure could increase to 950 million, with 38.7% (younger than 5 years or older than 64 years) projected to be especially vulnerable (Marcotullio, 2021_[61]) (OECD, 2022_[62]).
- » In a study of Indian workplaces, occupational heat stress was found to be associated with heat-related health issues and reduced workplace productivity (Venugopal et al., 2015_[63]). In major American cities, an average person of colour and people living below the poverty line live in areas with higher heat stress intensity (Chakraborty et al., 2020_[64]).
- » Rising temperatures increase energy demand for cooling, placing major strains on electricity systems, while also increasing energy consumption costs which directly affects the most vulnerable groups in the economy. Climate change, along with other factors such as population and GDP growth, has direct impacts on energy demand. The temperature increase will directly lead to a significant growth in cooling demand, with air-conditioner ownership rising from 35% in 2022 to over 65% in 2050. The projected increase in cooling demand may strain electric power systems, driving the peak electricity demand to an unprecedented level (IEA, 2022_[46]).

FIGURE 2.4. *The world keeps getting warmer*

Global surface temperature change relative to 1850-1900 and causes of recent warming, in Celsius (°C), 1850-2019



Source: (OECD, 2021_[65]), *The Annual Climate Action Monitor: Helping Countries Advance Towards Net Zero*, <https://doi.org/10.1787/5bcb405c-en>

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POSSIBLE FUTURE



In many countries, outdoor work, manual labour, and even recreational activities may become impossible during daylight hours for several months a year.

Some industries may shift working hours to the cooler parts of the day, or grant workers the flexibility to work reduced hours or not at all during heat waves. However, changing workplace patterns could strain family dynamics and budgets, and come with a cost to economic prosperity. Many industries could be discontinued if unable to operate for extended periods. Changing tourism patterns in terms of the destinations and timing of holidays could result in economic impacts for existing operators. Total economic output may decline owing to the substantial drop-off in many sectors. Food insecurity would rise dramatically as crops cannot be harvested, driving price increases at a time when many people will have seen their incomes decrease.



Infrastructure in some countries could fail due to extreme heat, with problems such as melting roads impeding transportation and failing electricity grids disrupting service delivery.

This could be exacerbated by an inability to safely undertake repair and reconstruction work outdoors during periods of extreme heat. The increased stress placed on water and electricity supplies during heat waves could cause intermittent outages and increase the cost of living in ways that would be particularly acute for low-income households. Some areas could become uninhabitable, possibly driving unprecedented migration and straining the infrastructures of still-liveable areas.



Extreme heat could be a catalyst for societal breakdown and increased emissions.

Increases in the proportion of households using air conditioners for cooling could result in surging carbon emissions. Public-health expenditure on heat-related health issues may rise significantly. Cities and regions in high-income countries may experience many heat-related deaths per year, with much higher numbers in low- and middle-income countries. Hospitals and emergency services could be overwhelmed in many areas during heat waves. The scale of tragedies occurring regularly during heat waves, as well as increased food prices and barriers to earning an income for many workers, carry substantial risks of a societal breakdown and a complete lack of trust in government.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to enact emergency measures to provide climate-controlled facilities in areas where citizens do not have access to air-conditioning. To prevent mass mortality, international efforts may be needed to make available support and infrastructure for countries in which wet-bulb temperatures surpass lethal levels. Urban planning may need to adapt to protect all people in the event of heat waves and ensure access to cooling, especially at night. Heat counselling, aiming to find ways to minimise heat exposure, may become a core component of public health and emergency measures.

Extensive retrofits, infrastructure upgrades and financial assistance may become necessary to support vulnerable populations. Governments may need to change their labour policies to protect manual workers, outdoor workers and other vulnerable population segments, including pregnant women, from the effects of excessive heat. They may need to bolster agricultural output and preserve food security in the event of extreme heat events, which carry a heightened risk of crop failure driving up food prices. Governments would be well-advised to develop plans for water management during extreme heat episodes and other ways to ensure food security for their populations.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Implement better data collection to help identify and monitor heat-related risks and vulnerabilities.

Consider combining data on urban stress intensity with census data to create a predictive risk vulnerability map (OECD, 2021_[47]) and estimate relative risk of death associated with temperature (Office for National Statistics (ONS), 2023_[66]). This would allow better monitoring of the data on socio-economic factors, which interact with climate data to determine vulnerability to extreme temperatures (OECD, 2023_[67]).



Prioritise integrated urban development policies that align policy goals into a coherent strategy.

Identify potential complementarities across existing policy tools and frameworks. Ensure alignment between climate mitigation and adaptation strategies, prioritising nature-based adaptation strategies where possible (OECD, 2023_[67]). Provide funding to de-risk and reward design innovations that promote climate mitigation and adaptation (such as internal courtyards acting as cooling systems).



Create green corridors by expanding and connecting green spaces, among other nature-based solutions, to reduce the urban heat island effect.

Green spaces should be carefully distributed across the urban fabric to ensure that the greatest proportion of the population benefits from the cooling effects (Anderson, Patiño Quinchía and Prieto Curiel, 2022_[68]). These measures should be complemented by actions to improve biodiversity, remove pollutants from the air and water, and contribute to carbon sequestration (OECD, 2023_[67]).



Employ a whole-of-population approach to build systemic resilience by requiring inputs on policy measures from a wide range of stakeholders.

Ensure information is communicated to stakeholders in an accessible manner to create a shared understanding of the problem and a shared vision of the solution (OECD, 2023_[67]).



Localise national adaptation plans and strategies to ensure coherence with city planning.

Build awareness of national adaptation plans in local governments to ensure that city-level plans build on national goals, targets and priorities (OECD, 2023_[67]).



Employ more energy-efficient cooling systems to reduce the strain on the electricity supply and avoid potential power outages.

Doubling air conditioning efficiency by 2050 could reduce the need for 1 300 gigawatts (GW) of additional electrical generation capacity to meet peak demand. Adopt policy measures, such as minimum energy performance standards, to ensure cooling appliances become more efficient and prevent the least efficient options (IEA, 2022_[46]).

CLIMATE DESPAIR

Climate change exacerbates a global mental health crisis

POSSIBLE 2030-50 DISRUPTION

Declining optimism about the future, as well as tangible losses (e.g. in living standards) and intangible losses (e.g. in cultural heritage, biodiversity) owing to the changing climate conditions play heavily on people's mental health. New forms of mental distress (including eco-anxiety, eco-paralysis, ecological grief and nostalgia) are becoming commonplace. Birth rates decline more than anticipated as young people increasingly factor instability due to climate change into their reproductive choices. Large sections of the population withdraw from social and professional life, with damaging implications for the functioning of a democratic society. The sense of helplessness and grief is even more pronounced among youth, who feel that leaders are failing them but are too young to vote for a change.

CONTEXT

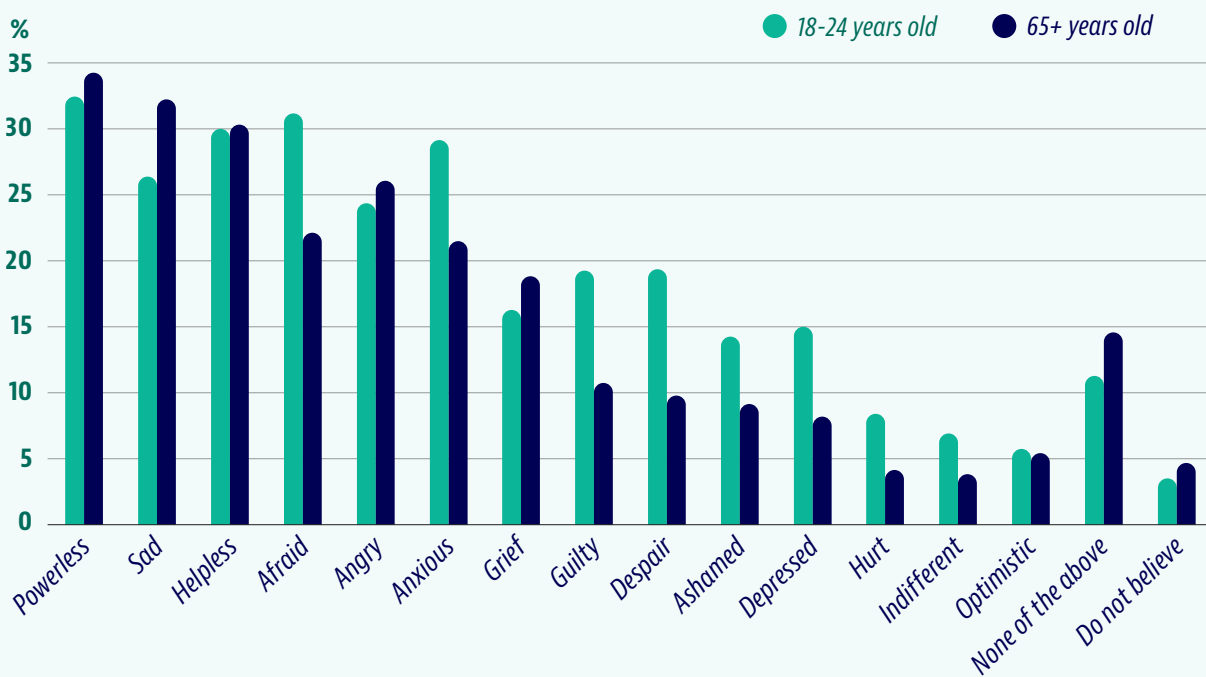
After decades of insufficient climate action, citizens are becoming increasingly pessimistic about the future (IFRC OCHA, 2022_[69]). People living in some of the world's hottest countries already fear losing their lives due to heat stroke (Tunio, 2022_[70]). A clear link is established between climate change and mental health challenges such as anxiety disorders, substance abuse and suicide. Mental ill-health is also linked to lower educational attainment and poorer physical health, which could severely impair people's ability to function and contribute to society (OECD, 2023_[71]).

EMERGING EVIDENCE

- » In a study of 1 700 children in the United States who lived through major hurricanes, nearly half developed symptoms of post-traumatic stress disorder, 10% of which were chronic (Lai et al., 2021^[72]).
- » Younger generations have reported that climate change harms their daily lives, including their ability to concentrate, eat, sleep, study and enjoy their relationships (Figure 2.5) (Thompson, 2021^[73]). A study of six OECD countries found that 60% of young people felt sad or afraid because of climate change (Hickman et al., 2021^[74]); in the Philippines and India, over 70% of young people reported suffering from anxiety daily because of climate change. A significant proportion of young people factor climate change into their reproductive choices, with 96.5% of survey respondents reporting they were “very” or “extremely concerned” about the well-being of their existing, expected or hypothetical children in a climate-changed world (Schneider-Mayerson and Leong, 2020^[75]).
- » Children and adolescents – particularly girls – as well as people with existing mental, physical or medical challenges, are at the highest risk of experiencing adverse well-being and mental health associated with climate change. These risks are compounded for anyone living in low-income countries or areas that tend to have the highest exposure to climate threats. Mental health impacts can occur as a result of exposure to extreme weather events, displacement, migration, famine, malnutrition, degradation or destruction of health and social care systems, climate-related economic and social losses, as well as anxiety and distress associated with worry about climate change (IPCC, 2022^[76]).
- » The United Kingdom has started measuring “eco-anxiety” as part of its Lifestyle Survey on public opinions and social trends (Office for National Statistics (ONS), 2023^[77]).

FIGURE 2.5. *Climate change negatively affects the feelings of youth and older age cohorts*

Percentage of respondents who report a range of feelings in the face of climate change, OECD 12, 2022



Note: OECD 12 refers to Belgium, France, Germany, Ireland, Italy, Japan, Mexico, Spain, Switzerland, Türkiye, the United Kingdom and the United States. The sample sizes were 2 000 respondents in each country. Data were weighted post hoc to be representative of the general population in terms of gender, age, region and occupation.

Source: (OECD, 2023^[77]), *How to Make Societies Thrive? Coordinating Approaches to Promote Well-being and Mental Health*, <https://doi.org/10.1787/6b9844-en>

- HOTHOUSE EARTH
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POSSIBLE FUTURE



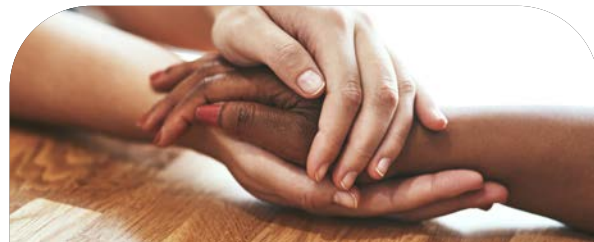
Climate-induced despair could have major negative impacts on physical health, mental health and workforce participation, placing a greater burden on the health care infrastructure.

Issues with addiction, alcoholism and suicide could worsen, and interpersonal violence and other forms of crime may increase. These forms of antisocial behaviour would drive a vicious cycle of declining safety and social trust, challenging many governments around the world and undermining co-ordinated efforts to address climate change. Lower educational attainment among youth struggling with low motivation and eco-anxiety could lead to skill shortages in important sectors.



Climate-induced despair could undermine democratic participation and support for carefully co-ordinated green and digital transitions.

There would be fewer incentives for people to plan and save for the future. Widespread apathy could make it harder to build sufficient political support for the large-scale interventions needed to mitigate or adapt to climate change. People struggling with despair could be more vulnerable to reactionary or divisive politics that lead to erratic policies, rather than carefully co-ordinated approaches to bring about a just transition. Social divisions may arise or be exploited, and healthy democratic discourse may be far harder to maintain.



Climate anxiety could have major negative effects on families and communities as individuals self-isolate and engage less in social activities.

Experiencing mental distress would be detrimental to job performance and career progression, further straining government care budgets. This could mean people are less able to support their families financially, compounding the harm caused by greater social isolation. Faster-than-expected declines in birth rates in many countries would prompt more young people from low- and middle-income countries to move abroad to work as caregivers in ageing societies, further distorting family and social lives.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

As rising mental health-care costs and reduced workforce participation would strain fiscal budgets, governments may struggle to support their citizens. The generosity of the welfare system may have to be scaled down, potentially causing social backlash. Funding constraints for social safety nets may further erode well-being and reduce citizen support for governments. Citizens may begin to question the value of a democratic process that creates pressures on standards of living and increased environmental degradation. Understanding the psycho-social implications of climate change is key for informed action at individual, community, and societal levels.

Faster-than-expected falls in birth rates and declining workforce participation due to depression and despair could create issues around supporting an ageing population. Countries may begin to compete for working-age immigrants to fill gaps in critical services in a “silver economy” dominated by health care for elderly citizens. Policies designed to incentivise families to have more children may be ineffective if worry about the future state of the environment drives decisions to delay or avoid having children.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Increase support for mental health care, including ecotherapy and green social prescribing, particularly when it relates to climate change. The Climate Psychology Alliance provides a directory of climate-aware therapists (Climate Psychology Alliance, 2023_[78]), and the Good Grief Network has a “10-Step Programme” for dealing with eco-anxiety (Schmidt and Lewis-Reau, 2023_[79]). Mental health professionals should also be educated on the climate-specific nature of certain mental health conditions or symptoms; for example, extreme heat exacerbates issues or lessens the efficacy of some psychotropic medications. Ecotherapy leverages time spent in nature to improve health outcomes. It is a potentially promising approach for individual treatment which can be linked to other, broader-scale social interventions aiming to promote sustainability.



Prioritise policies designed to improve overall population health. This would reduce the demand for health services and the volume of emissions associated with their provision, as well as helping to develop the population’s overall health resilience (Boyd et al., 2021_[80]). Further resources would also need to be mobilised to manage the increases in interpersonal and intergroup conflicts that occur during periods of extreme temperatures and rainfall (Burke, Hsiang and Miguel, 2015_[81]).



Invest in well-designed disaster preparedness and emergency response systems, and actively engage community leaders in disaster response planning. Examples include public information campaigns on ways to minimise fire damage to a home (clearing away dried plant material, creating a fire line, etc.); subsidising or providing weather-resistant materials (e.g. non-flammable siding for a house, sandbags in zones prone to flooding); or strengthening zoning regulations to prevent the construction of new homes in areas known to be vulnerable to climate events. Once a traumatic climate event has occurred, well-coordinated responses can help minimise its indirect mental health impacts. Active engagement of community leaders is another crucial component for fostering resilience and preventive measures (OECD, 2023_[71]).



Give citizens opportunities to engage in climate action. Partaking in actions (even at a small scale) that can incrementally make an impact, as well as building personal and community resilience by engaging with community groups and supporting climate solutions, can help alleviate feelings of eco-anxiety and related concepts of distress (Clayton et al., 2017_[82]; Koger, Leslie and Hayes, 2012_[83]).

HOTHOUSE EARTH
 SILENT SPRING
 SEA-LEVEL RISE
 HEAT WAVES
 CLIMATE DESPAIR



Invest in “win-win” policy options that both address climate change and promote psychological flourishing.

Following are some examples of climate-change mitigation policies that synergistically improve mental health outcomes (Health Canada, 2022_[84]):

- **Active transportation** (walking, jogging and biking) is a form of physical activity that will reduce emissions while also improving one’s mood and reducing the risk of depression.
- **Community environmental stewardship programmes** can improve environmental outcomes at the local level while enhancing social connections and community engagement, both of which have a positive impact on mental health.
- **Green infrastructure** construction can reduce urban heat islands, thereby improving physical and mental health outcomes. Green, well-connected cities play a vital role in promoting mental health and climate resilience.



Conduct school-based interventions to support better mental health and resilience. Young people are particularly vulnerable to mental health challenges related to climate change, and schools are well-suited to mental health interventions. Incorporating social and emotional learning, linking education to hope-inspiring climate action that can involve youth, could help mitigate some of the risks of climate-induced mental health issues among younger populations. Moreover, preparing young people to deal with extreme events can enhance their trust in democratic systems.



CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

POSSIBLE FUTURE
DISRUPTIONS
SOCIAL

ID 20190609/007.1215.6

like/followers/subscriptions

CONSPIRACY CHAOS

*Misinformation and disinformation
paralyse democracy*

POSSIBLE 2030-50 DISRUPTION

Deepfakes and large language models are used to increase exponentially the quantity and credibility of misinformation and disinformation as well as the speed at which this content is spread, overwhelming the protections put in place by democratic societies. Compelling conspiracy theories proliferate, exacerbating issues related to lack of trust in research, science and government. The more salient disinformation undermines public trust, increasing vulnerability to conspiracy theories and driving a vicious cycle that distorts the information ecosystem.

CONTEXT

The spread of mis- and disinformation exploits cognitive biases (Figure 2.6). It has been accelerated by digital technologies such as generative AI as well as social media, threatening trust in public institutions and democratic functioning. Language models capable of autonomously generating convincing content at unprecedented scales have quickly become “cultural sensations” (Thorp, 2023_[85]). Deepfake technologies that can create fake videos mimicking real people have made it “easier and more effective” to disseminate mis- or disinformation at scale (Masood et al., 2022_[86]). Society’s capacity to mitigate the threats posed by mis- and disinformation and to reinforce information integrity more widely could end up lagging in ways that harm democratic engagement.

EMERGING EVIDENCE

- » The OECD Truth Quest Survey that measures the ability of people to identify false and misleading content online found that people could correctly identify true and false content 60% of the time, with no major differences between the environment, health and international affairs (OECD, 2024_[187]). People who source their information from social media had the worst ability to identify true and false information online.
- » Misinformation has contributed to a range of contentious societal events, from elections and referenda to political or religious effects, as well as informing the global response to the COVID-19 pandemic (Ecker et al., 2022_[188]). For example, increased susceptibility to misinformation negatively influenced citizens' compliance with COVID-19 public health guidelines, their willingness to be vaccinated against the virus, and whether or not they would recommend the COVID-19 vaccine to vulnerable friends and family (Roozenbeek et al., 2020_[189]).
- » The Russian government has used disinformation as a weapon in its war of aggression against Ukraine (OECD, 2022_[190]). Russian-linked groups tried to undermine the credibility of the 2019 European elections (BBC, 2019_[191]) and the 2016 US federal elections by using autonomous social media bots to spread false information designed to influence voters (United States Senate Select Committee on Intelligence, 2019_[192]). Emerging technologies could further exacerbate these threats.
- » A local government plan to reduce traffic congestion in Oxford, United Kingdom, triggered a viral conspiracy theory about forced "climate lockdowns" (Reuters, 2022_[193]). The conspiracy theory was shared widely on social media, and resulted in death threats against elected officials and city staff (BBC, 2022_[194]).

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

FIGURE 2.6. Multiple cognitive biases exist that conspire to make us susceptible to fake news



POSSIBLE FUTURE



CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

Well-meaning firms may substantially increase their spending on strategic communications to maintain trust in their brands while other firms exaggerate the effectiveness and sustainability of their products.

Rational societal debate on many issues may become all but impossible. Even the most well-meaning citizens are left confused as to what to believe, owing to persistent, widespread and highly persuasive misinformation and disinformation that distorts public policy debates and further reduces trust.

Companies may be forced to expend significant resources to avoid losing customers after being targeted by a disinformation campaign. Vested interests may commonly deploy mis- and disinformation campaigns – including against competitors who may be developing more sustainable alternatives or regulators seeking to curtail harmful impacts or behaviours in certain industries – to undermine anything that threatens their influence or bottom line.

Malicious actors optimise social media algorithms for widespread sharing of conspiracy messaging, and unaware influencers promote misinformation in pursuit of engagement. The present-day challenges facing the integrity of democracies' information environments may continue to confuse public discourse, undermine participation, and amplify polarisation, thereby eroding democracy more widely.



Conspiracy theories may gain traction more easily. This would exacerbate social division and even fuel hatred and xenophobia, contributing to a strong decline in social cohesion.

Growing distrust of government and an overwhelming information ecosystem may lead people to withdraw into small, homogenous social groups that play a greater role in people's identity, with many filtering information through a narrow group identity lens. Cross-group solidarity would be seriously undermined, posing significant threats to maintaining a pluralistic society and effective democratic functioning.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may decide to curtail freedom of speech and expression through heavy-handed content regulation for various forms of media and penalties for sharing misleading information. In addition to increasing restrictions on fundamental rights to expression, such actions could lead to greater political control of expression, as well as provoke a backlash against a perceived encroachment on democratic rights.

Governments may need to substantially increase security budgets to protect public figures and curtail violent protests as generally agreed upon sets of facts become less common, including around elections. Securitisation may come at a high financial cost. It could also harm civil society and democratic engagement, especially if large parts of the population do not trust the security forces.

Increased polarisation may lead to bottlenecks and roadblocks in conventional policy processes. Building sufficient policy coalitions to enact major legislative changes could become a very fraught process. In a highly distrustful environment, governments may need to establish far more cumbersome consultative processes in order to achieve sufficient levels of buy-in and legitimacy to pass any form of legislation.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Implement policies that enhance transparency, accountability, and plurality of information sources to support access to wide-ranging, high-quality and reliable information (OECD, 2024_[95]). This includes supporting research on how mis- and disinformation is spread and by whom, and which responses are the most effective; and analysing lessons from other countries and policy areas on best practices to spur government engagement with civil society, media and academia (OECD, 2020_[96]) (OECD, 2022_[97]). Free access to official data and additional resources for national statistics offices could help improve the quality of research and analysis of all kinds and create a robust evidence base for policymaking, as well as support fact-based journalism. So could policies that support independent local journalism. Governments could encourage existing donors to the media sector to apply principles that enhance the public information ecosystem, including empowering members of civil society to act as watchdogs, as has been advocated by the Network on Governance of the OECD Development Assistance Committee (OECD, 2010_[98]).



Foster societal resilience to disinformation by empowering individuals to develop digital literacy, critical thinking skills and recognise and combat disinformation (Leshner, Pawelec and Desai, 2022_[99]) (OECD, 2024_[95]). As world problems become more complex, digital and scientific literacy – including the ability to access and critically appraise evidence from diverse sources – are emerging as a basic democratic needs of the 21st century. Engaging all young people, regardless of their socio-demographic background, in robust and relevant science learning is important not only to enable future scientific and technological breakthroughs, but also to form scientifically literate citizens who can resist mis/disinformation and make informed life choices. Targeted educational programmes that help students identify biased information by mapping mis- and disinformation threats could support societal resilience. Encouraging public engagement from all segments of society to guide and inform communications would help ensure messaging is relevant to all segments of the population (OECD, 2022_[97]).



Build government capacity for effectively counteracting mis- and disinformation, including with official statistics. Developing and implementing strategic frameworks that support a coherent vision and a comprehensive approach to reinforce information integrity, as well as institutionalising a dedicated function within the government, would help build understanding of the information space and deliver clear, tailored, timely and relevant messages to support evidence-based knowledge sharing. In addition, it is important that governments gather audience insights, use behaviourally informed communications principles and evaluate communications while ensuring the highest ethical principles are followed. Governments may expand collaborations with non-government partners to collaborate on debunking and “pre-bunking”, exchange best practices for fact-checking and respond to false information.



Promote more responsible behaviour on online platforms through content moderation policies developed in a multistakeholder processes with independent oversight (Leshner, Pawelec and Desai, 2022^[99]). Transparency of the underlying processes employed to moderate content should be improved, including through requirements to disclose the role of algorithms and the use of AI systems. Platforms could be encouraged to provide clear information on actions to moderate content, including procedures to address users who spread mis- and disinformation, as well as conduct due-diligence risk reviews of possible false and misleading content (OECD, 2022^[100]). Local stakeholders, researchers and fact-checking organisations should be involved in the development of the policies for content moderation (Leshner, Pawelec and Desai, 2022^[99]).



Undertake effective regulatory responses and approaches especially those that limit market concentration and promote a diverse range of communications channels and information sources. Policies that can help prevent undue influence from political and commercial interest can foster a more informed citizenry to engage in fact-based civic debates (OECD, 2024^[95]).

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

CRUELTY-FREE SOCIETY

Societies call for animals and ecosystems to be considered active policy stakeholders

POSSIBLE 2030-50 DISRUPTION

An ethical shift towards plant-based diets and the preservation of animals takes hold across many cultures globally. A majority of the world population adopts a plant-based diet, leading to environmental and health benefits and reductions in greenhouse gas emissions globally. Animals and ecosystems are now considered stakeholders in policy decisions. Animal-impact assessments are integrated into many policy areas, and significant work is dedicated to restoring functioning ecosystems on previously degraded land.

CONTEXT

Changes in humanity's relationship to animals and nature can cause significant disruption to policy priorities. Interest in veganism is increasing in many parts of the world, particularly among young people (OECD, 2022_[101]). Historically, meat consumption tends to rise with income growth (Schroeder, Barkley and Schroeder, 1996_[102]), but plant-based diets are particularly growing in high-income countries (OECD, 2022_[101]). This trend is driven by ethical concerns about animal cruelty, environmental concerns (Xu et al., 2021_[103]) and the health benefits of plant-based diets (OECD, 2022_[101]). The increasing rates of those adhering to the philosophy of veganism and those embracing plant-based diets are being helped by the greater availability of meat alternatives through technological advances in lab-grown meats and alternative proteins.



EMERGING EVIDENCE

- » The plant-based food market, worth USD 29.4 billion annually in 2020, is projected to represent up to 7.7% of the global protein market by 2030, with a value of over USD 162 billion (Bloomberg, 2021_[104]). A shift to meat alternatives in high- and upper-middle-income countries could decrease greenhouse gas emissions and food prices, as well as diminish agricultural land (Figure 2.7) (Frezal, Nenert and Gay, 2022_[105]).
- » Livestock farming is significantly more resource-intensive than other forms of agriculture, with global greenhouse gas emissions from animal-based foods double those of plant-based foods (Xu et al., 2021_[103]). This has led a growing number of scholars and activists to advocate for a consumption tax on meat (Funke et al., 2022_[106]), to address the environmental externalities of meat production and improve diet-related public health.
- » Many indigenous communities around the world are pushing to recognise legal “personhood” rights for rivers, lakes and mountains, to recognise that living things have inherent rights. In New Zealand, a river revered by the Māori people was recognised by the parliament as a “legal person” in 2017 (New Zealand Parliament, 2017_[107]). The Ganges and Yamuna rivers in India, the Magpie River (Canadian Environmental Law Association, 2021_[108]) in Quebec (Canada) and Mar Menor (McGlone, 2022_[109]) in Spain have all been awarded legal rights.

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

FIGURE 2.7. A reduction in meat demand would diminish agricultural land

Agricultural land use, absolute change compared to the baseline (2030), in million hectares, by 2030



Note: Moderate scenario: This scenario assumes that 10% of meat consumption in high-income countries will be replaced by consumption of meat alternatives by 2030, 90% of which come from plant-based proteins (i.e. soybeans, pulses, cereals, and roots and tubers), and 10% from insects and cultured meat. Strong scenario: This scenario assumes that 25% of meat consumption in high-income countries will be replaced by the consumption of meat alternatives by 2030 (with 80% of the replacement coming from plant-based proteins, and 20% from insects and cultured meat), and 10% of meat consumption in upper-middle-income countries is replaced by the consumption of meat alternatives by 2030 (with 90% of the replacement coming from plant-based proteins, and 10% from insects and cultured meat).

Source: (Frezal, Nenert and Gay, 2022_[105]), “Meat protein alternatives: Opportunities and challenges for food systems’ transformation”, <https://doi.org/10.1787/387d30cf-en>

POSSIBLE FUTURE



The regeneration of ecosystems would become a *cause célèbre*, gaining popularity among large segments of the population.

Significant amounts of land that were once used for meat production, or to grow feed for livestock, would be in the process of being rewilded to support carbon sequestration and biodiversity conservation. The change in land use may bring substantial opportunities and challenges for communities once reliant on farming and associated industries.



Some tensions may arise as implementing animal rights generates trade-offs between the rights of individual animals and the rights of species and ecosystems.

Ecosystem management and biodiversity preservation methods that involve killing “pest” species may be judged as unacceptable in some regions. This would cause issues with the displacement of native flora and fauna, and breakdowns in ecosystem functioning. In some instances, the popularisation of animal rights may occur before ethical principles on the balance and trade-offs between animal welfare, biodiversity and ethical use of animals are developed.



Food security may improve as land no longer needed for livestock is allocated to growing food directly for humans.

The price of foods such as soybeans and cereals would decrease globally, with direct benefits for consumers. However, this would come with substantial job losses in the meat industry, as well as potentially higher prices for some traditional foods endowed with cultural significance in some regions and cultures. The job losses could be offset by emerging opportunities in other forms of agriculture, biodiversity protection or ecotourism, as well as the production of plant-based meat substitutes, although this would depend on sufficient reskilling, buy-in among the impacted population and the local availability of alternative income sources. Governments would need to anticipate changing consumer trends or societal value shifts and assist communities in pivoting to work in ecosystem restoration or alternative crop production. Governments that fail to do so would amplify the hardship on farming communities that rely on forms of agriculture that are no longer viable for societal or environmental reasons.

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may rapidly need to develop plans for a large-scale transition away from animal products and update legislation to better reflect the rights of non-humans due to public pressure. This process could have wide-ranging and hard-to-predict implications, disrupting lives and livelihoods. It would require patience from the public during the transitional period, which could be difficult to maintain if there were to be sufficient societal pressure for a rapid transition. Citizen engagement would be needed to make educated decisions on the ethical trade-offs between delicate and complex ecosystems, the rights of native species and the rights of “pest” species to live.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION



Increase land-use coherence by mainstreaming biodiversity conservation in all relevant strategies and plans, including national economic plans, fiscal budgets, climate and emission-reduction plans, national risk assessments and development co-operation strategies. It is particularly important to develop high-quality indicators within existing frameworks to measure and report on progress on biodiversity, and to promote policy coherence by strengthening inter-ministerial co-ordination to integrate biodiversity targets systematically across all programmes, policies and projects (OECD, 2021_[110]).



Scale up the use of economic instruments to reflect the true cost of ecosystem services and ecosystem loss. Economic instruments could include biodiversity-related taxes, fees, tradable permits, biodiversity offsets, and payments for maintaining and protecting ecosystem services (OECD, 2021_[110]).



Remove or reform environmentally harmful supports for agriculture, fisheries and fossil fuels to improve sustainability. Prioritise reform of the most market-distorting and environmentally harmful economic instruments, such as market price supports, payments based on outputs and those that subsidise the cost of inputs, including fuel (OECD, 2021_[110]). Revise subsidies and other market instruments that support livestock farming and animal husbandry to ensure they are in line with current ethical standards.



Promote a more diverse agro-food workforce with adaptable skill sets able to thrive in a wide range of possible food futures. Emphasise digital skills that enable adopting new technologies that could optimise sustainability and overall output. This could be accompanied by campaigns that highlight and share best practices in sustainable farming to address growing labour and skill shortages in the agro-food sector (OECD, 2023_[111]).



INDIGENOUS REIMAGINING

A grassroots-driven rethinking of values and institutions

POSSIBLE 2030-50 DISRUPTION

Several indigenous-led social movements succeed around the world and develop ways of coordinating their efforts globally. Many new models for institutions and new modes of doing business emerge in several core sectors of society. The greatest shifts initially occur in indigenous majority regions in Africa and Latin America, with mirrored breakthroughs in countries such as Australia, Canada and New Zealand. These movements inspire people around the world to pursue various forms of personal liberation and actively craft new identities while questioning institutions and dominant societal narratives. Relational values and communal conceptions of identity have emerged in many places as an alternative to individualism.

CONTEXT

A growing questioning is taking place of global economic systems, past institutions and governments whose roots trace back to colonisation, in parallel with rising awareness of indigenous peoples' livelihoods, knowledge and role in sustaining biodiversity (Figure 2.8). The ways in which these movements may lead to the proliferation of different worldviews and through that, to a transformation of existing institutions, are a source of long-term uncertainty. For instance, the philosopher Achille Mbembe has articulated a vision for planetary politics that centres humanity's connection to other Earth systems (such as local ecosystems) and does not depend on nation-states (Mbembe, 2021_[112]).

EMERGING EVIDENCE

- » The White Earth Band of Ojibwe, a part of the Minnesota Chippewa Tribe, adopted a law recognising the rights of wild rice ("Manoomin") and the habitats on which it depends (Centre for Environmental Rights, 2021_[113]).
- » In areas such as design and technology, and native park management, indigenous knowledge has been used to provide innovative ways of thinking and problem-solving (Yunkaporta and McGinty, 2009_[114]) (OECD, 2019_[115]). For example, traditional burning by Indigenous peoples has been reintroduced in Australia to reduce bushfire risk.
- » To recognise the harm caused by colonisation, several museums in Western countries have begun to return stolen Benin Bronzes to Nigeria (Horniman, 2022_[116]).
- » The Institute for Urban Indigenous Health has shown that integrated family, health and well-being support services delivered in a culturally informed and safe manner have been shown to reduce the health-adjusted life expectancy (HALE) gap between indigenous and non-indigenous people in Australia at over double the rate of traditional care (Institute for Urban INdigenous Health, 2022_[117]).
- » Both Ecuador and Bolivia, which have large populations of Indigenous peoples, have enshrined the rights of nature ("Pacha Mama") in the constitution, responding to Andean indigenous concepts of well-being (Buen Vivir/Vivir Bien), strengthening the rights of indigenous people and Nature itself (Etchart, 2022_[118]).
- » The New Zealand Treasury is taking into account the Living Standards Framework and a framework for Māori well-being while shaping its budgetary decision-making and other policy processes (New Zealand Treasury, 2023_[119]). The integration of kaitiakitanga, referring to the well-being of family (whanau) and the environment in Māori-owned fishing company practice, has resulted in profitable, innovative and strategic business approaches that also meet goals of social and environmental sustainability (Rout et al., 2019_[120]).

CONSPIRACY CHAOS

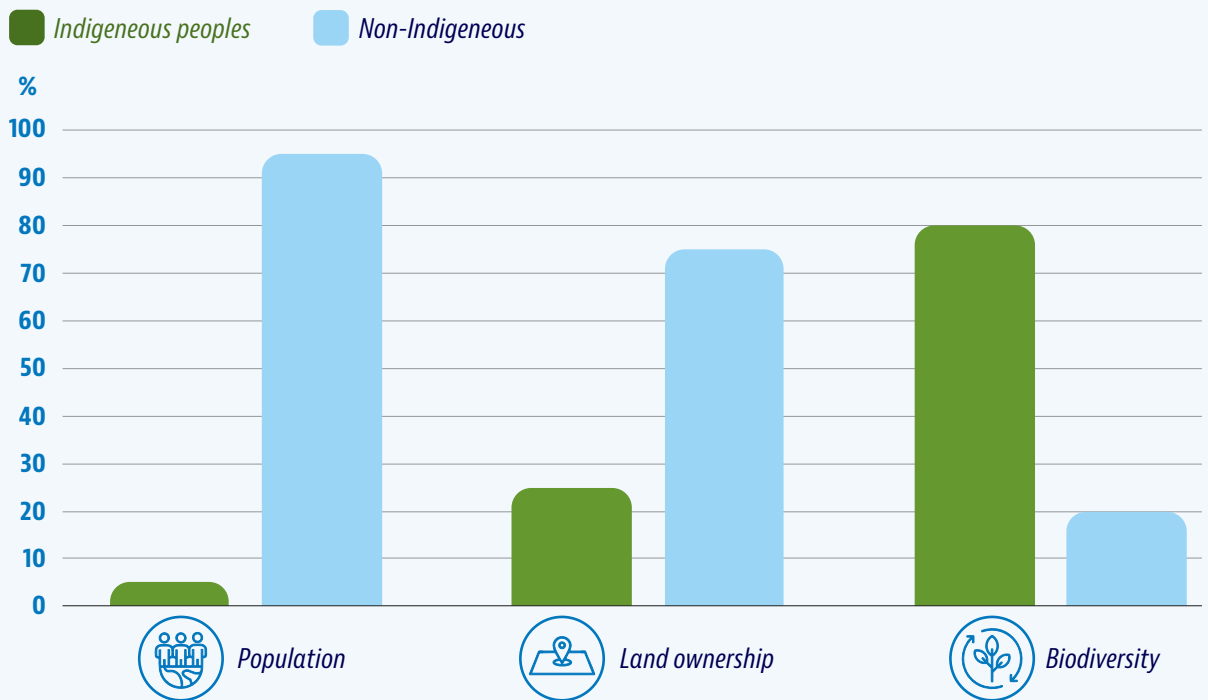
CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

FIGURE 2.8. Indigenous peoples are stewards of the majority of Earth's biodiversity

Estimates of population, land ownership and biodiversity for Indigenous and other peoples, percentage



Note: Biodiversity refers to the variety of plant and animal species

Source: Adapted from (UNDESA, 2021_[121]), "Challenges and Opportunities for Indigenous Peoples' Sustainability", https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2021/04/PB_101.pdf

POSSIBLE FUTURE



“Hyper-fluidity” in terms of cultural and individual identity could mean that governments must find ways to manage a far more pluralistic society.

In the absence of widely shared foundational assumptions about the role and legitimacy of government, new approaches to building political consensus and achieving societal harmony may be necessary. Translating indigenous practices and beliefs for the larger population may be open to various forms of interpretation and possibly manipulation. There may also be a need to handle the backlash from those who disapprove of challenging existing norms as part of a large-scale shift in values.



The global indigenous-led social movement could see educational systems transformed through vastly different pedagogical approaches, leading to a different socialisation process for children.

These approaches may vary in different places. There could also be far greater involvement of younger and much older people as important leaders in society, transforming the traditional structure of schools, teachers and students into a more horizontal or community-centric structure implying changes in linear curricula and introducing more practical forms of learning associated with the territory. The young may be a driving force and a focus of societal transformation. The elderly may be revered and sought after for their wisdom; this could result in extended working lives and an overhaul of the pension and elderly care systems. The new focus on alternative education systems may also spur the revival of various indigenous languages, giving them a new role not only in schools but also in state administrative procedures. This transformation could also bring challenges in terms of evaluating the performance and competency of teachers, as well as assessing the competencies of students.



The prioritisation of nature in budgeting and planning may lead to substantial restoration projects and an increased focus on societal value in the private sector.

This may necessitate reskilling and carries the potential for large-scale employment creation in some sectors. Broadly, this could lead to an economy based on conserving rather than exploiting nature, which may require funding nature as a major public good. It could also lead to a prioritisation of long-term sustainability, especially in infrastructure planning and innovation policy. However, there could also be instances of superficial appropriation of indigenous beliefs by the private sector, with businesses misinterpreting the beliefs and needs of indigenous communities in an attempt to legitimise certain economic activities. Incompatibility between different value systems, such as the concept of profit-seeking and the sacredness of territories, may become evident.



Widespread adoption of more holistic and culturally safe community interventions could lead to more effective and cost-efficient outcomes for society.

Indigenous wisdom could gain ground as a solution to food scarcity, biodiversity conservation and sustainable forms of land use. Furthermore, societies can tap into different traditional wisdom and may see a wave of innovations that improve health and well-being for large parts of their populations. These could enable better service delivery to populations that conventional public service providers currently struggle to reach, supporting earlier and more effective responses to challenging issues in health care and community service. Beyond the cost savings associated with higher-quality and preventive service delivery, this could mean that more people can thrive economically, generating wider societal gains.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments and international organisations may need to undergo large-scale institutional restructuring to accommodate a more diverse set of values and worldviews, and be fit-for-purpose in a world reimagined from the grassroots up. This process could end up being contentious due to fears that new approaches to governance as well as new systems of regulation could disadvantage some groups over others.

If the demand for societal reimagining is sufficiently strong, governments could host forums for discussion and debate about a new social contract and social responsibilities. These could take the form of elaborate consultative processes, perhaps integrating immersive technologies that make participation more accessible to wider audiences and enable different forms of visual presentation.

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Ensure the participation of indigenous peoples in decisions about projects and policies. This can be achieved by engaging in dialogue and meetings with indigenous groups on specific policy issues, and increasing the scope of policy assessments to include the impacts on traditional knowledge and socio-cultural issues (OECD, 2019_[122]). To this end, governments need to be aware of the diversity of cosmogonic visions of the different indigenous communities that coexist on their territory, and even of the conflicts and incompatibilities that may exist between different groups.



Strengthen multilevel governance and partnerships with indigenous peoples. This implies taking a place-based approach that tailors policy engagement to the specific strengths and challenges of particular areas, as well as ensuring a sufficient level of co-ordination between levels of government and sectors to ensure policy complementarities (OECD, 2019_[122]).



Support and empower building the capacity of indigenous groups to engage meaningfully with the policy process. Measures include taking steps to develop the quality and depth of leadership, promote financial management, and implement processes to ensure the continuity and sustainability of indigenous-led governance (OECD, 2019_[122]).



GREEN RADICALISATION

Protests escalate in response to stalled climate action

POSSIBLE 2030-50 DISRUPTION

Due to beliefs that global action is insufficient to avert a climate catastrophe, environmental activists adopt increasingly extreme tactics. Violent demonstrations occur more frequently, ranging from attacks on the fossil-fuel infrastructure to harassment of political and corporate leaders believed to be resisting climate action. Cybercrime tactics are employed, including doxing (the publication of private identifying information with malicious intent) of executives in high-emitting industries, and other forms of blackmail and harassment.

CONTEXT

There are implicit assumptions in net-zero transition strategies that citizens are willing to take a patient and peaceful approach to climate action, and that this will continue in the future. Despite the widespread support for policy action to address climate change (Figure 2.9), peacefulness and governability may reach a breaking point if government actions to combat climate change are seen as falling short. This could be followed by more extreme and radical actions stemming from climate-related disasters or scientists calling for greater urgency than governments are willing – or able – to deliver.

EMERGING EVIDENCE

- » Research shows that citizens who are alarmed by climate change are more likely to support civil disobedience in support of action against global warming (Campbell et al., 2022_[123]).
- » Civil disobedience is effective in its stated aim of raising public awareness of the climate emergency (Thackeray et al., 2020_[124]). An article in the prominent scientific journal Nature Climate Change described scientists' participation in peaceful civil disobedience as a "legitimate next step" for climate action (Capstick et al., 2022_[125]).
- » Climate change may drive increased rates of terrorism in the future (Silke and Morrison, 2022_[126]). Those displaced from rural to urban areas due to climate change are more likely to be drawn into extremist groups (Schon and Nemeth, 2022_[127]).

CONSPIRACY CHAOS

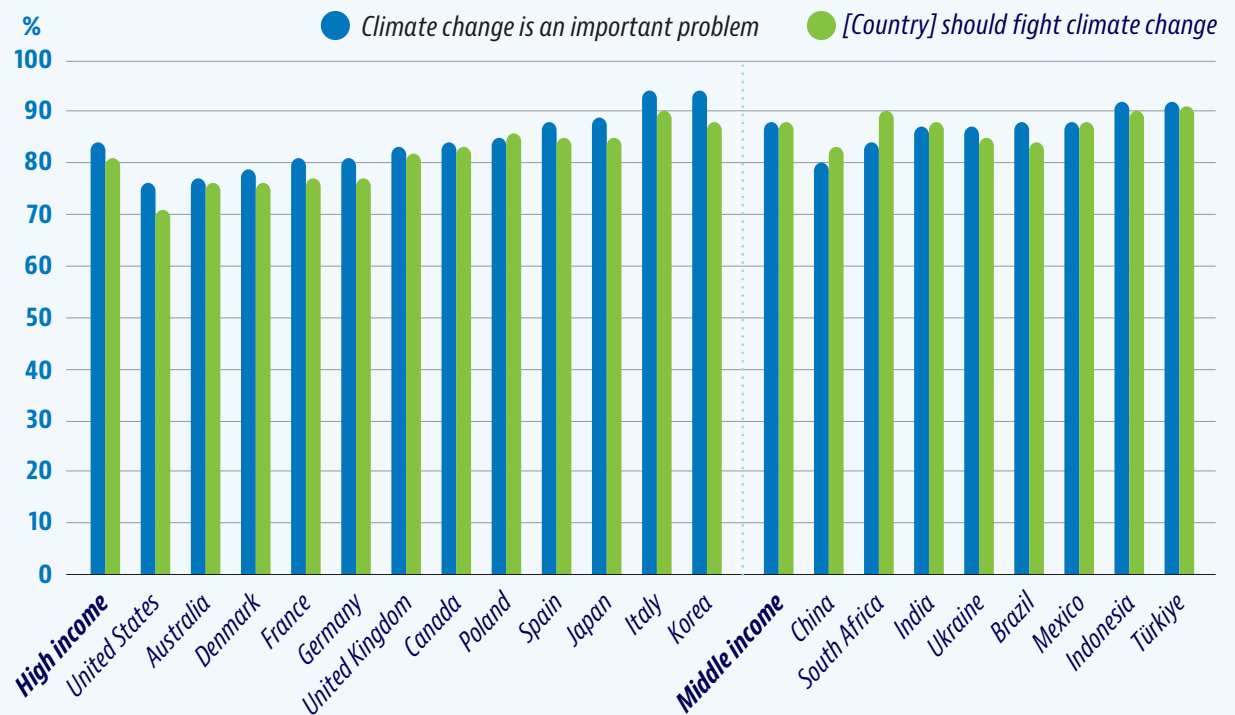
CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

FIGURE 2.9. Many people agree that climate change is an important issue requiring policy action

Percentage of respondents



Note: The figure shows the share of respondents who agree somewhat to strongly that "climate change is an important problem" and that their country "should take measures to fight climate change".

Source: Adapted from (Dechezleprêtre et al., 2022_[128]), "Fighting climate change: International attitudes toward climate policies", <https://doi.org/10.1787/3406f29a-en>

POSSIBLE FUTURE



CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION

Increasingly extreme environmental activism could exacerbate polarisation and pose serious challenges to law and order.

Some businesses targeted by climate activists owing to their poor environmental records could relocate to authoritarian states, which would respond brutally to disruptions caused by environmental activists.

Social media may be used to heighten sympathy and even admiration for individuals carrying out radical actions, using images and stories of victims of climate-related disasters to garner public support. Meanwhile, some firms could support mis- or disinformation campaigns to discredit environmental activists' claims and hire private security forces to prevent damage and deter activists. Many members of the public may want a strong law-and-order response to crack down on disruptive behaviour by activists, arguing it has tarnished the environmental cause.

This could cause an outflow of private investment from democracies towards authoritarian states. Democracies that cannot rapidly incentivise sustainable alternatives from hard-to-decarbonise sectors may cede geopolitical leverage to authoritarian states, which would gain greater control over these industries. This may generate further tensions in democratic countries between activists and policy makers, who would blame each other for the domestic dependence on high-emitting authoritarian states.



In some regions, intensified environmental protests could provoke a feedback loop of escalating violence and economic downturn.

People harmed by climate change, including displaced people or those suffering the greatest socio-economic hardship, would be more susceptible to radicalisation. Areas suffering under the worst effects of environmental disasters linked to climate change could also see a disproportionate rate of social unrest and violence.

CONSPIRACY CHAOS
CRUELTY-FREE SOCIETY
INDIGENOUS REIMAGINING
GREEN RADICALISATION

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may be pressured into harsh security responses to restore law and order at the expense of civil and democratic rights. This could involve large increases in security spending to protect members of the public targeted by activists or vigilante groups. These responses could in some cases backfire and further radicalise the extreme ends of a polarised political spectrum. In a highly polarised and increasingly low-trust society, governments could struggle to find neutral arbiters to resolve issues of violence between activists, public and private security forces, and vigilante groups.

In those cases when activism succeeds in shutting down the operations of some high-emitting firms, governments or businesses may need to rapidly find alternative products. This could have significant economic consequences, involving increased and accelerated spending, or subsidies for sustainable alternatives. Governments may also need to increase spending on unemployment benefits and reskilling for workers in negatively impacted sectors. If civil unrest drives major economic downturns, governments may need to deploy stimulus packages to bolster the economy.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Implement a genuine and ambitious environmental transformation at all levels of government. Take a precautionary approach to climate mitigation, and strive for rapid and deep cuts in greenhouse gas emissions in this decade. Strengthen NDCs to limit global warming to 1.5°C, and avoid lenient interpretations of the Paris Agreement that focus on achieving net-zero emissions by the middle of the 21st century to focus instead on urgent actions in this decade (OECD, 2022_[1]).



Strive for enhanced integrity in public decision-making to bolster trust in the democratic process. This can be done by implementing the highest standards on integrity and conflict of interest, designing policies to minimise the influence of lobbying, and upgrading public-service safety standards to protect citizens and the civil service from outside influence (OECD, 2022_[100]).



Build government capacity for effective communication to reach a broad consensus on how to undertake a net-zero transition. Institutionalising best practices to deliver clear and tailored messages in a timely and relevant manner will support evidence-based knowledge sharing about the best way to undertake such a complex whole-of-society transformation, as well as the risks stemming from uncoordinated and overly hasty actions. Effective communication involves gathering audience insights, using behaviourally informed communications principles and encouraging public engagement to ensure the messaging is relevant to all segments of the population (OECD, 2022_[97]) (Dechezleprêtre et al., 2022_[128]).



Implement deliberative and participatory processes to increase trust between citizens and government, leading to better policy outcomes (OECD, 2020_[129]). Citizen assemblies can engage representative samples of the population in important debates on climate policy. Such processes are currently being undertaken in cities such as Brussels (Bruxelles Environnement, 2022_[130]) and Paris (Marie de Paris, 2023_[131]).



Strengthen the representation of population segments historically underrepresented in democratic processes, such as youth, women, indigenous populations and minorities, to build trust and bolster democracy. Incorporating the views of these populations while protecting their privacy and confidentiality helps ensure that policies are designed with a whole-of-society strategy, which builds consensus and shared expectations about the timeline of the transition. Ensuring representativeness in the civil service, and collecting disaggregated data on the barriers preventing population segments from engaging in democratic processes (OECD, 2022_[100]), are other evidence-based steps to strengthen democracy, which is a necessary condition for a just transition. Data collection on historically under-represented communities and vulnerable groups should be done in a way that protects their privacy and confidentiality to prevent further harm.



Institutionalise an intergenerational justice-oriented long-term strategy. The Future Generations Commissioner of Wales published a guide to implementing the Well-being of Future Generations Act (Future Generations Commissioner of Wales, 2023_[132]). The guide calls for the collaborative development of a desirable long-term future vision and could be applied to other jurisdictions.



Nurture democratic behaviour from an early age by strengthening agency and co-agency in students in schools, but also through mechanisms for giving students a voice within education systems. In the short term, well-implemented student engagement and student voice platforms would help provide a better understanding of emerging issues shaping learners' experiences. In the longer term, systematic, regular and impactful student voices could act as a model of democratic behaviour that empowers citizens and can strengthen trust in institutions (OECD, 2021_[20]).

CONSPIRACY CHAOS

CRUELTY-FREE SOCIETY

INDIGENOUS REIMAGINING

GREEN RADICALISATION



BIOTECH BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL INTELLIGENCE LEAP

VIRTUAL WORLDS

POSSIBLE FUTURE DISRUPTIONS
TECHNOLOGY



BIOTECH BREAKTHROUGH

The fusion of biology and digitalisation transforms the economy

POSSIBLE 2030-50 DISRUPTION

Advances in biotechnology continue to power the ease and accessibility of engineering new organisms. Breakthroughs in biotechnologies transform established industries and become key drivers of economic growth. Biofoundries – factories for genetic products – proliferate around the world, rapidly generating and deploying synthetic biological innovations. The capabilities only available to leading labs today, including gene drives, engineered viruses and vaccine development, become affordable and accessible. New drugs and medicines are produced rapidly, making it possible for those with access to these cutting-edge innovations to live longer and healthier lives. New modes of construction and food production bring new possibilities for sustainable development, construction, including of housing, and public health globally.

CONTEXT

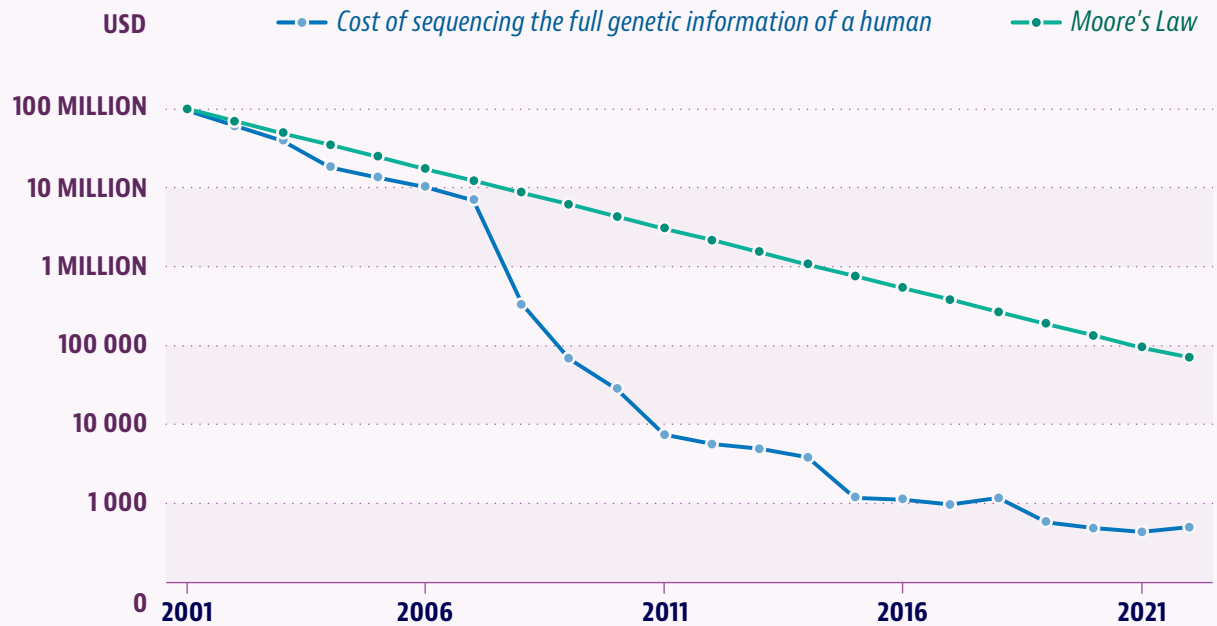
Synthetic biology (the design and engineering of biological components or organisms to produce new properties or abilities) is on the cusp of becoming as transformative for the global economy as the digital revolution (Policy Horizons Canada, 2019_[133]). Some high-profile breakthroughs have taken place in genetics, such as the advent of the Nobel Prize-winning gene-editing technology CRISPR Cas9 (Ledford and Callaway, 2020_[134]). Another breakthrough is the emergence of biofoundries (Freemont et al., 2019_[135]), which can develop and manufacture synthetic biological products. Paired with advances in AI that (among other things) enable highly accurate predictions of protein structures, these biofoundries could facilitate drug discovery and the creation of other biological products (Jumper et al., 2021_[136]). However, high uncertainty persists about the timing and extent of such developments, as well as their potential to transform key sectors such as health care, food production, manufacturing and construction.

EMERGING EVIDENCE

- » The cost of sequencing the human genome has dropped from USD 100 million to less than a USD 1 000 over the last 20 years (Figure 2.10) (Wetterstrand, 2021_[137]).
- » New methods of vaccine development, such as mRNA vaccines, enabled the global response to the COVID-19 pandemic (Ball, 2020_[138]).
- » Biologically inspired engineering, often called biomimicry, can use living organisms in architecture, as well as civil and environmental engineering (Tang et al., 2020_[139]). For example, scientists are developing new building materials from fungi (Young, 2020_[140]), reducing plastic waste through genetically engineered plastic-eating bacteria (Carpenter, 2021_[141]) and using bacterial spores for in-situ concrete crack repair (Wang et al., 2014_[142]).
- » A DNA test that can detect over 50 genetic diseases has been developed, significantly enhancing early detection and rapid diagnosis (Deveson, 2022_[143]). Scientists have also developed an electrogenetic framework for storing digital data in living cells (Yim et al., 2021_[144]).

FIGURE 2.10. *The cost of sequencing a human genome has fallen dramatically*

USD, 2001-2022



Note: Moore's Law involves the doubling of "compute power" every two years and represents a long-term trend in the computer hardware industry. Technology advances that match Moore's Law are improving at a pace similar to that of digital technologies during the digital revolution, making it useful for comparison.

Source: Adapted from (Wetterstrand, 2021_[137]), "DNA Sequencing Costs: Data from the NHGRI Genome Sequencing Program (GSP)", www.genome.gov/sequencingcostsdata

POSSIBLE FUTURE



Health care could be revolutionised by personalised gene therapies and pharmaceuticals that can be quickly developed, tested and distributed.

Population growth, population ageing and health-care needs evolve as advances in medical technologies prevent premature deaths, diminish the effects of ageing and increase average lifespans. The planning trajectories devised by many governments may not match earlier projections. Pension schemes could come under increased pressure. While medical treatment could become more cost-effective, the savings may be offset by increased expectations for medical care and personalised medicine. Overall productivity may also improve thanks to improved worker health and longer, healthier lives.



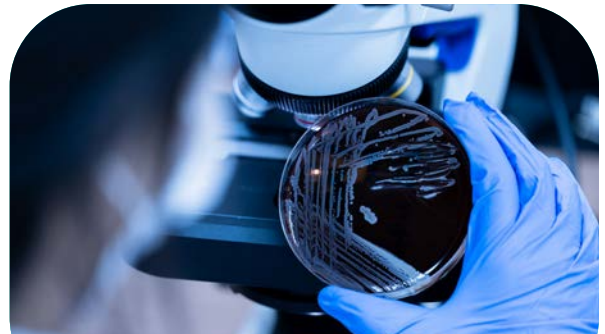
Innovations in synthetic biology would influence food production, increasing crop yields and enabling localised, lab-grown food production.

Drought- and heat-resistant crops could grow faster, using fewer inputs and offering more nutritional content, while lab-grown meat, which requires fewer inputs but more energy than livestock, would make high-protein food more accessible. Invasive species and pest populations could be managed with gene-drive technologies, although this could also cause unintended flow-on effects across ecosystems. This risk may be exacerbated as climate change causes stress on food systems, causing many farming communities to turn to new biotechnology interventions to protect their crops.



New bio-construction materials could be produced more cheaply, enabling booms in construction and textiles using carbon-neutral or carbon-negative materials.

These materials would become increasingly necessary to sustain the production needs of ever-growing populations as longer lifespans reverse the trend towards declining population growth. They could also enable a greater decoupling of economic development from emissions growth.



Rapid advances in biotechnologies come with risks – including their unregulated proliferation – that could lead to the accidental or malicious leak of synthetic pathogens or public backlash on ethical grounds.

The increased accessibility of the technology could make it possible for terrorist organisations or lone-wolf attackers to engineer a virus with the infectiousness of the flu and the lethality of Ebola. While the impacts of some malicious or accidental releases could be localised when they are detected and contained early, some could spread widely – and even globally – resulting in high global mortality and disruption beyond the scale of the COVID-19 pandemic and causing continued crises in the economy and health system. Some segments of the population may also experience discomfort about living in a world where biology is being manipulated to such a large extent, and increasingly present in people's day-to-day lives.

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to develop internationally agreed contingency plans concerning the accidental or malicious release of biological agents that could strike the global population. Viruses do not respect national boundaries, causing increased international tensions and calls for international co-operation to limit the release of hazardous biological agents.

Governments may need to address important global debates over the optimal governance and intellectual property regimes for biotechnologies, including several difficult issues around safety, democratisation and ethics. A more decentralised model, featuring few restrictions on where biofoundries could operate and widespread open-source access to genetic sequences, could be a boon for small businesses and entrepreneurs in low- and middle-income countries. However, a highly decentralised biotechnology industry could lead to challenges of oversight and safety, such as in identifying which actors have the technical capability to develop dangerous pathogens accidentally or maliciously. A more centralised regulatory model, featuring a few dominant companies in synthetic biology, may mean biotech jobs cluster around existing hubs for advanced research in high-income countries. This could generate barriers that prevent low-income people around the world from benefiting quickly from innovations designed to provide better healthcare, housing and nutrition.

Governments may need to dramatically increase spending on pensions if the population's lifespan increases substantially. This may force governments to raise the retirement age, causing public discontent.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS



Adopt an anticipatory framework for the governance of emerging biotechnologies. Strategic intelligence and strategic foresight can be used to anticipate biotechnological developments and the need for biotechnology governance. Forward-looking technical analyses can identify potential benefits and harms, and the expected trajectories of emerging biotechnologies (OECD, 2023^[145]).



Include and align upstream stakeholder and societal engagement to enhance the democratic governance of emerging biotechnologies. Deliberation on societal values should support and guide biotechnological development and governance that reduces biorisks (OECD, 2023^[145]).



Co-develop principles, standards, guidelines and codes of practice. Strengthen professional guidelines, technical standards and norms, as well as codes of conduct and best practices during biotechnological development, to promote an agile and adaptive system of governance (OECD, 2023^[145]). This could ensure widely shared safety and ethical standards in biotech industries.



Prepare for longer lifespans. Pension systems should be developed with appropriate assumptions about mortality to ensure the sustainability of retirement income into old age and minimise the risk of people outliving their pensions (OECD, 2022^[146]). Similar adjustments could be necessary in education and retraining for older workers as well as caring for the elderly. Adjustments to these systems need to overcome many practical challenges that differ across regulatory environments, highlighting the need to engage citizens and employers carefully to ensure support for changes that are required for long-term sustainability.



Invest in pandemic preparedness. This should include research, for example on better personal protective equipment, rapid detection and prevention of future pandemics, as well as the required infrastructure for a rapid diagnosis and blocking of outbreak transmission (OECD, 2023^[147]).



CYBER SLOWDOWN

The dark side of digitalisation leads to an economic downturn

POSSIBLE 2030-50 DISRUPTION

Cyberattacks are regularly carried out by increasingly numerous and capable state and non-state actors, causing a slowdown in – and in some cases a reversal of – the course of digitalisation. Attacks overwhelm the cyber-defences available to individuals, organisations and governments to such a degree that no digital space is secure. Frequent cyberattacks targeting critical activities destabilise energy, communications and health-care systems. At an individual level, personal vehicles and smart homes are vulnerable to being hacked causing widespread fear and undermining consumer confidence.

CONTEXT

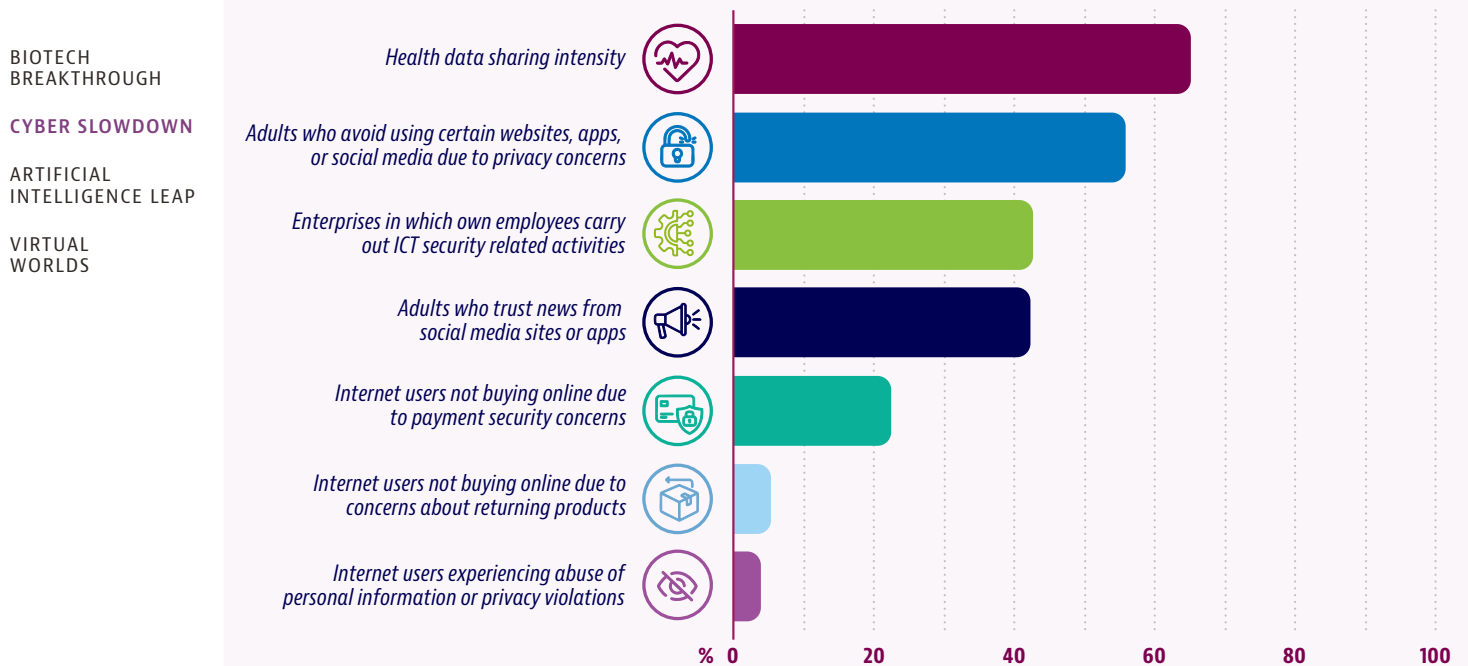
Digitalisation is a megatrend on which policy makers are leaning to help address climate change and foster economic growth, with new products such as smart thermostats and electric vehicles helping bring more sustainable lifestyles at the individual level, while advances in areas such as energy grids bring system-wide emissions reductions. Cyberattacks are growing, and a more digitalised world has a larger attack surface for hackers to exploit. Large-scale breaches could harm the trust consumers and businesses are willing to place in technologies, holding back business investment to support a green transition, as well as economic and social progress more broadly (Figure 2.11). Increasing cybersecurity risks could undermine the transition to a greener and more digital future.

EMERGING EVIDENCE

- » Hackers believed to be directed by the Russian intelligence service slipped malicious code into SolarWinds software used by over 100 companies and governments (Temple-Raston, 2021_[148]). In 2020, the United States Department of Energy launched a multi-year plan to advance cybersecurity R&D and preparedness for emerging energy technologies (US Department of Energy, 2020_[149]).
- » A ransomware attack on a major gas pipeline threatened to cut off much of the United States from access to fuel (Morrison, 2021_[150]). A hospital in France had to cancel several surgeries and transfer patients after being hit by a cyberattack (France24, 2022_[151]).
- » Tech experts have warned about the possibility of large-scale ransomware attacks on smart-city systems (Palmer, 2021_[152]).

FIGURE 2.11. *Low digital trust can hold back economic and social progress*

Percentage



Source: Adapted from (OECD, 2024_[153]), OECD Going Digital Toolkit, <https://goingdigital.oecd.org/dimension/trust>

POSSIBLE FUTURE



Economic activity could be weaker than expected globally as individuals engage in far less online activity.



High-profile cyberattacks could cause widespread distrust of technology and lead to far less adoption of new products, potentially even reversing the current course of digitalisation.

E-commerce and digital-first businesses would suffer most acutely, but the negative impacts could be far-reaching. Greater fears about hacks and losses of privacy may lead to higher transaction costs for businesses, especially those in fields reliant on sensitive data, such as biotechnology and health care. Small firms that cannot afford cutting-edge cyber defences would be at an even greater disadvantage compared to the largest market players. Research communities may become more hesitant to share information given the threats of hacking, limiting the openness of research, which could slow innovation overall. Investors may also be less willing to support projects if the risks of ransomware or corporate espionage were to raise the cost of doing business or otherwise undermine the ability to turn a profit through innovation.

This could cause particular problems for the transition to net zero, as consumers would be less willing to embrace green technologies or smart systems that could bring major efficiency gains. If internet-connected cars – especially self-driving cars – were hit by large ransomware attacks, people would refrain from purchasing high-tech and more energy efficient vehicles, which they could perceive to be less secure than older fossil-fuel-based vehicles and not connected cars, slowing the transition to sustainable transportation. There might be similar hesitancy about upgrading to smart household systems which could increase energy efficiency but also provide additional opportunities for compromised security, making intimate family moments vulnerable to hacking.



Energy systems could also require far higher redundancy than expected, resulting in major increases in cybersecurity costs.

The possibility that significant portions of the electricity grid could be taken offline by a cyberattack would require major investment in digital technologies to provide greater visibility, real-time monitoring, fault detection and protection from cyberattacks.

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Government intervention may be necessary to ensure a level playing field in digital markets if small and medium-sized enterprises (SMEs) become overwhelmed by cyberattacks. While dominant technology firms may be able to afford the best available cybersecurity, smaller firms may be unable to adopt cybersecurity protections at scale and compete in digital markets characterised by rampant distrust. Governments may need to heavily subsidise the development of cybersecurity capabilities in ways that benefit SMEs and individuals, as well as increasing cybersecurity spending for all public systems.

If situations were to become sufficiently dire, governments may need to finance the maintenance of backup systems that are not connected to the internet for some parts of the critical infrastructure. While this would be highly costly, it may be one of the only ways to maintain essential functions in several sectors should cybercrime far outpace cybersecurity capacity in the future. Governments would also need to take costly steps to monitor, measure and minimise the digital security risks to critical infrastructure.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS



Establish strict cybersecurity standards across the economy. Firms may have higher individual tolerance to cyber risks than what is considered acceptable for society in the aggregate, and governments may need to address this discrepancy. These objectives should be aligned with national risk assessments, include key digital activities at the highest levels of government and feature as a core component of national digital security strategies (OECD, 2022_[154]).



Undertake a whole-of-government approach when preparing and implementing a domestic digital security plan. The plan should allocate responsibility and authority to relevant government bodies for developing and implementing digital security initiatives, and identify the roles played by the bodies in charge of national security and defence (OECD, 2022_[154]). The increasing threat of cyberattacks could require collective actions among all stakeholders of critical infrastructure and services, including energy, water, transport, information and communication technology, health and finance. Strategies should consider and plan for the possible future cybersecurity needs related to quantum computing.



Build capacity to support the resilience of key digital activities and manage risks to digital security. Strengthen the capabilities for monitoring, warning, alerting and recovering from digital security incidents by supporting the development of a skilled workforce that can manage and respond to digital security threats. Promote and share learnings on international digital security standards and best practices (OECD, 2022_[154]).



Address the SME digital gap. SMEs lag in the digital transformation, increasing inequalities among people, places and firms. Enable the digitalisation of SMEs by supporting them in adopting certification schemes and security standards. Provide SMEs with incentives (including one-stop shops) to develop business solutions that help them align with best practices (OECD, 2021_[155]).



Integrate digital security risks in national risk management activities, especially for critical digital security activities. Ensure that key risks are reflected in national risk assessments and that identification of risks to critical functions is up to date (OECD, 2022_[154]).



Invest in cybersecurity-related skill development. Providing incentives for more people to become cybersecurity professionals could help address the risks posed by cybercrime.

ARTIFICIAL INTELLIGENCE LEAP

Technology brings new tools that transform society

POSSIBLE 2030-50 DISRUPTION

Improvements in hardware and software, as well as more training data, accelerate advances in machine learning and lead to dramatic improvements in AI capabilities. The number of tasks that AI can complete at or above a human level is increasing rapidly, and the barriers to its integration into most organisational settings are diminishing. AI has become central to key societal functions, like finance, health, energy and agriculture. Advanced AI systems complete ever more complex tasks, although in many cases they remain black boxes that are not well understood and on occasion behave in unexpected manners when interacting with situations that are different from their testing environment. Unprecedented growth in the rate of creative destruction occurs alongside the accelerated rate of innovation and technological advancement, while the number of AI incidents may increase with greater diffusion.

CONTEXT

In 2024, the OECD updated its AI Recommendation in light of the rapid advancements in AI (OECD, 2024_[156]). There exists inherent uncertainty about how much, and how fast, AI will continue to advance and transform economies and societies, although recent developments suggest a significant pickup (Figure 2.12). AI systems, including those embedded in robots, are expected to be able to perform an increasing number of tasks better, faster or cheaper than humans. The rate of technological advancement could slow as marginal gains become harder to achieve, or it could accelerate if more investment and larger datasets continue to yield major breakthroughs.

Today, the ability of AI labs to produce advanced AI systems surpasses society's ability to ensure these do not produce unexpected and harmful impacts, but numerous efforts are underway to address this challenge. For example, many experts believe that sufficiently robust technical solutions do not presently exist to ensure AI systems are not misused and that they are aligned with human values.

Advanced AI systems like GPT-4 have been able to be misused to produce harmful content. If this mismatch continues, efficiency gains could cause the widespread adoption of technologies that are not sufficiently safe. Several open letters signed by executives at leading AI companies, as well as leading AI researchers, have called for a focus on mitigating the potential risks of AI as a top global priority (Center for AI Safety, 2023_[157]), and for a potential pause in large-scale AI experiments (Future of Life Institute, 2023_[158]), signaling growing discomfort by many AI researchers with the pace of advancement given the current level of AI safety capabilities.

The G7 Hiroshima AI Process initiated in 2023 stresses the importance of preventing the use of generative AI to create biological or chemical threats, massive misinformation/disinformation and cyber security risks on a global level (OECD, 2023_[159]). In March 2024, the European Union passed the AI Act which established a common and risk-based regulatory framework for AI (European Commission, 2024_[160]). On 11 March 2024, the United Nations adopted a landmark resolution promoting the design, development, deployment and use of AI in ways that respects and protects human rights and benefits sustainable development globally while closing the digital divide (United Nations, 2024_[161]). The 2024 AI Seoul Summit convened the OECD, UN, EU, G7 and country representatives and corporate players to address challenges and opportunities for advancing AI safely and responsibly with 16 prominent technology companies vowing to undertake risk assessments, set risk tolerance thresholds and have risk mitigation plans in place for their AI ventures (DSIT, 2024_[162]). The follow-up events, such as the 2025 AI France Action Summit, are expected to deliver further progress.

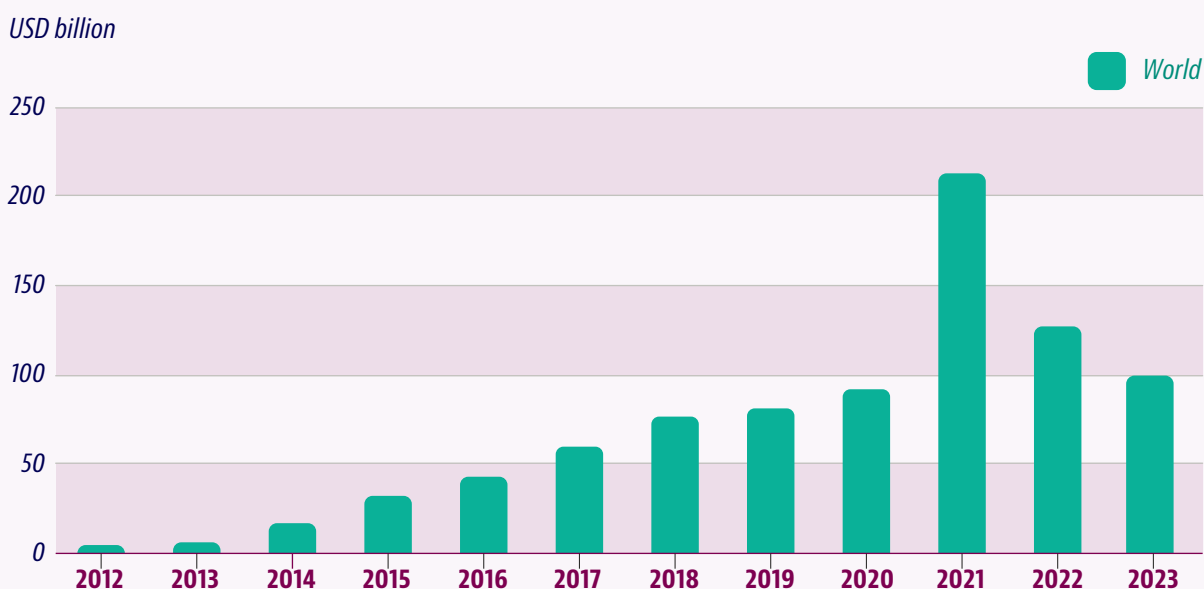
EMERGING EVIDENCE

- BIOTECH BREAKTHROUGH
- CYBER SLOWDOWN
- ARTIFICIAL INTELLIGENCE LEAP
- VIRTUAL WORLDS

- » Large language models have performed in the 90th percentile on a simulated bar examination for lawyers, (Lorenz, Perset and Berryhill, 2023_[163]). These benchmarks, however, are contested by others, with LLMs still having significant limitations that make them not fully reliable (OpenAI, 2023_[164]).
- » When accounting for current and likely future software developments that complement LLM capabilities, 46% of jobs could see over half of their tasks affected by LLMs (Eloundou et al., 2024_[165]). Occupations most at risk of AI automation takeover make up 27% of current total employment (OECD, 2023_[166]).
- » AlphaFold, an AI program developed by DeepMind, was able to make highly accurate protein-structure predictions, solving a fundamental scientific challenge with the potential for a wide range of applications in biology and drug discovery (Jumper et al., 2021_[136]).

FIGURE 2.12. *Worldwide venture capital investments in AI are significant*

Annual investments, USD billion, 2012-2023



Source: Adapted from (OECD.AI, 2023_[167]), Visualisations powered by JSI using data from Preqin, <https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=worldwide-vc-investments-in-ai>

POSSIBLE FUTURE



AI-related efficiency gains could continue to foster productivity growth while transforming the makeup of workforces and the future of work.

Accelerated innovation could lead to the emergence of data-driven solutions that optimise countless sectors. AI could bring down tremendously the cost of producing goods and providing services. The efficiency gains could allow firms to downsize their workforce while freeing workers to focus on more cognitively demanding functions. Enhanced productivity may allow some firms to expand their operations into new sectors. Advances in AI could automate a growing set of tasks and alter the nature of work in entire sectors in unprecedented ways, transforming the skill needs of businesses. By extension, the entire structure of education systems may change due to the increasing need for specialised AI skills, along with the skills needed to interact with AI and complementary skills, also potentially making some other skills redundant. Access to (and intellectual property rights over) AI and sufficient system knowledge to deploy AI could become the primary determinant of who obtains the economic returns from their application.



Rapid AI advances could foster geopolitical tensions.

If AI were to increasingly become a core determinant of economic and even military power, countries, regions and companies could all compete for control of the best technologies, leading experts and inputs. Actors could engage in espionage to avoid falling behind competitors. Increased demand for certain critical raw materials and semiconductors could cause prices to rise, with an escalation in tensions between countries seeking to secure access to the vital but scarce resources needed for cutting-edge AI. Geopolitical tensions could create significant challenges to developing shared

global standards and safeguards for the deployment of increasingly advanced AI. This would increase the risk of a powerful but misaligned AI causing unforeseen damages without a clear understanding of why it made certain decisions, or who is accountable for the harmful actions. Globally co-ordinated approaches to managing extreme AI risks could be undermined by a worsening geopolitical context, the possibility that leading players in AI may not trust their competitors to comply with standards, and the lack of mechanisms to ensure compliance with any safeguards that have been established.



Misaligned or uninterpretable AI may pose safety risks.

Increasingly sophisticated AI systems could be used to manage public services efficiently, but at the expense of human oversight. Insufficient oversight of rapid and oftentimes opaque AI decision-making could make it difficult to anticipate and prevent harm arising when an AI behaves unexpectedly. Unexpected behaviours are likely to continue because tools may be still lacking to explain the outcomes of some types of deep learning-based AI systems and methods to verifiably align AI systems reliably with human goals. When a complex digital system behaves in undesirable ways, regulators and industry may lack the capacity to correct – or even diagnose errors – and get these critical systems back online. This could result in cascading failures leading to blackouts, crippled freight networks and food shortages. In the worst case, it may be impossible to regain control of the system from increasingly autonomous AI systems. Powerful and increasingly general-purpose AI systems could be integrated into various services because of anticipated efficiency gains, but then be misused for nefarious purposes by bad actors or behave in unexpected manners – including by developing sub-goals that are not necessarily aligned with human goals – when confronted with situations for which they were not trained or tested. Much like issues with algorithms promoting misinformation during the COVID-19 pandemic, or the 2010 trillion-dollar “flash crash” caused by algorithmic trading, AI that was previously functioning as intended could act in ways that cause harm, especially if the AI systems use deep networks that are still largely complex “black boxes” that are not fully understood, even by their creators.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to develop approaches to ensure that AI augments human capabilities but also be prepared to manage large increases in the numbers of people negatively impacted by creative destruction, adjust fiscal policies to reflect possible future economic realities, and preserve sufficient competition in sectors where access to cutting-edge AI would be a decisive factor in firms' success.

Given the growing fear among leading experts about the possibility of extreme AI risks, governments may need to establish contingency plans for several dangerous possibilities related to misaligned and increasingly autonomous AI systems, or misuse of AI by malicious actors.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Invest significant funds in AI safety research to promote robustness, interoperability and fairness in AI models. Governments and industry still lack sufficiently robust technical or governance tools to prevent AI systems from causing unintended harm (Lorenz, Perset and Berryhill, 2023_[168]) even at a time when AI incidents are rapidly increasing according to data from the OECD AI Incident Monitor (OECD.AI, 2023_[167]). Governments can draw on international standards for reporting incidents to promote global consistency (OECD, 2022_[169]).



Support international co-operation on AI, especially concerning potential risks, privacy and intellectual property. Since AI advancements and their implications are not limited to national borders, an international dialogue and co-ordinated approaches are essential to align standards, manage risks and share benefits more equitably globally (Lorenz, Perset and Berryhill, 2023_[168]). As AI systems often rely heavily on data, there need to be clear regulations about data privacy, consent and ownership. These regulations should ensure the responsible use of data, protect individual privacy, and clarify what constitutes fair use of copy righted content and ownership of content generated by AI systems.



Invest in the development of policy approaches tailored to different AI systems. There exist different opportunities and challenges for deploying AI in medicine, transportation and communications, all requiring different policy responses (Lorenz, Perset and Berryhill, 2023_[168]). The OECD has developed a tool to help policy makers characterise and evaluate AI systems from a policy perspective; this can serve as a foundation for building specific governance approaches for these sectors (OECD, 2022_[169]). AI systems should be "safe by design" and include mechanisms for shutting off a system should the need arise.



Invest in policies to prepare the workforce for AI-induced job changes, notably by supporting education, skill development and reskilling to address skill gaps among SMEs. By sponsoring education and reskilling initiatives, governments can prepare their labour force for the jobs of the future and reduce the risk of unemployment due to automation (OECD, 2021_[170]). Policies should also address the expected workforce transition caused by AI, including through mental health support systems to address the potential added stress due to the introduction of AI.



Further advance the development of AI guidelines and standards, based on the OECD AI Principles updated in May 2024, ensuring that the benefits of AI are widely shared (OECD, 2024_[171]). Guidelines are currently being developed at the OECD to address issues such as bias in AI systems, their potential for misuse and the ethical implications of their decisions. These will incentivise AI deployment which is human-centred and promotes democratic values.



VIRTUAL WORLDS

Most people spend most of their time in highly immersive virtual reality

POSSIBLE 2030-50 DISRUPTION

The bulk of commerce, entertainment and socialising occurs in immersive virtual worlds. The average person spends roughly as much time in immersive world mediated through virtual reality (VR) and extended reality (XR) as they do sleeping, with time in immersive virtual worlds replacing nearly all conventional screen time and many other activities that were once in-person. Most work is done, and people's most important social connections are made or preserved, through hybrid practices and VR workplaces. The experiences are seamless, immersive and free from the natural limitations imposed by geography. A substantial portion of people's lives can now take place in one room. Technology companies compete to produce the hardware and software that enable these experiences, lowering prices to the point that immersive technology is the primary way most people access and engage with the internet.

CONTEXT

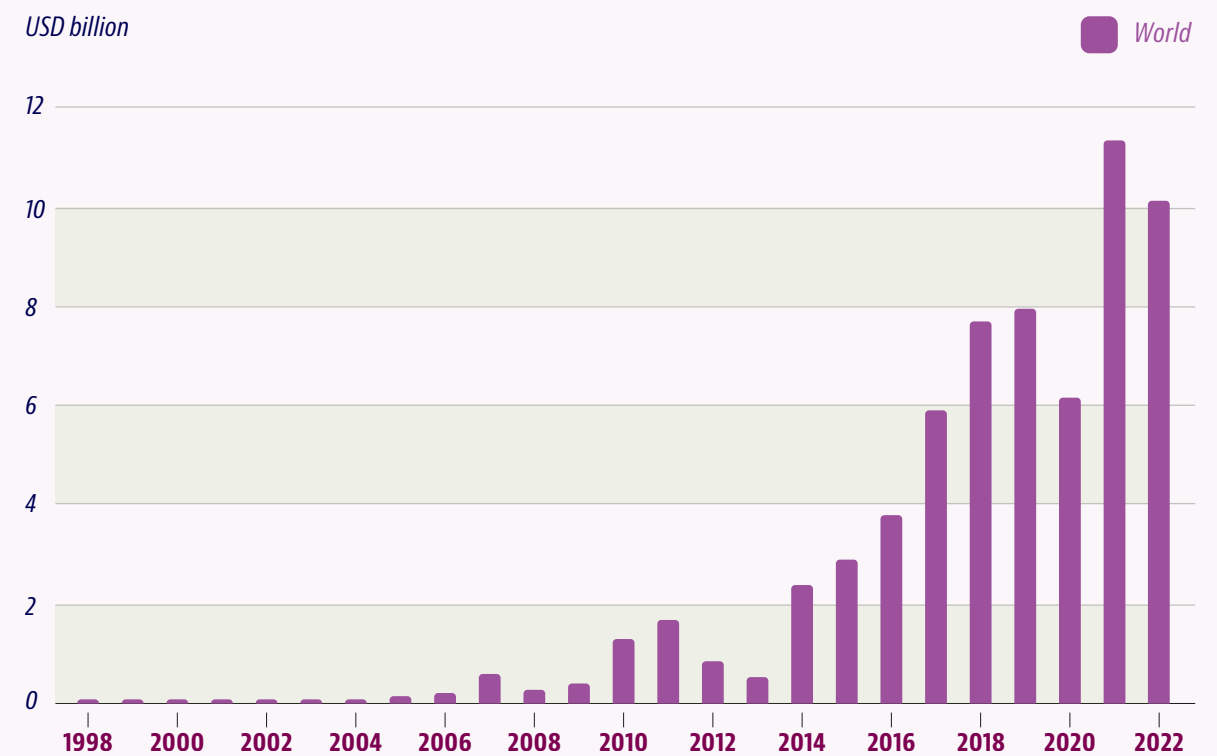
What the next generation of online interaction will look like is unknown. Whether virtual reality (VR) can truly become immersive, as promised in popular science fiction, while also being comfortable enough for people to use for long periods, is unclear. VR is currently attracting growing investments (Figure 2.13) and is a technological possibility in the coming decades. The technologies may become so high-quality that many people’s aversion to replacing physical reality instinctively dissipates, especially among younger generations born into a world where such technologies are readily available. This could mean that large portions of the population could have a vastly different relationship with the physical world in the future.

EMERGING EVIDENCE

- » Researchers at Stanford University created an educational VR experience that helps students visualise the negative impacts of ocean acidification (Virtual Human Interaction Lab, 2020_[172]).
- » Activities ranging from job training (Needleman and Dill, 2022_[173]) to physical therapy (Tugend, 2021_[174]) and church attendance (Australian Broadcasting Corporation, 2022_[175]) already occur in VR.
- » It has been suggested that the fall in working hours in the 2010s in men aged 21 to 30 is associated with increased access to sophisticated virtual leisure technologies (Aguiar et al., 2017_[176]).

FIGURE 2.13. *Worldwide venture capital investments in immersive technologies are expanding*

Annual investments in Augmented Reality (AR) and Virtual Reality (VR) start-ups, USD billion, 1998-2022



Source: (OECD Global Forum on Technology, 2023_[177]), “Immersive Technologies Brief”

POSSIBLE FUTURE



VR could transform education and children's lives.

Children could receive more of their education in virtual spaces with children from other countries and regions, learning about a far wider range of cultures and being exposed to the particular challenges facing different parts of the world. Immersive experiences could make the teaching of history or physics more interactive, help students visualise the potential dangers of climate change or inspire a passion for nature or animals. VR could also facilitate learning new languages, and enable access to high-quality teaching for rural and remote communities. Alternatively, virtual worlds, outside the purview of the education system, could pose risks such as being a distraction from productive learning or lowering physical activity levels – or worse, a source of harm in the form of abuse by anonymous users who gain access to children in vulnerable settings.



The growth of immersive technologies could enable a far greater range of social participation and creative expression, with both positive and negative consequences.

Some groups prone to social isolation, such as the elderly or people with disabilities, could gain access to a whole suite of social activities, without the barriers to participation that exist in the physical world. On the positive side, people could explore many different personas through different avatars, connect to like-minded communities around the world, and even create new forms of art. On the negative side, immersive virtual worlds could also have unforeseen implications for mental health, especially if they become addictive and drive social withdrawal and isolation. Moreover, people could be exposed to new forms of abuse through highly targeted forms of multisensory manipulation.



VR and other telework supporting technologies could enable more widespread remote work, enabling some degree of climate resilience and lowering environmental footprints.

People forced to relocate could stay connected more easily to friends and loved ones in different places. Online markets and businesses that are less bound by geographic constraints could also create less carbon-intensive economic development pathways for low- and middle-income countries. Significant portions of business or leisure travel may be less necessary, lowering the need for flights and personal vehicles. Urban areas could sustain higher population density through more efficient land use if people increasingly consume and socialise online. The consumption of some goods, such as clothing and fashion, may be dematerialised if the clothes worn by one's digital avatar become a more important expression of identity or status than those on one's physical body.

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

If virtual lifestyles result in less need for offline movement, policies focusing on the need for physical exercise may be required, and obesity levels could rise as citizens lead less physically active lifestyles.

Governments may need to explore ways of making it possible for citizens to engage with government services and potentially some forms of democratic processes – especially related to the collection and use of behavioural data generated through activities in immersive virtual worlds.

Governments may need to develop some form of data-sharing agreements with, as well as set privacy standards for, large immersive technologies companies that have access to their users' behavioural data in a world where people spend the majority of their time in immersive virtual worlds. If the data generated could help inform both public and private sector activities than what could be obtained from censuses, surveys or health registers, having clear frameworks derived from public consultation for who can use and access this behavioural data would be crucial. Highly granular data, including biometrics, could provide far better insights into the overall population's health, well-being and social preferences than what governments can obtain through conventional sources. If obtained ethically and used responsibly, this information could be used to improve public services and government interventions. Conversely, any mishandling of this process and data would lead to public criticism about government or corporate overreach into people's personal lives. Updates to legislation that governs data-sharing agreements and protects data at the national level may be required; programmes can be supported through the provision of information derived from traditional and alternative data sources (e.g. private data, citizen-generated data, big data).

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Embed human rights in all digital technologies and immersive environments, including VR and XR as well as virtual spaces, video game worlds and social media across their lifecycle (OECD, 2024_[178]). The landmark UN resolution on artificial intelligence adopted on 11 March 2024 stated that people have the same rights in online virtual spaces as they do in the physical world which must be respected and protected by governments and other actors (United Nations General Assembly, 2024_[179]).



Promote the interoperability of immersive technologies to limit monopolistic market power (European Commission, 2022_[180]). Support policy dialogue between policy makers and the researchers and firms creating emerging immersive technologies, such as through the Virtual and Augmented Reality Industrial Coalition platform organised by the European Commission (European Commission, 2020_[181]).



Ensure that both the economic and social dimensions of cybersecurity are key public policy priorities. Market forces may be insufficient on their own to promote and incentivise businesses, citizens and the public sector to manage their digital security risks adequately. Governments can provide incentives for digital providers to develop "secure-by-design" products (OECD, 2022_[182]). National digital security strategies should be implemented to provide a clear vision of objectives and responsibilities.



Utilise international co-operation to protect children in virtual worlds. The protection of children from online risks should be balanced with the opportunities and benefits of engaging in digital worlds (OECD, 2021_[183]). Enabling children's safe use of immersive technologies, paired with training education staff in understanding the ensuing opportunities and challenges, could be essential to young people developing valuable 21st-century skills (OECD, 2021_[20]). This likely requires adequate resourcing to enable safe and educational immersive experiences for children.



Support the development of a trusted and portable digital identity system where possible. Trusted and portable digital identity tools could act as safeguards against manipulation by bot accounts and other disinformation tactics. The 21st-century needs of citizens can be met by systems that work across borders while protecting privacy (OECD, 2021_[184]).



Support and empower children in learning how to navigate immersive technologies autonomously, safely and responsibly. This can help children, particularly those in vulnerable settings, navigate potential risks of immersive technologies use in their broader lives (such as lower physical activity levels, distraction from productive learning) and avoid harm (such as abuse by anonymous users). Students could also play a valuable role in shaping the use of these technologies in education as many students may be more comfortable with immersive technologies than their educators are.

BIOTECH
BREAKTHROUGH

CYBER SLOWDOWN

ARTIFICIAL
INTELLIGENCE LEAP

VIRTUAL
WORLDS

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY

POSSIBLE FUTURE DISRUPTIONS

ECONOMY



WELL-BEING ECONOMIES

Taking a more holistic view of societal success

POSSIBLE 2030-50 DISRUPTION

The promotion of good lives for all (diverse groups of people, the planet and future generations) becomes the core focus of governments and other actors. Coupled with new approaches to conceptualising and measuring well-being, a social and economic paradigm shift takes place that prioritises inclusive and sustainable well-being. Different standards for what constitutes a good life proliferate at the national, community and individual levels, leading to a more complex but transparent – and often participatory – policy-making process.
























CONTEXT

For two decades, the movement to broaden the definition of societal progress beyond economic growth (“Beyond GDP”) has been gaining momentum. Contributions from the OECD (OECD, 2023^[185]), the United Nations (UN System Chief Executives Board for Coordination, 2021^[186]) and the European Commission (European Commission, 2022^[187]) have been bolstered by political, academic, business and civil-society action from all over the world. Many countries have already embraced the notion that better measures of well-being are needed, further supported by a well-being framework developed by the OECD (Figure 2.14).

EMERGING EVIDENCE

- » OECD countries are increasingly implementing policies to promote diversity and social mobility (Balestra and Ciani, 2022^[188]). These include anti-discrimination legislation, affirmative action and incentives for firms to hire from a more diverse pool of candidates (OECD, 2020^[189]).
- » Most people in OECD countries are concerned about high income differences and inequality of opportunities. Income gaps at the subnational level have been increasing in OECD countries over the last two decades. Concerns over economic disparities and social mobility have risen in OECD countries over time, mirroring the rise of income inequality, as measured by conventional indicators such as those derived from household statistics (OECD, 2021^[190]). Similarly, concerns about climate change are driving citizens to demand sustainability and increasingly question the traditional growth model.
- » Several OECD countries have introduced government structures and roles, including at the ministry level, dedicated to well-being, mental health and loneliness. More than 70% of OECD countries have also enacted national frameworks, development plans or surveys with a well-being focus, which are published and updated regularly (OECD, 2023^[185]).
- » OECD countries undertake many different initiatives to strengthen their policies for enhancing child well-being policies. More than half of OECD countries have an integrated policy plan for child well-being – which is seen as an important vehicle for co-ordinating the child policy agenda – and develop institutional tools and implementation mechanisms for those plans (OECD, 2020^[191]; Dirwan and Thévenon, 2023^[192]).

FIGURE 2.14. *Measuring well-being and social progress at the OECD*

| CURRENT WELL-BEING | | RESOURCES FOR FUTURE WELL-BEING | |
|--|---|--|---|
| KEY DIMENSIONS | HOW WE MEASURE THEM | KEY DIMENSIONS | HOW WE MEASURE THEM |
|  <i>Income and wealth</i>  <i>Work and job quality</i>  <i>Housing</i>  <i>Health</i>  <i>Knowledge and skills</i>  <i>Environmental quality</i>  <i>Subjective well-being</i>  <i>Safety</i>  <i>Work-life balance</i>  <i>Social connections</i>  <i>Civic engagement</i> |  <i>Averages</i>  <i>Inequalities between groups</i>  <i>Inequalities between top and bottom performers</i>  <i>Deprivations</i> |  <i>Natural capital</i>  <i>Economic capital</i>  <i>Human capital</i>  <i>Social capital</i> |  <i>Stocks</i>  <i>Risk factors</i>  <i>Flows</i>  <i>Resilience</i> |

Source: Based on (OECD, 2020^[193]), *How's Life? 2020: Measuring Well-being*, <https://doi.org/10.1787/9870c393-en>

POSSIBLE FUTURE



The markers for societal and individual “success” may shift as well-being becomes an overarching goal of governments and citizens.



The notion of what it means to be a “successful” nation may shift towards countries that prioritise well-being, but are not necessarily the largest economies.

Certain sectors, such as teaching, caregiving and environmental conservation, could garner increased salaries and social status. Work-life balance may become a symbol of career success, and firms that offer attractive policies to support it would be more liable to attract talent. Trade-offs in terms of personal income may become more acceptable in exchange for sufficient gains in other areas of well-being, such as a sense of purpose or positive social relationships. Stakeholder demand, disclosure requirements, taxation or other regulations can provide incentives for businesses to focus on their long-term social impact over short-term profit.

Countries that develop best practices for improving citizens’ quality of life may become the preferred destination for high-skill immigrants, boosting productivity. These countries may also enjoy influence in the international sphere as trendsetters. The accession criteria to international organisations could change to include countries’ well-being performance, and international dialogues could include a broader range of participants. However, wealthy nations would still find it easier to maximise well-being. Debates about unequal opportunities between countries, and criticism of superficial attempts to “wellness wash” across sectors, may also become focal points of global discourse.

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Ensuring good lives and long-term sustainability would likely require fundamental changes in how governments allocate resources and design policies. Government investment may need to focus more on enabling people to flourish throughout their lives, from childhood to old age. This would require new analytical tools capable of evaluating policy options according to a multidimensional perspective of well-being, as well as participatory processes that reflect citizens’ beliefs about what matters for a good life.

Governments would need to explore carefully how they can ensure that jobs in key sectors remain sufficiently desirable should income become a less powerful motivator for young people entering the workforce. This may involve providing increased flexibility, or other perks and benefits to attract and retain younger generations with different personal and professional priorities.

Governments may need to develop mechanisms to monitor and manage “wellness-washing” by firms that seek to profit from the community focus on well-being. They may need to create forums for shared reflection on well-being and changing values to prevent the emergence of incompatible definitions of well-being that undermine economic interconnection. Broader transformations in a range of sectors would be required, for example, in how firms arrange their business models, skills and internal migration patterns, and how citizens use and access public spaces. Forums that garner citizen input would also enable global leaders in the field of well-being to share and spread the best practices governing the evolution of the global tax and trade system.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Support a dashboard of diverse well-being indicators (OECD, 2020_[193]). As no single metric is sufficient to measure well-being, the dashboard should leverage existing frameworks and include indicators of citizens' physical and mental health, their material conditions, societal disparities and environmental sustainability (OECD, 2023_[185]).



Collect disaggregated data on citizen well-being while protecting privacy and confidentiality. These data should help assess relevant factors, including age, gender, disability status, education and sexual orientation, which may explain group differences in well-being. Ideally, the data should be standardised to ensure comparability with international datasets (OECD, 2023_[185]). This collection should be done in ways that ensure the confidentiality and privacy of individuals is preserved.



Use relevant, clearly defined and measurable well-being metrics to guide decisions at all stages of the policy process. Such metrics would help identify the costs and benefits of different policy options and assign priorities for policy action (Jaquiere, 2022_[194]) (OECD, 2023_[185]).

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY



ACCELERATED CONVERGENCE

The African economic miracle expands the global middle class

POSSIBLE 2030-50 DISRUPTION

A collection of African countries leverage digital technologies, young populations, resource abundance and South-South co-operation to achieve levels of economic growth that surpass the expectations of the multilateral system. Some countries succeed in raising the same proportion of their populations out of poverty, and into middle and high-income status, in the 2030s as China did in the late 20th century and early 21st century. Globally, several hundred million people demand – and can afford – levels of consumption equal to those of Europeans. Large-scale leapfrogging occurs as countries in North Africa and other parts of Africa (including Botswana, Ethiopia, Ghana, Kenya, Namibia, Nigeria and Rwanda) increase their standards of living and consumption. Individual countries, existing regional bodies and some new organisations, such as the equivalent of the Organisation for Petroleum Exporting Countries (OPEC) for critical raw minerals, begin to play a larger role in global politics.

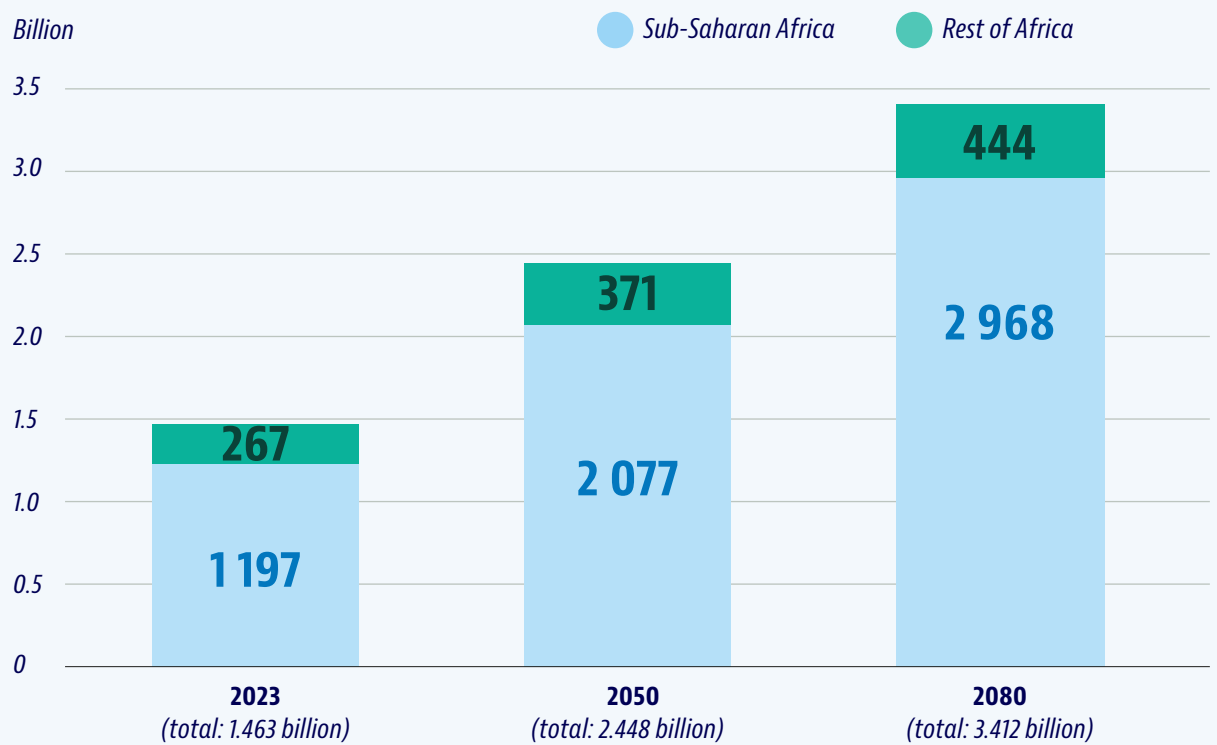
CONTEXT

The majority of the world's fastest-growing countries are in Sub-Saharan Africa, with the population expected to nearly double between 2023 and 2050 to reach 2 billion inhabitants, and to rise by another billion or so by 2080 (Figure 2.15) (United Nations Department of Economic and Social Affairs, Population Division, 2024_[195]). If this region were to experience something akin to the once-implausible economic boom in China and other Asian countries in the 20th century, this could significantly reshape the global economy. There is uncertainty about whether the gap in incomes and living standards between developed and emerging economies will persist. The legacy impacts of (i) the COVID-19 pandemic, (ii) the high debt levels of many low- and middle-income countries, and (iii) digital divides all risk exacerbating rather than narrowing inequalities of opportunity. However, with the right supporting social, digital and physical infrastructure, the youngest continent could thrive in a rapidly digitalising world.

EMERGING EVIDENCE

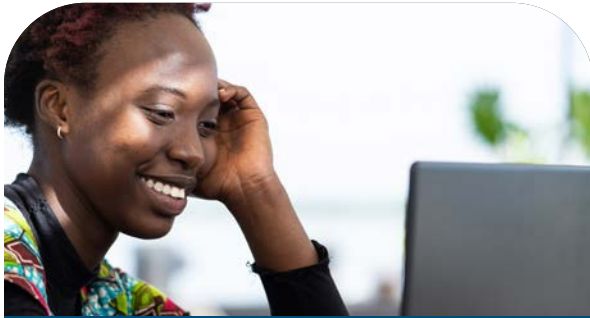
- » The African Continental Free Trade Area is the world's largest free trade area in terms of the number of member countries (The World Bank, 2022_[196]) (AUC/OECD, 2022_[197]).
- » Information and communication technology is a fundamental part of Africa's infrastructure budget. Tech companies such as Google (Reuters, 2021_[198]), Meta (2Africa, 2021_[199]) and StarLink (Iyanda, 2021_[200]) are investing heavily in digital development and connectivity in Africa (Pollio, 2022_[201]).
- » Emerging economies, including Guyana, Kenya, Ethiopia and Rwanda, have some of the highest rates of new enrolments in online learning, indicating a potential for significant upskilling through educational technologies (Wood, 2022_[202]).
- » Indonesia, Chile, Argentina and Bolivia have floated the idea of an OPEC-style organisation for lithium (Dempsey and Ruehl, 2022_[203]), and others have suggested this could be applied to a wider range of minerals as well (Treadgold, 2021_[204]).

FIGURE 2.15. Population in Africa is projected to grow significantly



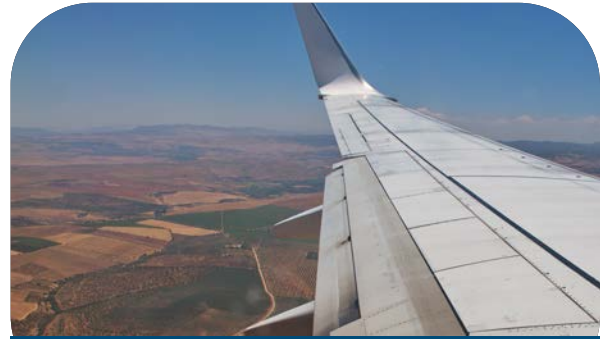
Source: Based on (United Nations Department of Economic and Social Affairs, Population Division, 2024_[195]), World Population Prospects 2024, <https://population.un.org/wpp/>

POSSIBLE FUTURE



Booming African markets could become a driving force for global economic growth.

African consumer behaviour may become a key factor in the success or failure of the net-zero transition. Investment in African businesses may mean that new products, including green technologies, can reach economies of scale more rapidly. Deeper economic ties may also mean OECD countries have a greater vulnerability to the risk of environmental disasters – and thus greater economic interest in helping to minimise and prevent them, as well as reducing the chance or extent of regional conflicts that might disrupt African economies.



Accelerated economic development could lead to significantly increased greenhouse gas emissions, stemming from higher demand for concrete and the increased number of flights taken by Africans.

This could lead to further encroachment on wildlife habitats, a higher consumption of meat and more waste overall, with significant negative environmental impacts.



Increased wealth may bring African states greater influence and obligations on the global stage.

There may be a more powerful push to reform global financial systems in ways that better align with the interests of emerging players. The relative importance of Western consumer markets could diminish and with it, the influence Western countries have over the rules of the international system. High-income countries may need to develop new policy levers to support a green transition and promote democratic values if there is less of a need to access their markets for businesses to succeed, and thus a lower incentive to meet the environmental standards enforced by those markets.

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Developing countries may prioritise the cost and speed of construction over environmental impact and high-income countries may need to ensure that sustainable and affordable options are available to their governments. In particular, developed countries may need to provide financial and fiscal incentives to support the use of sustainable building materials in housing and transportation infrastructure and to staunch the possible increase in emissions stemming from rapid economic and population growth in certain countries.

Multilateral agreements – including on climate – and even entire organisational structures may need to be restructured to reflect a new socio-economic reality. These new arrangements may need to be premised on expectations of equal levels of consumption and living standards for all people on all continents, which could change the extent of behavioural changes needed in high-income countries to mitigate climate change.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Build a partnership between OECD countries and African countries based on trust, mutual understanding, and enhanced co-operation on an equal footing. The report Towards an OECD-Africa Partnership (OECD, 2022_[205]) articulated a vision that promotes evidence-based policy analysis, knowledge sharing and peer learning. The OECD will seek to further integrate African nations into OECD databases and indicators to nurture policy dialogue and policy learning, which could require strengthening statistical systems in these nations. This partnership will build on the existing membership of multiple African nations at the OECD Development Centre and the OECD/G20 Inclusive Framework on Base Erosion and Profit Sharing as well as the longstanding tradition of the OECD annual International Economic Forum on Africa and the annual Africa's Development Dynamics report, produced in partnership with the African Union (AUC/OECD, 2023_[206]). Support may be needed for data production and alignment with international standards for measurement and reporting.



Restructure infrastructure investment to adapt to climate change and benefit from the digital transition. Mobilise private finance for inclusive, resilient and sustainable urban investment, strengthening cities' capacity to support transformation in a tight fiscal environment. Consider the opportunities and risks of innovative sustainable financing options, including green, social and sustainable bonds and loans, sustainability-linked bonds and catastrophe bonds (OECD, 2023_[207]).



Restructure the global governance architecture to give low- and middle-income countries a greater say in decision-making. The OECD Development Co-operation Report 2023 (OECD, 2023_[208]) acknowledges that geopolitical shifts have changed power relationships between OECD countries and emerging and developing countries, creating an urgent need to rebalance them. There exists an opportunity to reinvigorate the multilateral system's ability to address global challenges collaboratively and equitably.



Design policies to support a managed and just transition away from fossil fuels in developing countries. Policies should be informed by inclusive, sustainable and resilient low-carbon development strategies. Ensuring National Statistical Systems have resources and tools to accurately capture fossil fuel inputs/outputs through their national accounts will be important in the assessments. Promote coherence between supply-side and demand-side policies to avoid mismatches in fossil-fuel supply and demand, as well as disruptions in physical and financial global markets during the transition (OECD, 2023_[208]).



Look for innovative ways to prepare for a rapid upswing in the necessary infrastructure development. Africa's urban population has tripled since 1990 and is projected to grow by an additional 900 million people by 2050. Moreover, two thirds of the urban space Africa will possess in 2050 does not currently exist. This means that African cities need to build twice as much, in one third of the time in which the existing infrastructure was built (OECD, n.d._[209]).

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY



ENVIRONMENTAL- INDUSTRIAL COMPLEX

Wartime spending on climate action

POSSIBLE 2030-50 DISRUPTION

Finance ministries in several leading economies engage in large-scale climate-spending plans that rival the recovery and reconstruction plans in the wake of the Second World War. The world's richest governments de-risk investment in several green technology sectors, stimulating a boom in private investment. Green industries become the core of the global economy, and green businesses are the most powerful and profitable companies in the world.

CONTEXT

While significant progress is being made in terms of financing climate action (Figure 2.16), further steps are needed. The International Energy Agency's (IEA) World Energy Outlook 2022 calls for increasing clean energy investment from USD 1.3 trillion today to over USD 4 trillion in 2030 to align with its Net Zero Emissions by 2050 Scenario (OECD, 2023_[67]) (IEA, 2021_[210]) (IEA, 2022_[211]) (IEA, 2023_[212]). Mobilising this level of financing could have a transformative and unprecedented impact on the global economy.

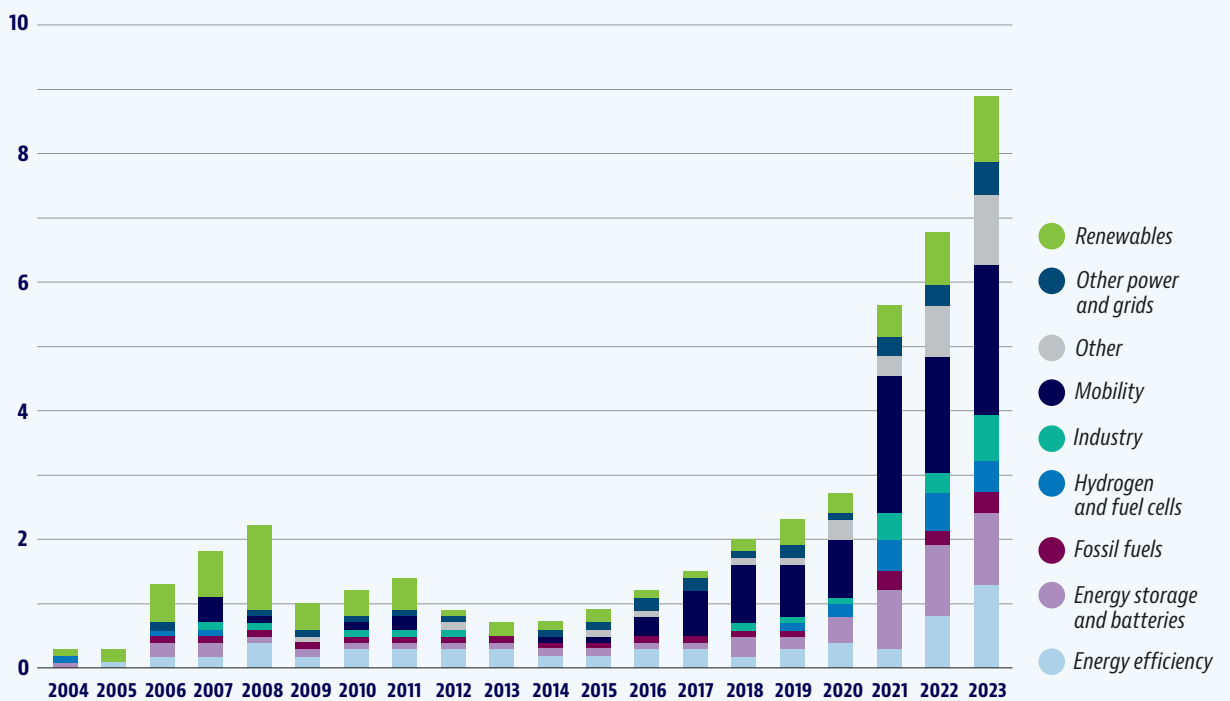
EMERGING EVIDENCE

- » The European Green Deal has been described as a “new growth strategy” that aims to decouple economic growth from increased greenhouse gas emissions (European Commission, 2021_[213]).
- » In the United States, the Inflation Reduction Act was expected to inject USD 370 billion in green investments to address the threats of climate change, as well as usher in a new era of innovation, economic opportunities and good jobs (White House, 2022_[214]).
- » The IEA estimates that 14 million jobs will be created worldwide by moving to a net-zero economy by 2030 and another 16 million workers will shift to new roles related to clean energy, 60% of which require some degree of post-secondary training (IEA, 2022_[215]).
- » Renewable-energy capacity has been growing steadily, surpassing 300 GW added for the first time in 2022. Solar photovoltaic makes up 60% of the increase in global capacity as countries around the world invest heavily in the green transition (IEA, 2022_[216]).
- » In the next decade, waste related to clean energy infrastructure reaching the end of its life cycle could increase 30-fold, a sign of potential environmental challenges emerging as an offshoot of the growth of green technology (European Environment Agency, 2023_[217]).

FIGURE 2.16. *Venture capital for green technologies surged globally in the last decade*

Venture capital funding invested in energy start-ups, by technology area, USD (2022) billion, 2004-2023

USD billion



Source: (IEA, 2023_[218]), *Venture capital investment in energy start-ups, by technology area, for early-stage deals, 2004-2023 (database)*, <https://www.iea.org/data-and-statistics/charts/venture-capital-investment-in-energy-start-ups-by-technology-area-for-early-stage-deals-2004-2023-2>.

POSSIBLE FUTURE



As green industries grow in influence and power, tensions could emerge between state-supported green businesses and broader social and environmental goals.

Scaling up green industries would require large amounts of raw materials, often found on lands indigenous peoples consider sacred, or in delicate ecosystems.



The number of meaningful green jobs could be underwhelming in some regions.

Some green industries may be labour-intensive. Others, however, may be highly specialised and automated, resulting in far fewer green jobs than anticipated, with those available requiring considerable upskilling. This could exacerbate tensions and generate negative perceptions of expanding green industries (OECD, 2023_[219]).



Greenhouse gas emissions would decrease rapidly, but societal challenges in terms of public perceptions of fairness could emerge.

Green industries could derive large financial gains from winning government contracts, which could lead to perceptions of corruption or profiteering, especially if this coincides with significant job losses in some sectors or areas. The rapid infusion of large sums of public funding into emerging industries could lead some companies to “greenwash” in an attempt to secure financing.

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

In the event of high profitability of initially heavily subsidised green industries, windfall taxes may be required to ensure that increasingly automated green technology businesses – including several former fossil-fuel companies – share their profits to fund just transition policies that benefit populations whose lives or livelihoods are disrupted by climate change or the green transition.

Governments should be prepared to resolve disputes between green businesses geared towards emissions reduction, and grassroots groups intent on protecting biodiversity and promoting indigenous rights.

Governments may need to bolster competition policies and plans for diversifying energy sources if dominant players in the energy industry are replaced by others with even larger market power.

Governments may need to scale up oversight capacity to prevent “greenwashing”, but without delaying the speed of investment. Strategies to build societal resilience to false information and greenwashing will need to carefully balance the threat of greenwashing with the risks associated with highlighting undesired behaviours.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Develop and nurture institutional mechanisms and participatory processes that promote consensus and a shared long-term vision that underpins a new sustainable social contract. The green transition is a once-in-a-generation opportunity to build a more cohesive society, but the potential for large-scale shifts in resources involved in this economic transformation could trigger division if not well-managed. Governments would be well-served to involve citizens, civil-society groups, underrepresented groups and local communities in the development of net-zero strategies, to ensure they align with societal values and promote shared prosperity (OECD et al., 2022_[220]).



Mainstream biodiversity protection and nature-based solutions in net-zero strategies to restore ecosystems. In some areas, nature-based adaptation may be more cost-effective, with the added benefit of maintaining ecosystem health (OECD, 2019_[13]). It is also important to identify and prioritise adaptation policies that provide investments in, and incentives for, restoring or protecting biodiversity and ecosystem services (OECD, 2022_[1]).



Provide access to sustainable finance to SMEs to help them align with environmental, social and governance (ESG) standards. SMEs have a significant aggregate environmental footprint and need to adopt cleaner business models. Addressing the climate crisis requires millions of SMEs globally to transition to net zero. Additional support and financing will be required to help SMEs meet ESG standards that are primarily designed with larger firms in mind and can be difficult for organisations with limited resources to meet (OECD, 2022_[221]).



Facilitate the decarbonisation of the economy through reallocation of capital, reskilling and low-carbon innovation. Build social and political support for decarbonisation to support low-carbon industries. Prioritise policies designed to incentivise and support the adoption of green technologies, coherent long-term infrastructure planning and private investment (D’Arcangelo et al., 2022_[222]). Carefully consider the possible labour and reskilling needs for a decarbonised economy.



Diversify public investments in searching for, developing and deploying a portfolio of green technologies, while also considering the potential trade-offs created by these technologies (OECD/The World Bank/UN Environment, 2018_[223]). Encourage public-private partnerships and collaborative platforms supporting low-carbon innovations. Inform citizens and businesses about the need for technological shifts to support low-carbon transformations in behaviour, knowledge, lifestyles and economic activity. Build cross-government co-ordination to ensure that policy efforts supporting green innovation and technology deployment are distributed across many different policy areas (OECD, 2023_[224]).

CRYPTO CENTURY

A blockchain boom follows a crypto winter

POSSIBLE 2030-50 DISRUPTION

The crypto market reaches a total valuation of over USD 10 trillion as many governments adopt enabling regulations. Most investors, including pension funds and sovereign wealth funds, have significant shares of their portfolios in crypto assets – despite their volatility – due to superior returns. The role of banks in international financial systems is diminishing as crypto assets disintermediate the financial system. This global economic shift has brought some benefits in terms of financial inclusion but has also exposed many more people to fraudulent behaviour, which is increasingly frequent. Several non-OECD countries have begun to use crypto-assets as legal tender. Beyond crypto assets, new, widely available blockchains enable very low transaction costs and are adopted by small businesses, as well as major banks and large-scale retailers, as payment rails and product tracking mechanisms.

CONTEXT

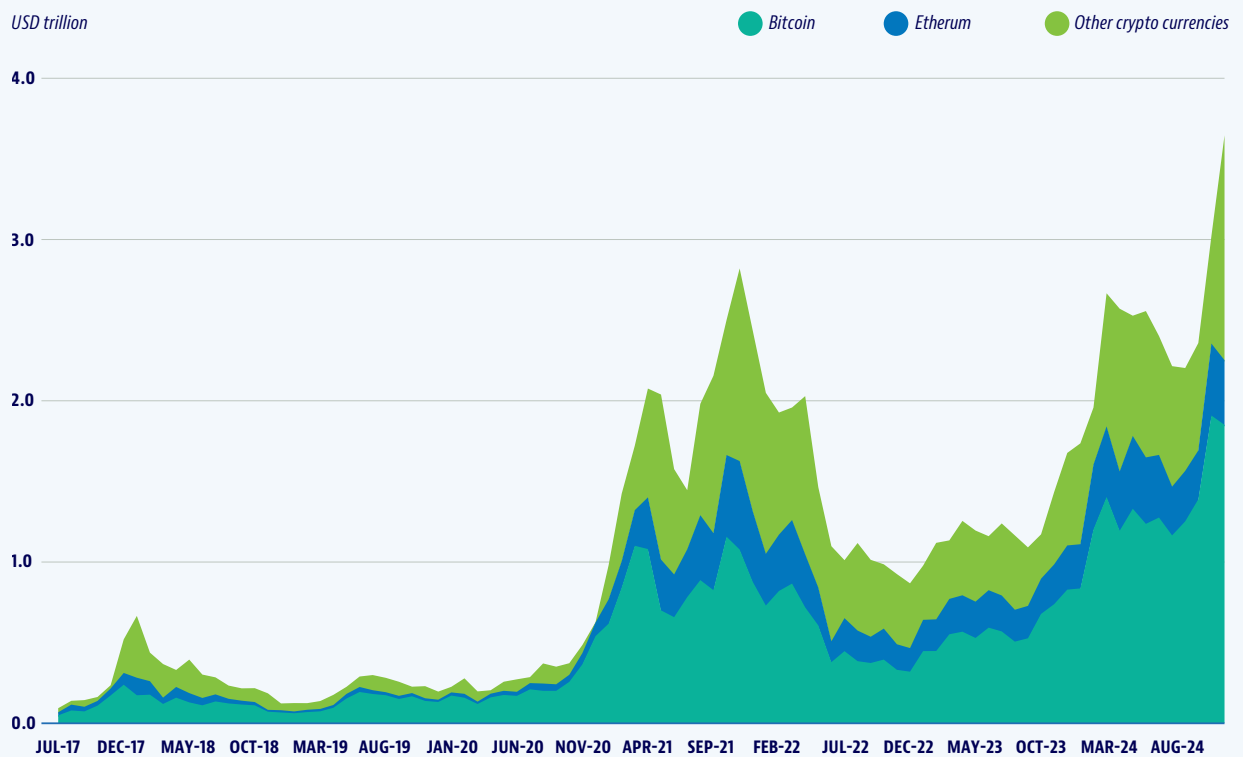
Proponents of blockchain technology, including some of the biggest names in the tech and venture-capital world, have lauded the potential of blockchain to transform the economy. At one point in 2021, Bitcoin's market capitalisation surpassed USD 1 trillion, and Ethereum had a market capitalisation of nearly USD 500 billion (Figure 2.17). However, crypto-assets are extremely volatile, as they fell in 2022 and have recovered strongly more recently. There were collapses in the crypto market at multiple points in 2022, prompting calls for better oversight and regulation (OECD, 2022_[225]). The disappearance of over USD 1 billion in customer funds from the crypto exchange FTX (Reuters, 2022_[226]) and the collapse of the Terra blockchain ecosystem have hurt faith in the crypto market (Deffenbaugh, 2022_[227]). Still, blockchain technologies and the emerging world of decentralised finance maintain a significant amount of disruptive potential (OECD, 2022_[228]) (OECD, 2022_[229]).

EMERGING EVIDENCE

- » Cryptocurrencies are increasingly popular in emerging and developing economies, with trading volumes in sub-Saharan Africa equalling those of North America. El Salvador became the first country to accept Bitcoin as legal tender in 2021, soon followed by the Central African Republic. The US city of Miami (Florida) launched a city-branded cryptocurrency project in 2021 (Wolfson, 2021_[230]).
- » Bitcoin used around 150 terawatt-hours of electricity in 2021 (Cambridge Bitcoin Electricity Consumption Index, 2021_[231]), more than the whole of Argentina that year (OECD, 2022_[232]). Some companies hope to avoid this excessive power consumption by switching the consensus mechanism for blockchains from proof of work (based on expended computational effort) to proof of stake (based on holdings in the associated crypto-assets) (Coroamă, 2021_[233]) (Castor, 2022_[234]).
- » On 10 January 2024, the US Securities and Exchange Commission approved the listing and trading of a number of spot bitcoin exchange-traded product shares. SEC chair Gary Gensler deemed this approach the most sustainable path forward, while noting that investors should remain cautious given the risks associated with bitcoin and crypto-assets (U.S. Securities and Exchange Commission, 2024_[235]).

FIGURE 2.17. *Crypto-assets experienced an important sell-off in 2022 and have recovered since*

Market capitalisation, USD trillion, July 2017 - December 2024



Source: OECD calculations. Adapted from (CoinMarketCap, 2024_[236]) Global Live Cryptocurrency Charts & Market Data, <https://coinmarketcap.com/charts/>

POSSIBLE FUTURE



Crypto-assets may bring major gains in terms of financial inclusion and economic decentralisation, but also further expose vulnerable populations to fraud and enable money laundering.

Financial inclusion may improve well-being and drive upward mobility of communities around the world. Crypto-assets may allow migrants to send remittances more easily to relatives abroad, which could become crucial if climate change or conflicts force large-scale migration. However, vulnerable populations in particular could be lured into scams or fraud, or simply find themselves unable to cope with the volatility of crypto markets. Decentralised finance could also enable organised crime to launder money at an unprecedented scale, in addition to facilitating corruption and foreign political influence that could undermine the rule of law and democracy.



Blockchain applications could produce efficiency gains for a wide variety of businesses, driving economic growth in parallel with greater economic volatility associated with higher use of crypto-assets.

Firms may develop more efficient ways of managing supply chains and tracking products, making it easier for companies to scale up (Bianchini and Kwon, 2020^[237]). Many of the services provided by financial middlemen and platform companies may become obsolete unless they adapt rapidly to a new economic reality. Governments, especially those not trusted by their populations, may lose revenues if they cannot control or adequately tax crypto-assets. Monetary policy transmission may be less effective as crypto-assets allow circumventing capital controls, and could ultimately lead to currency substitution. Cryptocurrencies could also disrupt monetary policy by reducing the demand for fiat currencies and diminishing the ability of monetary authorities to set interest rates. There also exists a risk that the growth of stablecoins (cryptocurrencies pegged to other assets) results in a scarcity of safe assets, reduces banking intermediation (in that holdings of crypto-assets replace bank-deposits), and in turn, harms credit creation.



Global energy demand may increase significantly at a time when governments have fewer levers to fund large-scale infrastructure projects.

Greater renewable-energy capacity may be needed to sustain a blockchain-based economy while still meeting net-zero commitments. Governments may need to consider trade-offs between the use of renewables for blockchain and more productive uses elsewhere in the economy (OECD, 2022^[238]).

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to invest in educational and financial literacy programmes to ensure citizens can flourish in the new digital economy, rather than fall victim to scams and fraud. Governments should consider enacting transparent regulation and standard setting for digital assets and cryptocurrencies and developing sufficient monitoring and oversight capacity for cryptocurrencies.

Additionally, governments may need to own substantial quantities of the most powerful cryptocurrencies to be able to engage meaningfully in various online markets. Central banks may need to start issuing digital currencies in order to regain influence on monetary policy, the financial system and the economy.

In a world where the electricity demands of crypto-assets mining increase exponentially, governments may have to increase renewable-energy capacity to successfully undertake their net-zero transitions. Barring interventions that promote more environmentally friendly forms of cryptocurrency mining, countries could find their renewable-energy infrastructure is unable to meet the total electricity demand.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Encourage the widespread adoption of consistent and comprehensive regulation. The Financial Stability Board has a global regulatory framework for crypto-asset activities. Widespread adoption and reinforcement of these standards, including in developing countries, is necessary to embrace opportunities and limit risks (Financial Stability Board, 2023_[239]).



Incentivise climate-friendly crypto innovation. The European Parliament and EU Member States mandated that crypto companies disclose the environmental impact of their operations as part of the “Markets in Crypto-Assets” law (Jenkins, 2022_[240]), which aims to make Europe a home for crypto innovation while reducing companies’ climate impact (EPP Group, 2022_[241]). This requirement may encourage a larger industry shift towards less energy-intensive proof of stake (Smith-Meyer, 2022_[242]) instead of proof of work, although an amendment to phase out proof of work entirely was defeated.



Increase resilience to the risk of shocks in traditional financial markets. Increasing interconnectedness between crypto-assets and traditional financial markets could cause spillover shocks in traditional markets as a result of bad actors, or other unintentional shocks in the crypto-asset markets (OECD, 2022_[243]).



Foster a transparent and inclusive blockchain industry with clear rules and regulations. Industry rules and norms should be developed through inclusive and multi-stakeholder processes. They should also ensure that the roles and responsibilities for managing blockchains are clearly defined, and that any changes to blockchain frameworks, codes of conduct or regulations are communicated promptly (OECD, 2022_[244]).



Enact policies to encourage energy efficiency, demand response and clean-energy procurement for digital services. While significant progress has been made, both government and industry should strive to lower the emissions from data centres and data-transmission networks, which currently make up 2.5-3% of global electricity use (IEA, 2023_[245]). Stronger requirements for transparency could shed light on the energy demands of data centres. Significant additional government and industry efforts to promote energy efficiency, R&D, and decarbonising the electricity supply and supply chains will be necessary to curb energy demand and align with net-zero policy goals by reducing emissions rapidly over the coming decade.

WELL-BEING ECONOMIES

ACCELERATED CONVERGENCE

ENVIRONMENTAL-INDUSTRIAL COMPLEX

CRYPTO CENTURY



GREEN TECH FAILURE

TRANSPARENT ENVIRONMENT

CAPTURED CARBON

POSSIBLE FUTURE DISRUPTIONS
GREEN TECH



GREEN TECH FAILURE

Tech shortfalls necessitate larger behavioural shifts

POSSIBLE 2030-50 DISRUPTION

Technological progress in the 2020s and 2030s is underwhelming in several key areas related to the net-zero transition. Cost-effective technologies in heavy transport, aviation, battery storage, electricity transmission and distribution, and carbon capture do not materialise at the expected rates. Significant investments in several green sectors do not bring beneficial returns for investors or consumers. There are major barriers to technology transfer and scale-up in sectors that do experience progress, further limiting the diffusion of sustainable products and infrastructure, especially to low- and middle-income countries.

CONTEXT

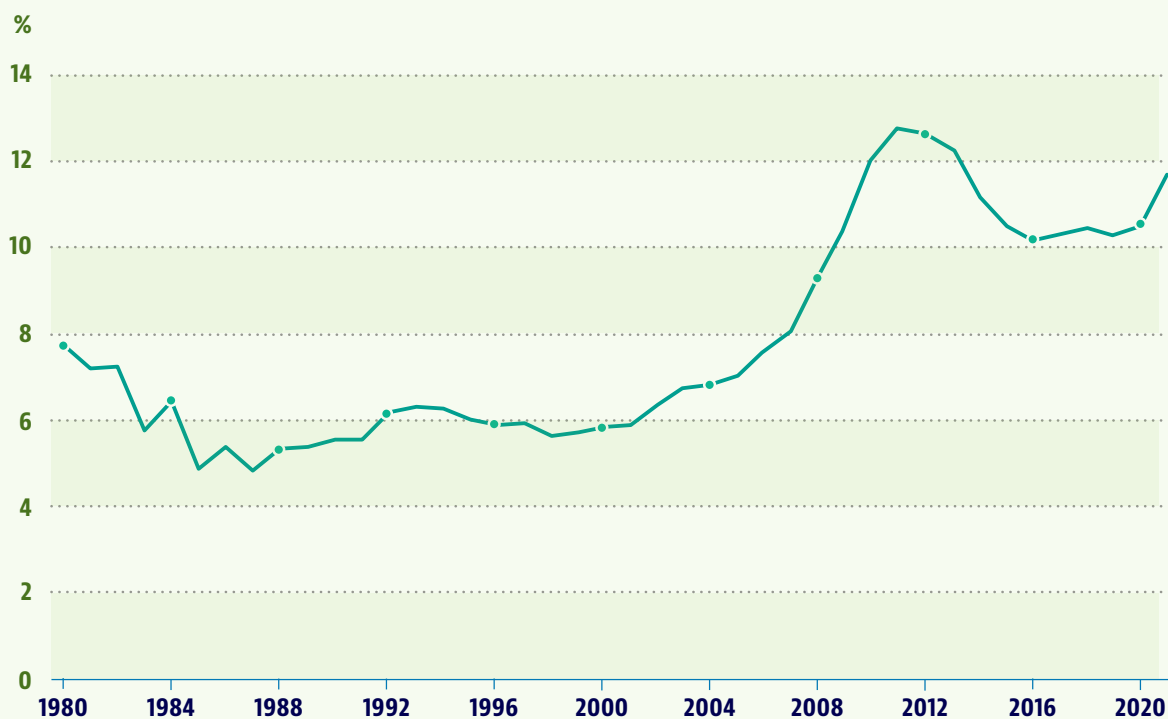
Nearly all net-zero transition strategies will require significant technological breakthroughs to succeed. According to the sixth IPCC report, most 1.5°C and 2°C global warming pathways are heavily reliant on large-scale carbon dioxide (CO₂) removal before the middle of the century (Rogelj et al., 2022_[246]). Around 35% of the emission-reduction technologies by 2050 laid out in the IEA's Net Zero Roadmap are only in the demonstration or prototype phase today (IEA, 2023_[212]). Progress is required on batteries for electric vehicles, especially for heavy transport; more sustainable forms of jet fuel and shipping; and the transport and storage of renewable energy. Moreover, significant strides must be made in affordable carbon capture, utilisation and storage.

EMERGING EVIDENCE

- » The OECD Green Recovery Database (OECD, 2022_[247]) shows that COVID-19 recovery packages, which provided a unique opportunity to accelerate low-carbon innovation, made a welcome contribution to net-zero goals but fell short in some key areas for the development of green technologies. Only 8% of spending focused on green-growth research and development (R&D) and 2% on improving green skills, and a large gap remained in terms of private-sector financing of net-zero globally (OECD, 2022_[248]).
- » A group of economists has postulated that the pace of technological progress may be slowing as innovation hits a point of diminishing returns (Bloom et al., 2020_[249]), and there is growing evidence that the pace of low-carbon innovation is not in line with the climate neutrality goal (Figure 2.18) (Cervantes et al., 2023_[250]).
- » Carbon capture, utilisation and storage (CCUS) requires significant financial support to enable its deployment at scale, and some of the largest projects have failed to meet their target volumes (IEA, 2021_[251]).

FIGURE 2.18. *Global low-carbon patenting efforts have been stagnant*

Climate-related inventions as a share of inventions in all technology areas, percentage, 1980-2021



Note: Data refer to families of patent applications filed under the Patent Cooperation Treaty. Low-carbon patents included are climate-change mitigation technologies related to buildings; information and communication technologies; the production or processing of goods; transportation; and wastewater treatment or waste management; reduction of greenhouse gas emissions related to energy generation, transmission or distribution; and capture, storage, sequestration or disposal of greenhouse gases.

Source: Adapted from (Cervantes et al., 2023_[250]), Driving low-carbon innovations for climate neutrality, <https://doi.org/10.1787/8e6ae16b-en>; and (OECD, 2023_[252]), "Intellectual property (IP) statistics and analysis", webpage, <https://www.oecd.org/sti/intellectual-property-statistics-and-analysis.htm>

GREEN TECH FAILURE
TRANSPARENT ENVIRONMENT
CAPTURED CARBON

POSSIBLE FUTURE



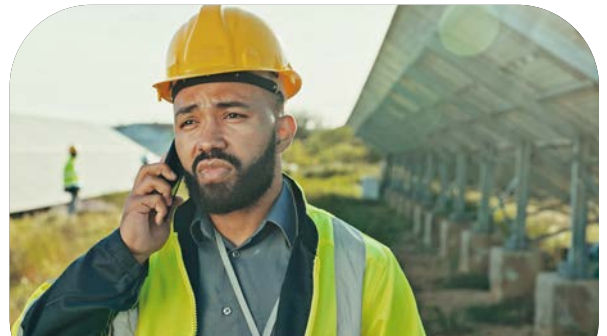
If green technology innovation falls short, successful net-zero transitions may need to rely far more heavily on behavioural shifts or risky forms of geoengineering, such as solar radiation modification.

This may occur at a time of public loss of confidence in government and industry to deliver the necessary breakthroughs, which could make it harder to mobilise support for collective efforts to mitigate climate change.



Lagging innovation rates for green technologies could be a major challenge for a just transition globally if low- and middle-income countries can only develop in ways that increase emissions.

Development assistance to developing economies may be diminished if high-income countries fear that economic growth in low- and middle-income countries may lead to substantial increases in global emissions, and thus offset their efforts to curtail domestic emissions.



The failure of the green tech innovation to materialise could have major economic and labour repercussions.

There could be a large-scale loss of faith among investors who fear diminishing economic returns, and funds may continue to flow into high-emitting industries. Even if countries can reduce fossil-fuel production, there could still be a challenge on the labour front if job losses in extractive industries are not offset by equivalent job creation in emerging green sectors or other high-growth sectors.

GREEN TECH FAILURE

TRANSPARENT ENVIRONMENT

CAPTURED CARBON

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

If innovation does not materialise, governments may need to spend substantially more on the deployment and procurement of green technologies than they currently expect.

To avoid a climate catastrophe, governments may need to rapidly push through carbon-austerity measures and other mechanisms to reduce global emissions through behavioural shifts or risky forms of geoengineering, such as solar radiation modification. These potentially drastic interventions to limit emissions could have heavy financial and social costs.

Governments may look to allow more transformative behavioural shifts that minimise transportation emissions and spatial requirements, enabling greater urban densification. If a drastic reduction of emissions reductions is required, giving people a way to connect socially through immersive technologies that produces a smaller physical footprint may help relieve stress on infrastructure. However, the possibility of a greater physical footprint as a result of people being freed to move away from cities must also be considered.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Substantially increase funding for green technologies. There exist significant shortfalls in the necessary funding for the development of the green technologies required for net-zero transitions (OECD, 2022_[253]). In particular, science, technology and innovation policies should be rebalanced to emphasise research, development and demonstration stages for near-zero emission technologies that are not yet mature (Cervantes et al., 2023_[250]). Governments may facilitate the deployment of green technologies at scale and reduce costs by committing to large-scale public procurement in the near term, as well as investing in inclusive science, technology, engineering and mathematics education to cultivate an innovative and diverse workforce.



Incorporate policies to achieve greater behavioural changes in net-zero transition plans. Net-zero transitions cannot fall into a “science, technology and innovation only trap” (OECD, 2022_[253]) – they must take a holistic and whole-of-economy approach. Governments should also ensure contingency plans to achieve a transition through greater behavioural shifts if technological progress proves elusive or too costly.



Conduct in-depth assessments of the mineral, material and manufacturing requirements for the green and digital transitions under various global scenarios. This could help identify the appropriate policies for managing supply chains for green technologies, as well as provide a better understanding of how the necessary inputs should be sourced to support the net-zero transition.

GREEN TECH
FAILURE

TRANSPARENT
ENVIRONMENT

CAPTURED
CARBON



TRANSPARENT ENVIRONMENT

Real-time data increase environmental accountability

POSSIBLE 2030-50 DISRUPTION

Increased investment in satellite infrastructure and other real-time sensing technologies allows identifying and measuring a vast array of environmental variables, including greenhouse gas emissions, at a highly granular level. Large volumes of data on the natural world as well as emissions at the household and business levels are constantly generated, processed in real-time and made publicly available.

CONTEXT

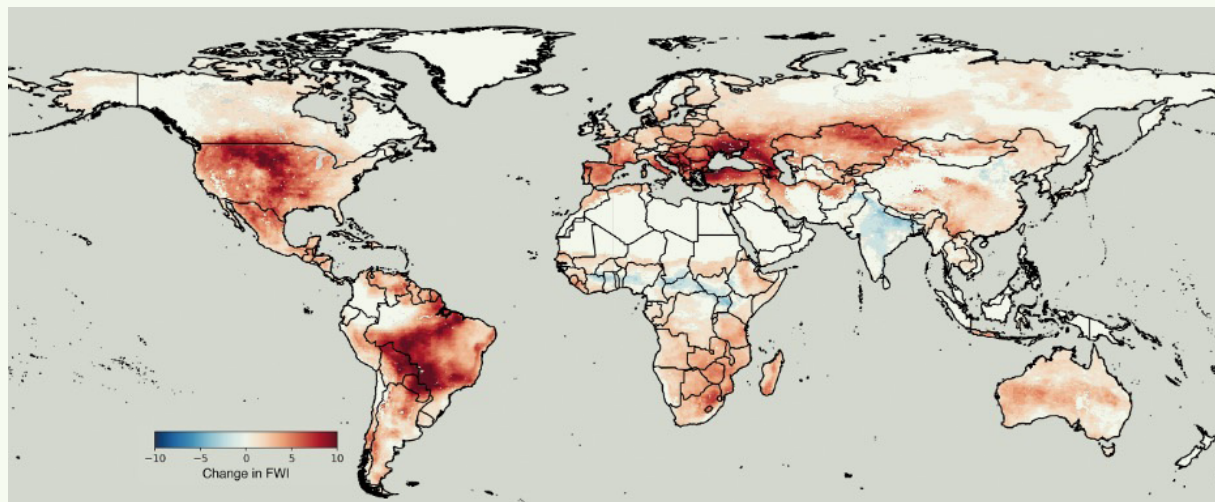
The European Space Agency is currently launching a fleet of satellites through the Copernicus Atmosphere Monitoring Service (Copernicus, 2023_[254]) which will enhance existing evidence from spatial data (Figure 2.19) and pinpoint greenhouse gas emissions resulting from human activity. The data will be available on an open-source platform (IEA, 2022_[255]). This initiative could bring newfound transparency to climate-change estimates, which have relied on measurements by countries and businesses that may not have strong incentives to adequately report their emissions.

EMERGING EVIDENCE

- » Nearly 90 countries had a satellite in orbit as of October 2021 (OECD, 2022_[256]), and tens of thousands of satellites will be launched over the next 5 years (OECD, 2022_[257]).
- » Satellite data showed that methane emissions, which have accounted for nearly one-third of global warming since the Industrial Revolution, are 70% higher than official figures (IEA, 2022_[258]), opening the possibility that other environmental metrics have also been significantly underreported.

FIGURE 2.19. *Climate-related hazards are likely to intensify if global temperatures keep rising*

Spatial distribution, change in the “fire weather index” by 2045



Note: Map showing the global change in the “fire weather index” (FWI) predicted by the study’s analysis for the year 2045 (where red: greater extreme fire weather; blue: less). The FWI metric includes a combination of conditions, including low rainfall and high winds, which together increase a region’s extreme fire weather conditions.

Source: (NASA, 2023_[259]), “NASA Study Reveals Compounding Climate Risks at Two Degrees of Warming”, <https://climate.nasa.gov/news/3278/nasa-study-reveals-compounding-climate-risks-at-two-degrees-of-warming/>

POSSIBLE FUTURE

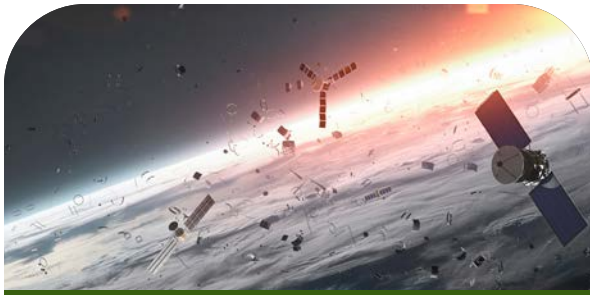
Publishing real-time, open-source emissions data could be a powerful tool to increase corporate and government accountability for environmental action.

The abundance of detailed environmental data from satellites could bring awareness that far more ambitious environmental action is necessary, thereby facilitating the testing, scale-up and evaluation of climate interventions.

GREEN TECH FAILURE
 TRANSPARENT ENVIRONMENT
 CAPTURED CARBON

Companies may feel heightened public pressure to green their supply chains or face consumer boycotts. Open-source data could assist civil society in advocating for more government assistance to vulnerable people in transitioning to greener ways of living, or stronger responses to threats to biodiversity. However, greater monitoring by civil society could lead to a backlash in high-emitting authoritarian states. It could also enhance global awareness of inequalities in emissions among various socio-economic groups.

Better data could provide a stronger rationale for interventions to protect the environment or biodiversity, especially if these data demonstrate a significant underreporting of emissions globally. The increased quantity and quality of data could also reveal the higher risk of crossing environmental tipping points, as well as exposure to a potentially even more severe climate emergency. The improved ability to test climate interventions such as geoengineering (e.g. solar radiation modification) could provide new options for policy makers looking to avert worst-case climate scenarios or develop less economically and socially disruptive net-zero transition strategies. It could also facilitate the evaluation of interventions, especially those targeted at hard-to-reach and remote populations.



The significant increase in the number of satellites in orbit, launched for telecommunications, environmental monitoring or other purposes, could compound the risks related to space debris, such as satellite collisions.

A cascading set of collisions would significantly undermine humanity’s ability to develop space-based infrastructure, hampering several space-derived services such as weather forecasting, navigation, telecommunications and climate monitoring. Such challenges would be especially acute in remote areas that rely more heavily on satellite-derived services.

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments could impose evidence-based penalties based on satellite data for excessive greenhouse gas emissions from companies or countries that have hidden or otherwise underreported emissions.

Countries could begin controlled and co-ordinated geoengineering experiments if satellite data reveal that radical policy action is required to avert catastrophic climate change.

Cities and regions may enact new urban planning and changes to the built environment, including through urban greening and policies targeting heat islands and higher pollution levels in certain areas.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Strengthen international co-operation and co-ordination of data- and space-based activities. The OECD Handbook on Measuring the Space Economy highlights the importance of co-operation between governments, industry and academia in making effective decisions about the future of the space economy (OECD, 2022^[256]). Government collaboration to make data and imagery from their satellite constellations available open source should be considered, for example, through international collaborations like the UN Global Platform.



Dedicate resources to better mitigate risks of space debris to enable the sustainable growth of space-derived services. The OECD Space Forum estimates that the worldwide losses from a catastrophic collision of space debris could be as high as nearly USD 200 billion (OECD, 2022^[257]).

GREEN TECH FAILURE

TRANSPARENT ENVIRONMENT

CAPTURED CARBON



CAPTURED CARBON

Carbon capture alters the climate-policy landscape

POSSIBLE 2030-50 DISRUPTION

Major steps forward in carbon capture, utilisation and storage (CCUS) technologies have significantly changed the emissions reduction landscape. CCUS technologies experienced a massive price drop and increased deployment in the late 2020s and early 2030s, much as solar energy technology did in the 2010s and early 2020s. The capacity to store larger quantities of carbon than expected is reached much earlier than was initially assumed. Hopes that these technologies will continue to rise as the technologies become even more affordable and widely distributed distract attention from wider climate and environmental issues.

CONTEXT

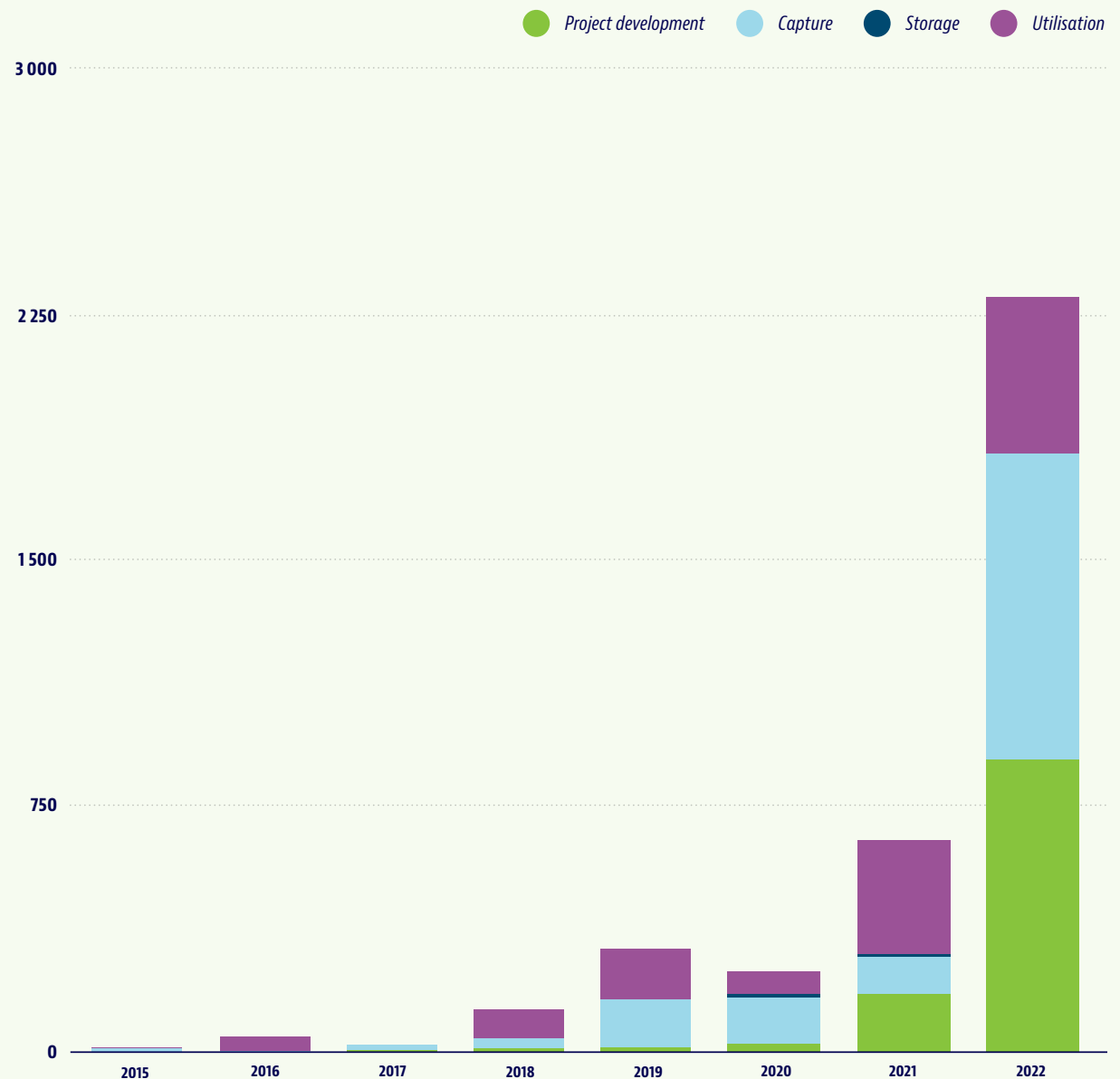
CCUS is a major X factor that could shift how drastically CO₂ emissions need to be reduced to fulfil net-zero emission pledges. The IEA's NZE Scenario points to a need for 1gigatonne (Gt) of carbon to be captured annually in 2030 and 6 Gt in 2050 (IEA, 2022_[260]), representing 3% and 18% respectively of the 33 Gt of global energy-related CO₂ emissions in 2021. To date, the deployment of CCUS technologies has been difficult and progress slow (Robertson and Mousavian, 2022_[261]). However, learning curves for carbon capture technologies may mirror those of solar energy and bring costs down rapidly as the technologies are deployed at scale.

EMERGING EVIDENCE

- » Venture capital investments in CCUS more than doubled between 2019 and 2021 (Figure 2.20). As of 2022, 35 commercial facilities were applying CCUS, with a total annual capture of 45 million tonnes (Mt) of CO₂ (IEA, 2022_[262]).
- » Direct uses for CO₂ are growing as well, including in food and beverage production; yield boosting in greenhouses; and fuels (including for aviation), chemicals and construction. However, the climate benefit of CCUS is limited for applications (such as fizzy drinks) that quickly re-release CO₂ into the atmosphere.
- » In cement production, CCUS is currently the only solution for reducing emissions at scale. Likewise, in the iron and steel sector, CCUS is the most advanced and cheapest option for emission reduction (IEA, 2021_[263]).

FIGURE 2.20. Investment in carbon capture, utilisation and storage (CCUS) was record-high in 2022

Venture capital investments in CCUS projects and companies, USD million, 2015-2022



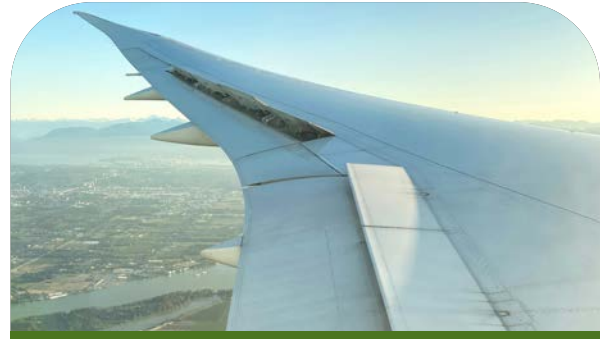
Source: (IEA, 2023_[264]), Annual venture capital investment in CCUS projects and companies, 2015-2022 (database), <https://www.iea.org/data-and-statistics/charts/annual-venture-capital-investment-in-ccus-projects-and-companies-2015-2022>

POSSIBLE FUTURE



Major advances in CCUS – beyond what is currently projected in the IEA's NZE Scenario – could provide room for manoeuvre if progress in other important areas for emissions reduction falls short.

While this may be a major relief in hard-to-decarbonise sectors, breakthroughs in CCUS could lead to underinvestment in emissions reduction or complacency in other sectors (e.g. transportation, energy and agriculture). Interest groups could begin to lobby for relaxing emissions reduction standards relevant to their industries, including potentially lowering the price of carbon.



Significant breakthroughs in CCUS could mean that more emissions-intensive development models may still be an option for emerging economies.

This could contribute to faster economic growth and rising standards of living in the developing world. New infrastructure could be built more quickly if there were fewer concerns about the emissions related to large-scale constructions. There may also be less pressure to reduce air travel if a larger amount of sustainable aviation fuel can be sourced affordably through CCUS, resolving the present-day issues related to the very high costs of sustainable fuels.



If there exists a prevailing notion that the climate crisis could be "solved" by technology, political capital for tackling other environmental harms may be diminished.

Furthermore, the technology itself could be a source of harm to ecosystems if stored carbon alters their natural functioning. Such a rapidly advancing carbon-capture scenario could cause a divide between those who believe in the need for further environmental action for ethical reasons, and those who want to minimise disruption to national development pathways and people's daily lives.



If they prove costly, CCUS technologies could exacerbate inequalities between countries, as well as lead to disputes over land use.

If only firms in high-income countries can afford access to cutting-edge CCUS technology, low and middle-income countries could face barriers to their industrial development and economic growth. On a more local scale, conflicts could arise from the installation of unwanted infrastructure required for certain types of CCUS technologies.

GREEN TECH FAILURE

TRANSPARENT ENVIRONMENT

CAPTURED CARBON

POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Governments may need to develop communication plans for breakthroughs in CCUS technologies to ensure that neither the public nor industry lower their ambitions concerning decarbonisation. CCUS must be reserved for hard-to-abate sectors, while those that can more readily decarbonise must be incentivised to do so.

Governments and international organisations may need to develop policies and mechanisms for technology transfer and equitable access to CCUS technologies. The extent of the intellectual property provisions would need to take into account the public interest of these technologies.

Governments may need to carefully co-ordinate efforts to promote CCUS development and widespread deployment while striving to protect biodiversity.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Increase R&D spending across the CCUS value chain and encourage CCUS deployment for hard-to-abate sectors while ensuring sectors that can more easily decarbonise do so. Initiatives such as the European Union’s Horizon 2020 programme (European Commission, 2020^[265]) and the United States Department of Energy’s Carbon Use and Reuse R&D portfolio (US Office of Fossil Energy, 2020^[266]) have underpinned the development of CCUS. Enabling more financing and de-risking investment in CCUS could also support global climate action.



Ensure credible and accurate reporting on carbon emissions. This might include measuring and reporting carbon emissions on both a territorial, production/residence and consumption basis, and communicating the difference between these metrics clearly.



Develop a sound international framework to regulate and incentivise direct air capture technology. This should include stringent guidelines for technology validation, offsetting requirements and trading mechanisms.



Support the development of CCUS projects to stimulate investment, low-emissions standards and mandates for the procurement of low-emissions products. The IEA has highlighted how rules in place in jurisdictions such as Norway, Sweden and France (on low-carbon aviation fuels), as well as Canada and the Netherlands (on low-carbon public procurement), could help advance CCUS technology (IEA, 2022^[267]).



Ensure that local and indigenous communities can negotiate and understand agreements on the technologies to be deployed on their territory. Nature-based solutions to carbon capture require adequate compensation for the local and indigenous communities involved. There is a need to level the playing field to ensure informed and conscious negotiations.

GREEN TECH FAILURE

TRANSPARENT ENVIRONMENT

CAPTURED CARBON



TECH TITANS

REGIONAL CONFLICTS

DIVIDED WORLD

MULTITRACK WORLD

RISING AUTHORITARIANISM

POSSIBLE FUTURE DISRUPTIONS
GEOPOLITICS

TECH TITANS

*Private companies
displace governments*

POSSIBLE 2030-50 DISRUPTION

A small number of global technology companies envelop consumers in digital ecosystems that satisfy a large share of their needs, such as socialising, obtaining information, monitoring their health, providing entertainment, and acquiring goods and services. Their scale allows them to collect so much behavioural data and to benefit customers so extensively from economies of scope and network effects that they can no longer be threatened by new entrants, even if more innovative and more efficient in some specific domains. This unrivalled market power means that tech titans can impose high and/or discriminatory prices and can forestall innovation. Moreover, these companies can influence working conditions, tax revenues and information to such an extent that they have incredible leverage over policy direction in most high-income countries. The “market” and political power of these companies has become so entrenched that governments do not have the necessary political capital or technological understanding to oversee their operations or prevent abuses of their dominant power over markets, consumers and countries.

CONTEXT

With growing market concentration (Figure 2.21), a small number of technology firms, and in some cases individual founders, have gained considerable global influence as driving forces of digitalisation. Whether these companies will continue to grow, plateau or be replaced – including by new competitors from outside OECD countries – is unclear. There is discussion among experts about whether the concept of market power needs to be adapted to digitalisation and better suited to addressing issues related to digital platforms acting as intermediaries or even gatekeepers (OECD, 2022_[268]). Authorities in many countries are making efforts to curtail the perceived harmful practices and anti-competitive behaviours of big

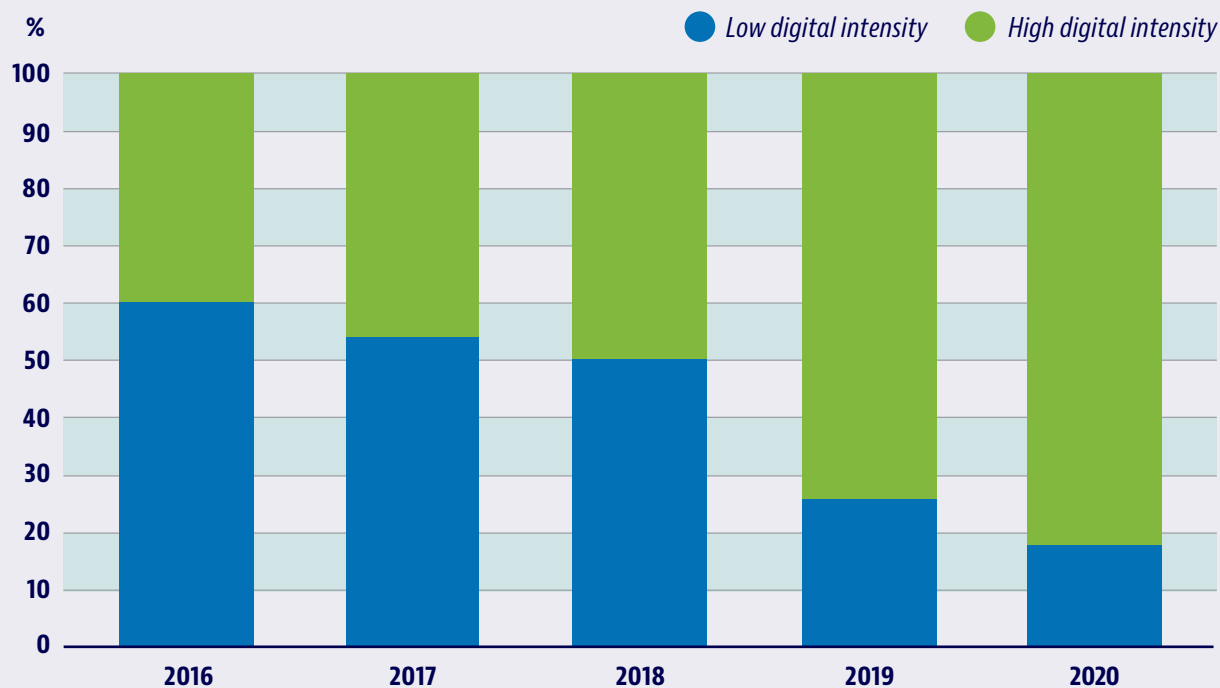
tech firms, both through ex-post competition-policy interventions imposing fines and behavioural remedies (European Commission, 2017^[269]), and through regulatory interventions such as the Service Market Act and the Digital Market Act in the European Union, the Act on Improving Transparency and Fairness of Digital Platforms in Japan and the Digital Markets, Competition and Consumers Act 2024 in the United Kingdom. At the same time, these companies are well positioned to attract top talent, and fully utilise their ability both to collect large amounts of consumer data and exploit network effects to increase their market dominance and influence.

EMERGING EVIDENCE

- » Tech giants have signed multi-billion-dollar contracts with militaries to provide cloud services (Novet, 2021^[270]) and augmented reality (Farrell, 2022^[271]).
- » The largest technology companies have appointed former political leaders to senior roles (Culliford, 2022^[272]), spent tens of millions on lobbyists in the United States (Zakrzewski, 2022^[273]) while also being the top spenders on lobbyists in Europe (Chee, 2021^[274]), and named representatives to work with the United Nations (Microsoft, 2020^[275]).
- » In response to public fears about AI, the White House convened seven leading companies (Amazon, Anthropic, Google, Inflection, Meta, Microsoft and OpenAI) to agree on voluntary commitments to manage AI risks (White House, 2023^[276]). This move highlights the central role played by these companies in regulating rapidly evolving technologies, at a time when governments often struggle to keep pace with these evolutions, though governments are playing an active role and working with key industrial players.
- » There is emerging literature showing evidence of a link between market power and increased lobbying (Cowgill, Prat and Valletti, 2021^[277]), while others cast doubt on these claims (McCarty and Shahshahani, 2023^[278]).

FIGURE 2.21. Mergers and acquisitions in high digital-intensive sectors have increased substantially

Mergers and acquisitions deals by digital intensity of the acquirer firm for euro area countries, percentage, 2016-2020



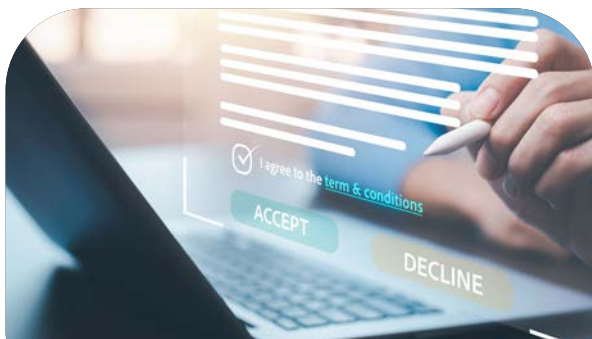
Source: (Crisuolo, 2021^[279]), *Productivity and business dynamics through the lens of COVID-19: the shock, risks and opportunities*, https://www.ecb.europa.eu/pub/conferences/ecbforum/shared/pdf/2021/Crisuolo_paper.en.pdf

POSSIBLE FUTURE



Companies' terms of service and policies may become more important than national laws and international standards in many sectors.

The best talent (not only in technical roles but also in policy making) may choose to mainly work for the largest technology firms instead of governments because these roles are both the best-paid and the most impactful. Big tech's in-house think tanks could surpass top universities in terms of thought leadership in most fields. The market power of the largest technology companies could further undermine the viability of news publishers and allow leading tech companies to entrench themselves as agenda setters, posing risks of amplifying viral misinformation and sensationalism over high-quality journalism, with few consequences for the companies responsible. This could increase public pressure calling for regulation to reduce the market power of digital platforms beyond what is already the case (OECD, 2021_[280]).



Vertical integration could limit interoperability and innovation.

It could enable dominant digital firms to combine user data from different sources and lock users into digital ecosystems, posing substantial challenges to SMEs and innovation. As firms come to provide a far larger share of essential services in sectors such as education and health care, most of the population may be forced to subscribe to their services, with the potential of personalised pricing for a broad range of goods and services becoming the norm. Some major firms may

optimise their services and products for delivery on their own hardware or platforms, thereby reducing consumer choices as the cost of switching to an entirely different suite or services would be too high. Furthermore, if large companies were to provide a wide range of bundled services, or if there were other barriers to integration with a large company's digital ecosystem, SME growth would be constrained. Indeed, even if they were to develop superior quality products or services in specific areas, SMEs would not be able to outcompete large firms on the full range of products and services.



The most important decisions in the world could be made by corporate boards and powerful CEOs.

Issues that align with the personal preferences and beliefs of one or a few very powerful people may see breakthrough progress, while others that may not be economically viable or personally appealing to multibillionaires could be neglected. This could lead to significant progress on issues championed by a company or executive. It could also result in a potential underestimation of safety concerns or other negative social externalities, as well as significant challenges in co-ordinating whole-of-society responses to complex problems such as climate change.

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The public sector may need to increase spending on recruitment and staffing dramatically to build the expertise and understanding of complex technologies required to provide at least minimum oversight.

If their power grew to such a degree in the future, large corporations may need to be given a greater voice than they have today within international organisations that establish global standards and co-ordinate responses to global challenges such as climate change, national security and technological safety. In extreme scenarios, governments may need to invest more heavily in convincing the most powerful corporate leaders to consider certain causes, essentially reversing the traditional pattern of lobbying and shifting the role of government to that of stakeholder and advocacy group, rather than decision-maker.

Governments may be pressured to lower taxes and alter service provision in several sectors, such as education or health care, if technology firms begin to provide more individually catered services thanks to more fine-grained consumer data and manage to displace them as the go-to provider.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Ensure competition authorities are sufficiently well-resourced to prevent abuses of market power and tackle dominant positions in the first place. Competition authorities that are equipped to anticipate and mitigate acquisitions, partnerships and transactions which pose significant risks to competition can better protect SMEs and enable thriving innovation ecosystems (OECD, 2024_[281]). Competition authorities having increased market investigation capabilities could provide another tool to tackle market power issues. Encouraging greater collaboration between competition authorities can improve their collective efficiency at mitigating coercive practices. The OECD Handbook on Competition Policy in the Digital Age highlights the need for co-operation between competition authorities, such as consumer- and data-protection authorities, in different jurisdictions (OECD, 2022_[282]).



Develop internationally co-ordinated ex-ante regulation of digital markets that ensures fairness, contestability, transparency, innovation and the public interest (OECD, 2023_[283]). Countries currently have a “window of opportunity” to share experiences and draft co-ordinated legislation to avoid anti-competitive digital platform markets that could compromise economic efficiency (OECD, 2021_[284]). Competition authorities also having a “voice in the room” in policy development could support the development of regulations that foster effective competition (OECD, 2024_[281]).



Embrace regulatory sandboxes that promote value-aligned innovation, dialogue and mutual learning between regulatory authorities and entrepreneurs. Regulatory sandboxes are a way of temporarily waiving some regulations to give firms the flexibility to test new business models or emerging technologies, under the careful observation of regulators, to develop regulatory best practices. They can promote innovation, especially among smaller firms that may struggle to find financing, as well as ensure that innovation is aligned with societal goals and values (OECD, 2020_[285]). By enabling live-market testing (which would otherwise not be feasible) and reducing regulatory uncertainty, regulatory sandboxes can lower the cost of innovation for firms, and help innovative products and services enter the market.



Protect the regulatory and policy-making process from undue influence and avoid regulatory capture through well-designed regulations on lobbying and campaign finance. The OECD Recommendation on Transparency and Integrity in Lobbying and Influence was updated in 2024 to address the evolving lobbying and influence landscape (including due to emerging technologies) to help governments, businesses and civil society bolster integrity in policy making and address foreign interference (OECD, 2024_[286]) (OECD, 2021_[287]).

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REGIONAL CONFLICTS

Military spending increases as multiple conflicts fester



POSSIBLE 2030-50 DISRUPTION

Several regional conflicts break out on multiple continents which require urgent global action to resolve. Major global powers have an interest in supporting opposite sides in the erupting conflicts. Military spending increases substantially in virtually all jurisdictions. Propaganda campaigns have gained traction on social media, with various sides attempting to sway public opinion at home and abroad. Multiple world regions are dealing with millions of refugees who are fleeing conflict and war.

CONTEXT

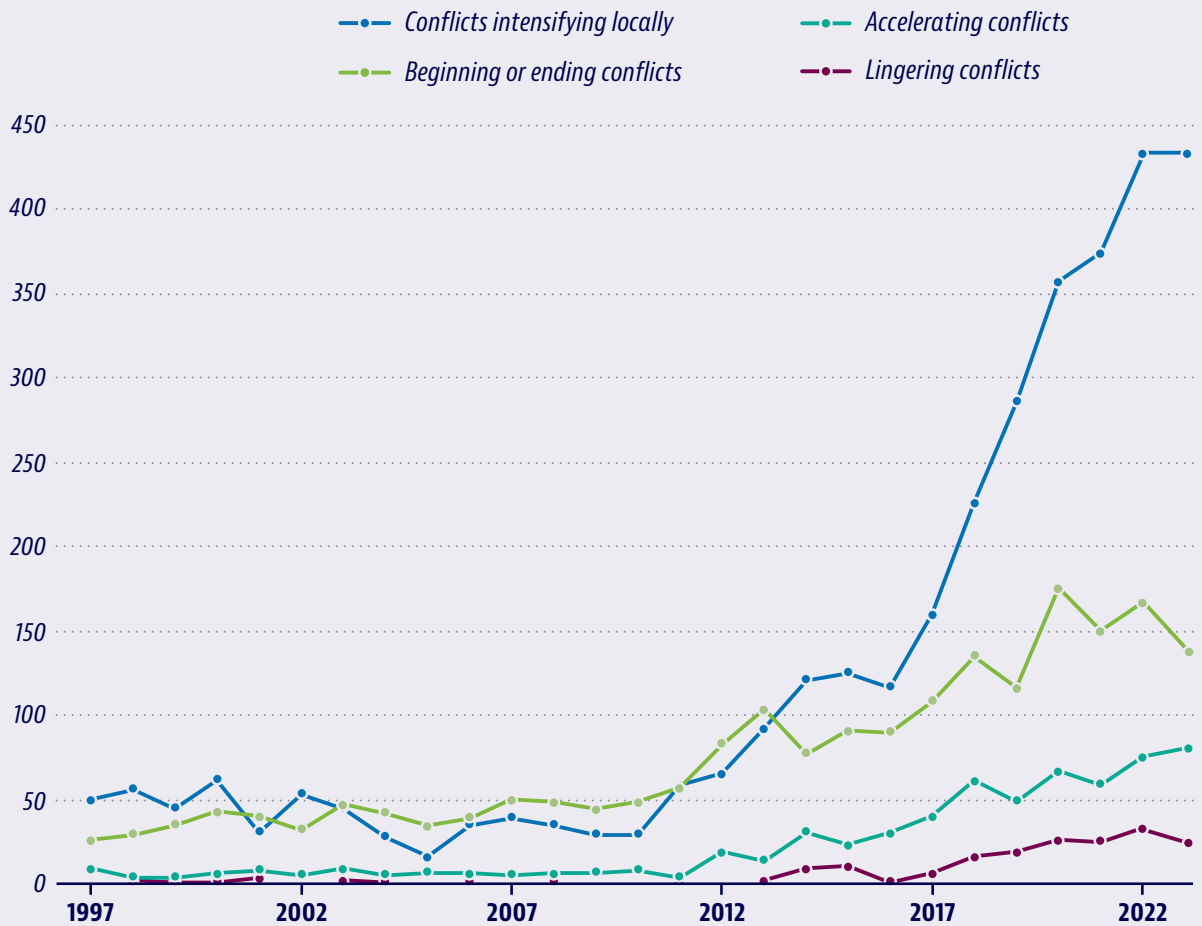
Russia's war of aggression against Ukraine and recent conflicts in the Middle East have amplified an already difficult global economic and geopolitical context. In recent years, transnational conflicts in North and West Africa have become more violent, widespread and complex (Figure 2.22) (OECD/SWAC, 2022_[288]) (OECD/SWAC, 2021_[289]) (OECD/SWAC, 2020_[290]). Whether peace can be guaranteed over the coming decades is highly uncertain. It is therefore imperative that long-term strategies are made resilient in the face of armed regional conflicts, which could become more common owing to heightened geopolitical tensions and the impacts of climate change.

EMERGING EVIDENCE

- » Research shows that climate change acts as an additional risk factor in fragile states (Mach et al., 2019_[291]) (UNHCR, 2022_[292]). At the end of 2022, 108.4 million people worldwide had been forcibly displaced as a result of persecution, conflict, violence, human rights violations and events seriously disturbing public order. Internally displaced persons account for 58% of all (conflict) forcibly displaced people (UNHCR, 2023_[293]).
- » The OECD report States of Fragility 2022 showed that violence, poverty, inequalities and environment degradation are concentrated in fragile contexts. The gap between the least and most peaceful countries continues to grow, making the world increasingly unequal as a result of conflict (OECD, 2022_[294]).

FIGURE 2.22. Conflicts in North and West Africa have been rising

Conflicts by type, number of conflicts, 1997-2023



Note: Conflicts which are intensifying locally; Type 2: Conflicts which are accelerating; Type 3: Conflicts which are beginning or ending; Type 4: Conflicts which are lingering.

Source: Based on (Radil and Walther, 2024_[295]), Identifying local conflict trends in North and West Africa, https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/03/identifying-local-conflict-trends-in-north-and-west-africa_ec379c7d/886d1a06-en.pdf

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A large-scale disruption of global supply chains could lead to soaring commodity prices and have a destabilising effect on some economies, exacerbating internal displacement and triggering mass forced migration.

The poorest regions of the world are likely to be the most vulnerable to the negative consequences of economic and social destabilisation, with compounded humanitarian crises putting a tremendous strain on the social and physical infrastructure in many countries. Some regions and cities may need to sustain far larger populations than expected.



Regional conflicts could exacerbate several other global challenges, such as climate change and biodiversity loss, cybersecurity threats, breakdowns in social cohesion and the militarisation of emerging technologies.

Military machinery is high-emitting, and warfare inevitably damages ecosystems. War and the ensuing disruption to the global economy could drive issues of overfishing, poaching and the depletion of ecosystems in strained economies trying to cope with food insecurity and poverty. Information warfare could intensify and lead to a large increase in mis- and disinformation online. Greater militarisation could shape the development of technologies such as AI and biotechnologies, without sufficient or globally shared safeguards to prevent extreme risks such as lethal autonomous weapons or bioengineered pandemics.



Unavoidable conflicts may lead to a reallocation of public budgets away from non-military sectors towards military spending and a militarised economy, as well as breakdowns in multilateral co-operation.

Conflicts could disrupt access to the inputs necessary for renewable energy or limit fiscal capacity for large-scale infrastructure spending, entrenching reliance on fossil fuels. Technological progress on any topic that is not deemed a short-term security priority may fall short. Accelerated militarisation could undermine the ability of global international organisations (such as the United Nations) to function effectively due to polarisation, forcing greater responsibility for the humanitarian response onto individual countries, regional bodies and civil society.

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High-income countries may need to invest more heavily in insulating low- and middle-income countries from the knock-on effects of global conflicts. Preventing further destabilisation in times of conflict should be a top priority to ensure sustainable development is not derailed globally.

Governments should strive to align investments in military spending with other priorities (such as advancing green technologies) and insulate global progress on net zero from major setbacks due to regional conflicts. Spillover innovation may lead to improvements in areas such as energy storage, electrification of heavy transport, biofuels and CCUS and environmental monitoring. Various forms of circular economy and recycling initiatives could increase strategic autonomy and supply-chain resilience in times of conflict, without diverting resources from climate objectives. To ensure that post-conflict rebuilding accelerates the green transition, aid funding should boost green technologies and ensure the highest quality of sustainable infrastructure to scale up the low-carbon construction industry. New energy-efficient architectural and urban-planning approaches that reduce heating or cooling requirements could be used, demonstrating the emissions savings potential of green technologies.

Governments would also need to develop strategies for harnessing migratory flows triggered by conflicts, integration of migrants into the economy and methods to combat stigmatisation and xenophobia.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Given the combined risks across all dimensions of fragility, large-scale investment in conflict prevention and building resilient societies is critical. Support for sustainable development globally is essential to global peace, prosperity and resilience. Strengthening the ability of international institutions to respond through appropriate conflict-resolution mechanisms should be a priority worldwide.



Align military development with net-zero objectives. The United Kingdom’s Ministry of Defence announced its Climate Change and Sustainability Strategic Approach in 2021, recognising the role played by the armed forces in enabling the net-zero transition (Ministry of Defence, 2021_[296]). The plan charts a course to increase operational self-sufficiency, reducing demand in low-resource environments. It supports investment in R&D for new defence technologies and infrastructure. It also highlights the behavioural and systems changes to be undertaken by training and educating defence personnel on sustainability.



Promote investments in renewable energy and equipment to reduce the economic impact of stranded assets. Such investments could reduce the risk that security interests lead to a much slower phasing down of fossil-fuel infrastructure to preserve energy independence in some regions (Ministry of Defence, 2021_[296]).



Prepare citizens to fight disinformation. Given misinformation’s divisive goal of increasing conflict risk, educational programmes should embrace fact-checking and healthy debate. Finland has started to test a curriculum on teaching a “Generation to Spot Misinformation” (Centre for an Informed Public, 2023_[297]).



Invest in anticipatory capacity and long-term strategies to handle forced migration flows due to conflicts. These strategies should be co-ordinated across several levels of government (municipal, regional, national and international) and civil society, and emphasise the protection of human rights (OECD, 2020_[298]).

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Global co-operation falls amid superpower competition

POSSIBLE 2030-50 DISRUPTION

The relationship between the West and China has deteriorated to the point that the world has become divided between two separate sets of digital and economic ecosystems with divergent norms and standards. Except for some very large economies such as India, countries in the rest of the world are forced to choose sides and interact with only one bloc while decoupling their economies from the other. Intense competition between blocs for global supremacy spills over into all major areas of the economy. Negotiations in all multilateral forums in which the two blocs participate have stagnated, with allies of each bloc also hardening their stances.

CONTEXT

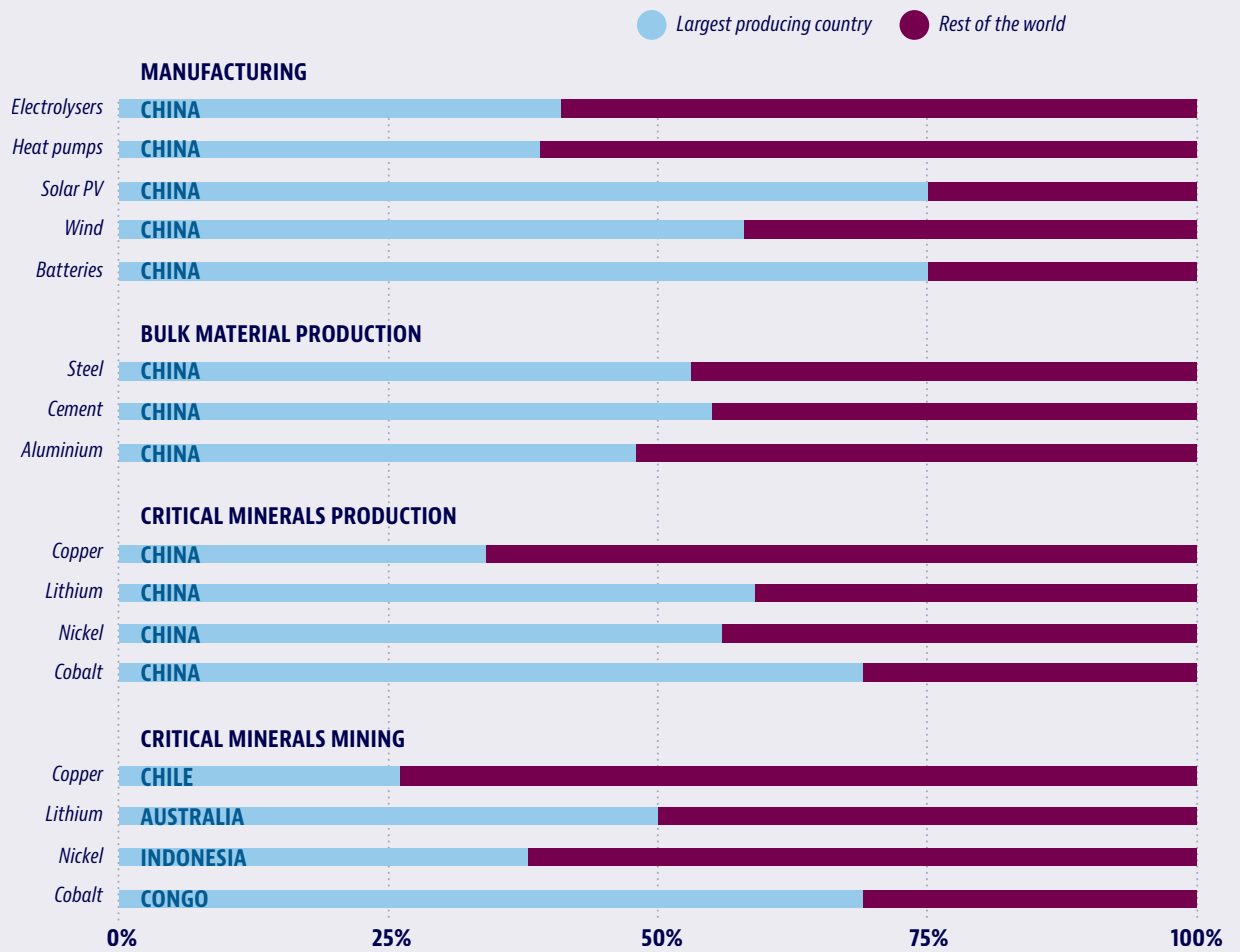
The West's relationship with China is currently strained, creating considerable uncertainty about the future of the multilateral system. Geopolitical tensions are the most acute in security and technology. Growing tensions could present challenges for global collaboration on other important issues, including climate change and sustainable development (Figure 2.23). Yet the climate transition will require an unprecedented level of international co operation between governments to reach global net-zero emissions (IEA, 2023^[212]).

EMERGING EVIDENCE

- » Addressing China's intention and capacity to reshape the international order features prominently in the White House's National Security Strategy (White House, 2022^[299]). The European Union, for its part, launched an anti-subsidy investigation into electric vehicles from China (European Commission, 2023^[300]).
- » China has initiated a World Trade Organization dispute complaint following export restrictions placed on advanced semiconductor chips and manufacturing products (World Trade Organization, 2022^[301]).
- » The BRICS group (Brazil, Russian Federation, India, China and South Africa) has expanded to include six new members (Egypt, Ethiopia, Indonesia, Iran, Saudi Arabia, and United Arab Emirates). In addition, 12 countries have acquired "partner state" status (Algeria, Belarus, Bolivia, Cuba, Kazakhstan, Malaysia, Nigeria, Thailand, Türkiye, Uganda, Uzbekistan, and Vietnam).

FIGURE 2.23. *Clean technology supply-chain concentration is significant*

Geographic concentration by supply chain segment, percentage, 2021



Source: Adapted from (IEA, 2023^[303]). Geographic concentration by supply chain segment, 2021, <https://www.iea.org/data-and-statistics/charts/geographic-concentration-by-supply-chain-segment-2021>

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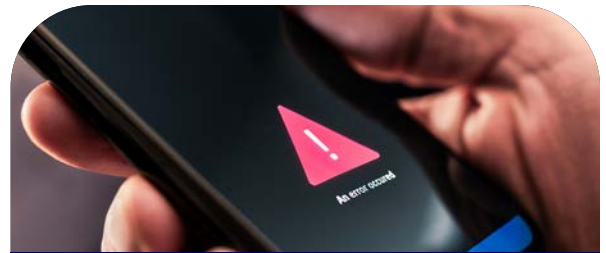
Intense competition for power may lead to a breakdown of shared spaces for communication, from social media, industry and academic conferences to diplomatic forums.

This could mean that grassroots campaigns lose the ability to have a global impact, as they can only speak to audiences within their blocs. Some businesses may also have trouble scaling if they do not have access to a global market. The leadership within competing blocs may also invest in shaping domestic perceptions of the other side, including regarding shortcomings in global climate action or other global challenges. However, there could be significant inefficiencies stemming from non-interoperable hardware, software and infrastructure provided by opposing sides of the divide, holding back sustainable economic development globally.



Fierce competition could lead to a technological arms race without sufficient safeguards.

Rapid advancement in AI and other technologies may become a strategic priority for both sides of the divide, at a time when escalating tensions and diminished trust make elaborating shared safeguards impossible. The goals of developing the controllability and transparency of algorithms, and preserving privacy standards, could be overlooked out of fear that safeguards could slow innovation and lead to one side falling behind the other. There could also be less political will from either side to penalise monopolistic or other forms of anti-competitive behaviour by dominant technology firms if their ability to attain or maintain global leadership in key sectors is seen as a security imperative.



In a more divided world, access to key technologies may be cut off by opposing sides.

A recent report found that China leads the world in 37 of 44 key areas of cutting-edge technology (Hurst, 2023^[302]). Supply chains may need to be redesigned if import and export restrictions are placed on the technology sector or critical raw materials owing to concerns over security or human rights. This, in turn, can lead to increased costs for green technologies which climate-change strategies may not have sufficiently accounted for. A further knock-on effect may be that China continues to be the largest producer and user of coal to ensure its energy autonomy. On the other hand, competition may bring opportunities for the green transition. If climate-related innovation could become a key indicator of success in a regionally polarised competition, blocs may increase R&D funding and accelerate technological development timelines. Each bloc may compete for global influence through aid for sustainable development in low- and middle-income countries.

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Countries may be forced to find alternative sources for inputs in key sectors. This could drive a costly acceleration in extraction capacity or rapid “friendshoring” (the restructuring of supply chains based on geopolitical relationships) of critical raw materials, including through deep-sea and asteroid mining or suboptimal partnerships with authoritarian governments. It could also mean a massive scaling up of electronics recycling programmes and increased support for the right to repair, which could extend the life cycle of a wide range of hardware.

Countries may need to develop clear criteria regarding what types of trade-offs between competing values and priorities are acceptable when dealing with a competitor who could try to extract concessions in exchange for agreements on climate, resources or technology.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Continue policy dialogue and strengthen engagement with China where possible, especially in areas with common interests and of global concern such as climate change mitigation. This could help to advance multilateral solutions to shared global challenges in areas where China’s buy-in is key to the success (OECD, 2022_[304]).



Expand co-operation with non-OECD countries to foster economic growth and well-being, as well as promote shared standards and greater adherence to OECD policy recommendations. The OECD notes that such engagement is necessary to address climate change, seize the opportunities and mitigate the risks of digitalisation, and manage migration (OECD, 2022_[305]).



Support greater global collaboration on climate action that puts all countries on an equal footing. The Inclusive Forum on Carbon Mitigation Approaches (IFCMA), which promotes better data sharing, evidence-based mutual learning and inclusive multilateral dialogue on climate policies, is a leading example of this. Delegates from countries representing 90% of global GDP and 85% of global emissions participated in the inaugural IFCMA meeting in February 2023, which took stock of all the existing carbon-mitigation policies put in place by countries and considered their combined effect on global emissions. The IFCMA aims to help policy makers discern good practices and adopt the carbon-mitigation policies that best suit their country.



Ensure global access to environmental goods and services, including by strengthening supply chains for low-emissions technologies and energy. Incorporate environmental objectives into regional trade agreements. Co-operate on environmental goods and services to facilitate the diffusion of environmental technologies and standards, as well as help SMEs realise their comparative advantages and scale up their businesses effectively (Bellmann and Bulatnikova, 2022_[306]). Building new supply chains for critical materials can take over a decade, necessitating policy interventions today to insulate them from potential future disruptions (IEA, 2023_[307]).

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*A reversal of globalisation
and increased regionalisation*

POSSIBLE 2030-50 DISRUPTION

Different systems and standards proliferate in different parts of the world, creating separate yet parallel clusters of countries. Each cluster has its own economic and digital ecosystem, as well as its own attitudes towards key determinants of well-being such as inequality, freedom of expression and surveillance. Clusters rely on their dominant currencies and largely equivalent corporate actors, which have adapted to unique regulatory and cultural standards. This is a world of diversity rather than universality, where ideas of what constitutes good policies and best practices, and how to measure them, vary significantly depending on each cluster's value systems or politics.

CONTEXT

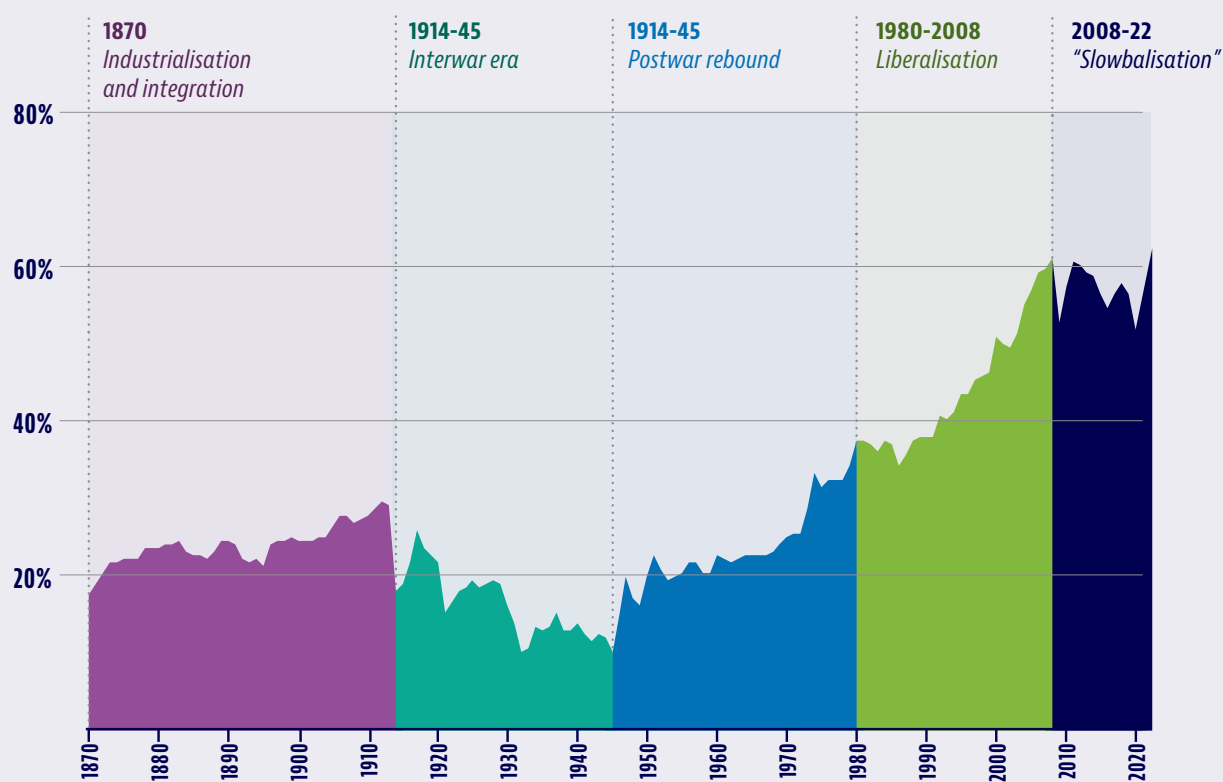
The future of international co-operation is uncertain. Globalisation and multilateralism are under significant strain. Russia's war of aggression against Ukraine and geopolitical tensions in other parts of the world have led to a more unified West. However, different approaches to social justice and environmental issues, technology regulation and energy persist among Western countries. Some emerging powers do not wish to take sides in a bipolar world and retain considerable influence in the international sphere. Globalisation is stagnant (Figure 2.24) and there is no guarantee of global compatibility of values or agreement on the universality of concepts such as human rights or national sovereignty.

EMERGING EVIDENCE

- » The UN General Assembly resolution of 23 February 2023 calling for an end to the war in Ukraine and Russia's immediate withdrawal from the country, in line with the Charter of the United Nations, was supported by 141 Member States but opposed by 5 others, with 35 Member States (including China, India and Pakistan) abstaining.
- » Plans for a European carbon tariff provoked worries over protectionism from other Western partners (Morton and Hurst, 2021^[308]), with Brazil, China, India and South Africa releasing a joint statement of "grave concern" about new trade barriers (Republic of South Africa, 2021^[309]).
- » Despite the creation of the EU-US Trade and Technology Council in 2021 (European Commission, 2021^[310]), tensions between the United States and Europe have flared up in recent years over tariffs (Kaufman et al., 2023^[311]) and technology policy (Overly and Scott, 2021^[312]). The US Inflation Reduction Act has also generated important transatlantic tensions (Lenain, 2023^[313]).

FIGURE 2.24. Globalisation is stagnant for the first time since the Second World War

Trade openness index, percentage, 1870-2022



Note: The trade openness index is defined as the sum of world exports and imports, divided by world GDP.

Source: Based on (Irwin, 2022^[314]), Globalization is in retreat for the first time since the Second World War, <https://www.piie.com/research/piie-charts/globalization-retreat-first-time-second-world-war> and (Our World in Data, 2025^[315]), Trade as a share of GDP, Multiple sources compiled by World Bank (2024), <https://ourworldindata.org/grapher/trade-as-share-of-gdp>

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POSSIBLE FUTURE



Significant economic restructuring may be necessary if countries withdraw into clusters, curtailing the development of the global economy.

Few firms would be able to operate successfully across multiple clusters. There could be localised gains due to a reshoring of production, which would benefit some domestic small businesses and boost domestic supply. Each of the clusters would need to secure sufficient supplies of goods (such as critical raw materials) and services through in-cluster sources or become vulnerable to economic coercion by those who control vital resources. Although inefficient from a global economic standpoint, this could spur innovation as each cluster strives to develop new domestic solutions to the challenges it faces. This disruption could also generate major skill shortages in key sectors within nearly all clusters. For products that may still be traded between clusters, the cost of meeting multiple standards would likely translate into higher prices.



A large-scale movement away from globalisation, combined with distrust between clusters, could lead to diminished interest in – and incentives for – international co-operation.

The different sets of values prevailing within clusters could render diplomacy considerably more complex. In an extreme scenario, this could lead to paralysis or even closure of some global multilateral organisations as countries lose faith in their ability to agree on globally shared goals and approaches. Co-operative agreements on global public goods could be undermined if each cluster turns inwards and views inter-cluster relations as increasingly zero-sum. Tense negotiations could ensue in areas where cross-cluster interactions would be still necessary, such as climate change and environmental protection.



Each of the clusters may have different levels of exposure to climate change and natural disasters.

The dominant or wealthiest countries may become responsible for supporting the hardest-hit areas within their cluster. However, cross-cluster international aid to the most vulnerable nations may be limited. As disasters become more frequent, clusters could begin to blame non-cluster members for global shortcomings in addressing climate change.

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Governments could use the global pullback from globalisation as a catalyst to accelerate the transition towards more circular economies. Sourcing the raw materials and inputs for a wide range of products could prove far more challenging in this type of future, making it even more important to develop good recycling programmes for critical materials.

Governments may need to develop clear contingency plans on ways to fulfil and absorb the responsibilities currently performed by international organisations should there be a large-scale retreat from globalisation. Regional bodies and organisations may be restructured to handle a larger range of tasks if global multilateral bodies are significantly undermined by this potential shift.

Governments could support the development of shared forums for cross-cluster cultural exchanges, to build the foundations for a return to more global trade and co-operation in areas of mutual interest. These efforts could use emerging technologies (such as VR) to help people develop social and emotional ties that build mutual trust. These forums could grow into trusted spaces where participants can reach cross-cluster consensus on difficult transnational issues.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Advance public support for multilateralism and global collaboration. As globalisation is challenged, governments may underestimate the extensive benefits of shared global interconnection. Multilateral bodies should make the case that better global collaboration helps address global challenges, clearly pointing out that increased isolationism will not provide relief or viable solutions. Governments could disseminate evidence about how solutions to shared global challenges (such as climate change) can be embedded in regional trade agreements, in the form of higher standards that incentivise sustainability (Bellmann and Bulatnikova, 2022_[306]).



Actively engage foreign stakeholders in the policy-development process and co-operate in the development and diffusion of good practices and innovations in policy and governance (OECD, 2021_[316]). This can happen through international communities of regulatory practice or the creation of co-ordinating mechanisms that build a shared understanding of the best ways to approach emerging issues and challenges.

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*Anti-democratic leaders
undermine global collaboration*

POSSIBLE 2030-50 DISRUPTION

Populist authoritarian governments prone to erratic policy making rise to power in several major economies. The growing number of non-democratic regimes presents serious challenges to the international order and individual democracies in high-income countries. Authoritarian movements often rally around a “strongman” leader offering an alternative to existing political elites. These movements take advantage of social media to amplify their messaging and undermine the political establishment. Once in office, such leaders take control of the media, the judiciary and national security establishments. They also actively assist one another in suppressing perceived domestic threats to their ability to govern.

CONTEXT

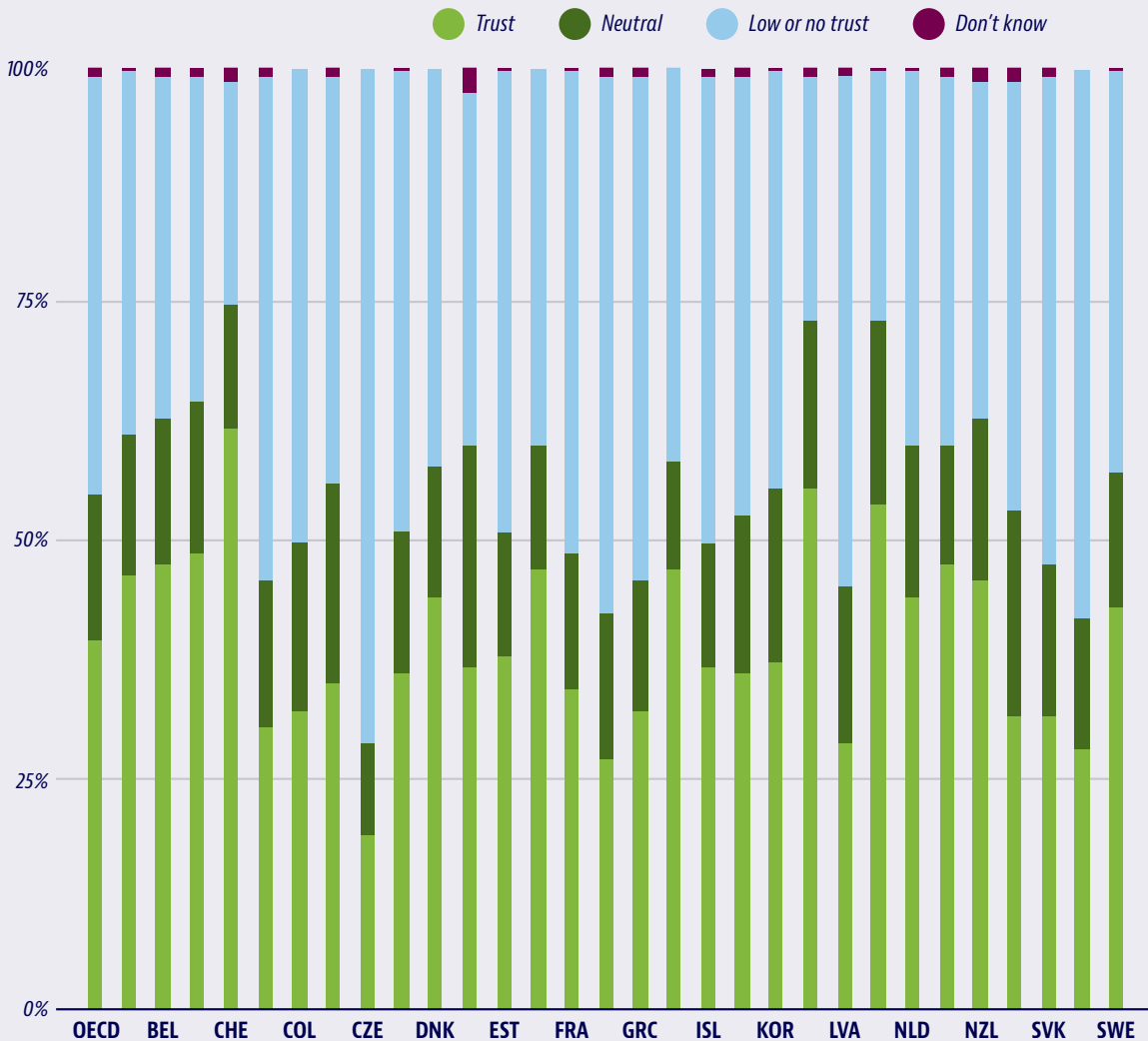
Many parts of the world have recently experienced a resurgence in authoritarianism. According to data from the V-Dem Institute, 28% of the population – 2.2 billion people – live in closed autocracies, while 13% of the population – 1 billion people – live in liberal democracies. Furthermore, the number of democratising countries is down to 14, representing only 2% of the world’s population (V-Dem Institute, 2023^[317]). Even within established democracies, large sections of the population do not trust their governments (Figure 2.25) and have begun to question democratic norms and traditions. These movements have been bolstered by misinformation and disinformation campaigns (Ong, 2022^[318]). It is not certain that these anti-democratic developments have passed their peak.

EMERGING EVIDENCE

- » The OECD's inaugural Trust Survey found half of the 50 000 respondents in 22 democracies did not feel the political system let them have a say in decision-making (OECD, 2022_[319]). Almost half of the respondents expected that a high-level political official would grant a political favour in exchange for the offer of a well-paid private-sector job.
- » A study from the Centre for the Future of Democracy at the University of Cambridge in the United Kingdom, which compiled a dataset on democratic legitimacy in 160 countries, found that younger generations are more dissatisfied with democracy than older cohorts, both today and at comparable stages of life (Foa et al., 2020_[320]).
- » The Democracy Perceptions Index 2022 found that nearly two-thirds of the people around the world feel that their government is acting only in the interest of a small group of people (Latana, 2022_[321]).

FIGURE 2.25. A slightly larger share of the population has low or no trust in their national government compared to those with high or moderately high trust

Share of population who indicate different levels of trust in their national government (on a 0-10 scale), 2023



Note: The figure presents the within-country distributions of responses to the question "On a scale of 0 to 10, where 0 is not at all and 10 is completely, how much do you trust the national government?". A 0-4 response corresponds to "low or no trust", a 5 to "neutral" and a 6-10 to "high or moderately high trust". "OECD" presents the unweighted average across countries.

Source: (OECD, 2024_[322]), OECD Survey on Drivers of Trust in Public Institutions – 2024 Results: Building Trust in a Complex Policy Environment, https://www.oecd.org/en/publications/2024/07/oecd-survey-on-drivers-of-trust-in-public-institutions-2024-results_eeb36452/full-report/component-5.html#figure-d1e827-dc86653da9

POSSIBLE FUTURE



Authoritarian states may be willing to hold global climate action hostage to extract economic or political concessions.

Global collaboration on climate is necessary, and high-emitting countries or those with vital natural carbon sinks and ecosystems must be on board. Authoritarian leaders could refuse to enact or enforce environmental policies that require any effort from their base or threaten their power. Climate brinkmanship is a possibility if there are insufficient measures to compel authoritarian states to abide by global climate agreements and standards.



Non-democratic regimes may continue to destabilise individual democracies through disinformation campaigns, malign political financing and foreign interference in domestic policy making.

These activities weaken internal cohesion in democratic societies, inciting perceptions that democracies are dysfunctional, corrupt and untrustworthy, which can ultimately lead to increased support for non-democratic forms of government (Rudolph, 2020^[323]) (Martin, Shapiro and Nedashkovskaya, 2019^[324]) (Bradshaw, 2019^[325]) (Zelikow, 2020^[326]). Areas such as scientific co-operation and education, as well as actors such as cultural institutions, diasporas, think tanks, civil society organisations and corporations, become easy targets for foreign covert influence operations.



Populist leaders may crack down on minority communities and expel or refuse entry to migrants, increasing the flow of migrants to democracies.

This could magnify infrastructure demands on democracies and civil society, which may have to support larger populations than expected. This, in turn, could provoke anti-immigrant sentiment within democratic countries and also stretch civil society organisations beyond their capacity.



Coalitions of authoritarian states could try to reshape the rules-based international order in areas such as trade or technology governance to suit their interests.

This could put firms in democracies at a disadvantage in the global economy. It could also undermine faith in a shared global trading system and encourage protectionism, or lead to increased economic coercion and the weaponisation of economic dependence.

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POLICY OPTIONS IN THE FUTURE IN THE EVENT OF THIS DISRUPTION

Democracies may face a dilemma between safeguarding human rights in authoritarian states and ensuring the global success of the net-zero transition. Progress on shared global priorities – such as climate change – could require the support of authoritarian leaders, who may request substantial political or human rights-related concessions in return. Democracies could be forced to develop criteria for determining which concessions are acceptable under these possible circumstances.

Democracies that take principled stances in their trade policy could lose access to several markets if authoritarian states co-ordinate their efforts to maximise their coercive economic power. Democracies may therefore need to prepare their populations for pressures on living standards should they decide to limit trade relationships with authoritarian states.

Democracies may need to develop targeted strategies for engaging constructively with authoritarian leaders. This includes creating multidisciplinary diplomatic advisory teams dedicated to studying the practices of individual leaders. Based on this complex understanding of their interests and personalities, these teams can negotiate strategies and communicate policies in ways that appeal to each leader’s worldview.

POLICY OPTIONS TODAY TO BE BETTER PREPARED FOR THIS POSSIBLE DISRUPTION



Reinforce institutional protections against foreign malign influence and interference. This could be done by closing loopholes in lobbying and political finance, as well as assigning responsibility for identifying and responding to foreign interference (OECD, 2022^[319]; OECD, 2021^[327]).



Support deliberative democratic processes (such as citizens’ assemblies) that remove barriers to political participation and boost trust in governance. Allowing the public to play a larger role in the decision-making process can increase public support for climate action and democracy, and thus prevent the rise of authoritarianism. The OECD published guidelines for organisations looking to implement citizen-participation processes (OECD, 2022^[328]). The Organisation encourages governments to consider introducing requirements for deliberative processes initiated by citizens once a certain threshold of public interest on a given topic has been demonstrated, such as by a petition (OECD, 2020^[129]).



Strengthen political integrity. Political integrity rests on the expectation that appointed and elected political leaders will pursue policies that aim to improve the economic and social well-being of individuals, and not pursue policies that further their private interests or the commercial or political interests of groups – whether domestic or foreign – that attempt to influence them. This entails improving trust, avoiding elite capture and strengthening the integrity of decision-making processes, since elected and appointed officials who act with political integrity are trusted by the public. Political integrity can be bolstered through government support for civil-society watchdogs, a free press and civics education for young people (OECD, 2017^[329]).

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FACILITATION GUIDES

MODULE ONE: **EXPLORING DISRUPTIONS**

The OECD has identified 25 possible disruptive changes that could emerge over 2030-50, with implications for long-term public policies. In this module, participants will examine two disruptions each in a modified futures-wheel or influence-cascade exercise, which are brainstorming exercises in which people think through the downstream consequences of a particular change or multiple changes.

EXPLORE

CONTEXT

Public policies created by experts and policy makers may be vulnerable to disruptions outside their focus area. A change in one area could radically alter the conception or implementation of policies in another area. This workshop enables participants to imagine possible radical changes and explore the different ways in which these could alter the particular policy-making context.

AUDIENCE

*Breakout groups of **six to nine participants** are optimal. Slightly larger groups are acceptable in an online setting.*

TIMING

*Typically, this module would run for **two to three hours**. The timing can be extended to enable a deeper discussion or cover a broader suite of disruptions.*

SELECTING DISRUPTIONS (BEFORE THE SESSION)

The number and types of disruptions chosen for the session depend on group size and timing. The standard approach is to choose between six and ten disruptions from the list.

Select a wide range of disruptions from different thematic areas. It may be valuable to include one or two disruptions in areas that are familiar to your audience, especially if the audience is expected to be somewhat sceptical or resistant. However, it is important to select some disruptions that lie outside the comfort zone of most participants. Disruptions that are likely to impact the policy area or represent a source of great uncertainty should be included. Participants are not expected to be experts in the specific disruptions, but rather, to discuss how the disruptions could impact the domains they understand well.

Divide the list of chosen disruptions into two waves. Include the most familiar disruptions for your audience in the first wave. For instance, an environmental group might select a first wave involving environmental or green technology disruptions, and a second wave focusing on geopolitical challenges or social disruptions.

REQUIREMENTS

Plan for one facilitator per breakout group, and if possible, one notetaker per breakout group as well. If conducting this exercise in-person, provide Post-it notes or one flip chart per breakout group.

- » **Note:** If online and in a smaller group, consider not using interactive mind-mapping technologies, which can distract participants and prevent them from listening to others in the conversation. Although these tools are useful for large groups, they can hinder the cohesion of intimate brainstorming sessions such as this, unless used by experienced facilitators. If they are used, it is best to have one person in charge of managing the mind map and another in charge of facilitating the conversation.

WORKSHOP AGENDA

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|--|---|-------------|
| OVERVIEW (PLENARY) | <ul style="list-style-type: none"> » Introduction to facilitators and strategic foresight. » Outline and purpose of the process. » Introduction to the first set of disruptions. Participants are invited to join a breakout group based on the specific disruption they would like to explore. | 15 mins |
| DISRUPTION EXPLORATION #1 (IN BREAKOUT GROUPS) | <ul style="list-style-type: none"> » Each participant is given time to read the disruption briefing provided. Facilitators should answer any questions on the material or process before moving on to the following questions: <ul style="list-style-type: none"> • What (other) signs or evidence do you see in the present that support the plausibility of this disruption? (5 mins) • Imagine this change reached a plausible extreme by 2040, what further impacts could this have broadly, or for you in particular? (Round-robin format: one contribution from each participant, also written on a Post-it.) (15 mins) • For each of these impacts, what further impacts or knock-on effects could they have? (Repeat for second, third and fourth-order impacts, etc.). Group related Post-its together. (30 mins) » Invite participants to identify the possible implication that struck them the most (either because it was surprising/novel or disruptive/impactful). (5 mins) » Take a photo of the Post-it notes or flip chart, then remove them from the table. | 60 mins |
| SHORT BREAK | | |
| PLENARY | <ul style="list-style-type: none"> » Introduction of a second set of disruptions – invite participants to choose their preferred group. | 5 mins |
| DISRUPTION EXPLORATION #2 (IN RESHUFFLED BREAKOUT GROUPS) | <ul style="list-style-type: none"> » Each participant is given time to read the disruption briefing provided. Facilitators should answer any questions on the material or process before moving on to the following questions: <ul style="list-style-type: none"> • What (other) signs or evidence do you see in the present that support the plausibility of this disruption? (5 mins) • Imagine this change reached a plausible extreme by 2040, what further impacts could this have broadly or for you in particular? (round robin – one contribution from each participant, written on Post-it notes as well) (15 mins) • For each of these impacts, what further impacts or knock-on effects could they have? (Repeat for second, third, fourth order impacts, etc.). Group related Post-it notes together. (30 mins) » Invite participants to identify the possible implication that was the most notable (either because it was surprising/novel or disruptive/impactful) to them. (5 mins) » Take a photo of the Post-it notes, then remove them from the table. | 60 mins |
| PLENARY | <ul style="list-style-type: none"> » Invite participants to share their most notable takeaways and high-level reflections from the session. | 10 mins |

MILESTONES

The purpose of this module is to introduce participants to current signals of change that may alter the policy landscape, and of which they might not be aware. By finding supportive evidence of this change and projecting themselves into the future to consider the broader socio-economic ramifications of the disruption, participants start engaging their creative brains and challenging key policy assumptions that they have held consciously or subconsciously. Significant relevant points on the policy implications should be recorded for future discussions, but extensive notes from this module are not needed for final reporting. This exercise alone is not designed to yield concrete action steps for an organisation. However, it can lay the foundation for more innovative thinking within an organisation.



1. FACILITATION SCRIPT IN PLENARY

- » **GIVE A BRIEF INTRODUCTION TO STRATEGIC FORESIGHT**, an exploratory exercise designed to get people to think more broadly about possible futures and how different domains might interact in the long term.
- » **REMINDE PARTICIPANTS THERE ARE (ALMOST) NO WRONG ANSWERS IN THESE TYPES OF EXERCISES.** Foresight is inherently speculative. All forms of contribution are welcome, from traditional expertise to personal or anecdotal data. Getting everyone comfortable with engaging in the exercise is a top priority.
- » **REMINDE PARTICIPANTS THE SESSION IS FULLY EXPECTED TO RAISE CONFLICTING IDEAS.** This is a subjective exercise, in which opposite implications may be imagined from the same disruption. All are possible, even if only one – or none – ever comes to pass. Highlighting this uncertainty and the diversity of possible implications is an important part of the exercise.
- » **ASK PARTICIPANTS TO AGREE TO “CHATHAM HOUSE RULES”** (no comments will be attributed to a specific person).
- » **REMINDE PARTICIPANTS THEY ARE FREE TO ANSWER FROM A PROFESSIONAL OR PERSONAL PERSPECTIVE.** If the immediate thought that enters their mind about a given disruption is how it could impact their children’s lives or their social circle, that should be encouraged. Including emotions and personal experience provides valuable context.
- » **BRIEFLY INTRODUCE EACH OF THE SELECTED DISRUPTIONS AT THE BEGINNING OF THE SESSION.** This presentation does not need to be overly detailed, since participants will be given the chance to read the full disruption briefing in their breakout groups.
- » **HAVE INDIVIDUAL PARTICIPANTS SELECT THE DISRUPTION THEY ARE MOST INTERESTED IN DISCUSSING** and join a breakout group based on that.
 - *This helps ensure active participation among participants.*
 - *If groups are imbalanced, ask some participants in the largest group(s) to switch to one of the smaller ones.*



2. FACILITATION SCRIPT IN BREAKOUT GROUPS

(assign one facilitator per group; repeat for Wave Two of the disruptions)

- » **GIVE PARTICIPANTS THREE TO FIVE MINUTES OF SILENCE TO READ THE DISRUPTION BRIEFING.** Encourage them to take notes.
- » **ASK PARTICIPANTS TO SHARE ANY EVIDENCE OR SIGNALS THAT THE DISRUPTION THEY WILL BE DISCUSSING IS POSSIBLE.** Spend no more than five minutes on this step.
 - *This part of the activity plays on participants' confirmation bias to help immerse them in this possible future.*
- » **BEGIN EXPLORING THE FUTURE:** ask participants to imagine this change has reached a plausible extreme by 2040, and to identify what else might be impacted by this change. Give them 30 seconds in silence to collect their thoughts.
 - *If this exercise is conducted in-person, have participants jot down a "headline" summary of their idea on a Post-it note.*
 - *Think about creative ways to group and cluster Post-it notes. This could be in common pre-set categories (written out on a flip chart) in futures exercises that encourage thinking broadly about society, technology, economy, environment and governance (STEEG), or political, economy, society, technology, legal and environment (PESTLE).*
 - *If online, request that participants keep their cameras on, do not multitask and use the "raise hand" function to indicate when they want to speak.*
- » **ENSURE ALL PARTICIPANTS HAVE AN OPPORTUNITY TO PARTICIPATE.** Begin the session's futures exploration section with a "round-robin" where each participant shares the first implication of the disruption that came to mind.
 - **Note:** *If discussions are very quiet or dominated by a few participants, you may wish to return to this round-robin method, whereby one participant at a time is invited to share in a fixed order.*
- » **PUSH PARTICIPANTS FURTHER INTO THE FUTURE:** continually ask them to think about the possible knock-on effects of the ideas raised by others. Questions such as "What might happen next?" are useful here.
- » **PUSH PARTICIPANTS TO EXPLORE DOMAINS THAT HAVE NOT YET BEEN DISCUSSED IN DEPTH.** Think back to sections of the STEEG or PESTLE map that have received less attention.
- » **OTHER POSSIBLE PROMPT QUESTIONS:**
 - *What might this disruption mean for people in a given country? (What might this mean for developing countries?)*
 - *What might this disruption mean for a given group? (For example, people with low incomes, people with disabilities, your children or the children of your friends, the stakeholders of your policy area?)*
 - *How might this disruption shape geopolitics? How would it shape domestic politics in your home country?*
- » **FINAL FIVE-TO-TEN MINUTES:** synthesise the session by having participants identify the threads of conversation which were most notable to them.
- » **REPORTING BACK:** Only share back to the plenary one to three of the most notable points identified by participants, in 30 seconds or less. These conversations are often too complex to summarise neatly, and the most common risk is that the larger audience stops listening.

MODULE TWO: IMAGINING INTERACTIONS

In this module, participants consider a world in which multiple disruptions occur simultaneously. This reinforces familiarity with the specific disruptions but also explores change in a more nuanced and detailed manner. This is an expansive exercise, where participants imagine a multitude of ways the future could be different than they expected. This exercise helps participants gain a deep understanding of complex systems and acquire the skills to recognise possible emerging opportunities and risks in an ever-evolving landscape. This session is a blend between a cross-impacting exercise (which looks at the relationships and implications of two disruptions occurring simultaneously) and a futures wheel (which looks at the direct and indirect consequences of a change).

IMAGINE

2

CONTEXT

This session helps participants develop the ability to engage with multiple disruptions at the same time. Generally, when possible disruptive changes are explored in a policy context, it is with the (implicit) assumption that all else will remain the same. This is a problematic assumption because policy makers are often forced to deal with multiple disruptions at once, and these disruptions impact one another in surprising ways.

AUDIENCE

*Each disruption pair would ideally be discussed in a breakout room with **six to nine participants**.*

TIMING

*Typically, this module would run for **two to three hours**. The timing can be extended for a deeper discussion, or to cover a broader suite of disruption pairs.*

PAIRING DISRUPTIONS (BEFORE THE SESSION)

Disruptions should be paired in ways that lead to new twists to the disruptions occurring in isolation. Some disruption pairings might not add new angles for exploration and should be avoided. Examples of these are “hothouse Earth” and “sea-level rise”, or “captured carbon” and “environmental-industrial complex”.

The collection of disruption pairs selected should cover a diversity of themes and topics. For instance, there could be some optimistic disruptions, some which are more pessimistic and some that are more ambiguous.

It is not essential to retain all the disruptions from the first module in the second. Individual disruptions can be part of multiple pairs explored in the second module (e.g. “hothouse Earth” could be paired with multiple disruptions).

INITIAL ASSUMPTIONS IDENTIFICATION (BEFORE THE SESSION)

The core team should extract a set of underlying assumptions in the core strategy document being stress-tested using this process. A list of around five is preferable. The extraction of assumptions can occur prior to the first module if necessary. Assumptions are statements about how the world works that can be inferred from the document if not stated outright.

Hypothetical examples of assumptions:

- » **“We will continue to collaborate with the international community to combat climate change.”**
 - *This assumes that there will be continued international collaboration on climate change. It assumes that other countries will still be willing to have dialogue.*
- » **“We will work to preserve a global level playing field for all businesses.”**
 - *This assumes that everyone would agree that there is at present a level economic playing field. Others may have a different perspective on the current degree of fairness.*
- » **“Our climate strategy will create millions of jobs and bring economic growth.”**
 - *This implies a level of certainty about the economic impacts of climate change and an expectation that more jobs will be created than lost. It leaves out, and thus potentially minimizes by omission, the potential hardships that will come in combatting climate change.*

Note: assumptions are not errors. Rather, they are core elements of strategic thinking that could be vulnerable to disruption or inadvertently minimise uncertainty. Everyone has assumptions that guide or inform their thinking. The assumptions extracted should be fair representations of actual strategic thinking. The goal is not to make those who have shaped strategy feel embarrassed, but to support the process of strengthening the foundational elements of strategy.

If there is not a core strategy document already in existence, then a list of assumptions guiding current strategic thinking can be generated through interviews with current leadership about their strategic thinking. If this is not possible, then have a brainstorm with organisers and facilitators to identify a preliminary list to be validated by participants.

REQUIREMENTS

Plan for one facilitator per breakout group and if possible, one notetaker per breakout group as well. If conducting this exercise in-person, provide Post-it notes or one flip chart per breakout group.

- » **Note: If online, consider not using interactive mind-mapping technologies**, which can distract participants and prevent them from listening to others in the conversation. These tools are useful for large groups but can hinder the cohesion of intimate brainstorming sessions such as these unless used by experienced facilitators. If they are used, it is best to have one person in charge of managing the mind map and another in charge of facilitating the conversation.

WORKSHOP AGENDA

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|---|--|-------------|
| OVERVIEW (PLENARY) | <ul style="list-style-type: none"> » Reminder of the outline and purpose of the process. » Brief summary of key takeaways from Module 1. » Presentation of disruption pairings – participants choose their preferred group. | 15 mins |
| CROSS-IMPACTING EXERCISE #1 (IN BREAKOUT GROUPS) | <ul style="list-style-type: none"> » Each participant is given time to read a briefing on any of the disruptions that they have not yet discussed. (5 mins) » Invite participants from each of the groups to summarise important takeaways from the previous discussions. (5 mins) » Discussion questions: <ul style="list-style-type: none"> • How do these two disruptions relate to each other? (5 mins) • Would the implications of either of them be amplified if they co-occurred? (Round-robin: one contribution from each participant, also written on a Post-it.) (15 mins) • Would there be any new opportunities or challenges arising in a world where both of these disruptions took place? (10 mins) » Participants identify the possible implication that was most notable to them. (5 mins) » Take a photo of the Post-it notes, then remove them from the table. | 40 mins |
| SHORT BREAK | | |
| CROSS-IMPACTING EXERCISE #2 (IN BREAKOUT GROUPS) | <ul style="list-style-type: none"> » Each participant is given time to read a briefing on any of the disruptions they have not yet discussed. (5 mins) » Invite participants from each of the groups to summarise important takeaways from the previous discussions. (5 mins) » Discussion questions: <ul style="list-style-type: none"> • How do these two disruptions relate to each other? (5 mins) • Would the implications of either of them be amplified if they co-occurred? (Round-robin: one contribution from each participant, also written on Post-it) (15 mins) • Would there be any new opportunities or challenges that would arise in a world where both of these disruptions took place? (10 mins) » Participants identify the possible implication that was most notable to them. (5 mins) » Take a photo of the Post-it notes, then remove them from the table. | 40 mins |

| Agenda item | Contents and discussion questions | Time |
|--|--|---------|
| ASSUMPTIONS EXERCISE (IN PLENARY) | <ul style="list-style-type: none"> » Present the preliminary list of assumption to all participants. • Give them each 3-5 minutes to read the list and propose amendments to it. • Is there a better way to phrase these assumptions? • What else should be added to this list? Are there any important core assumptions missing? | 30 mins |
| CLUSTERING EXERCISE (IN PLENARY) | <ul style="list-style-type: none"> » Place the list of disruptions and the final agreed upon list of assumptions side by side. • Go through the list of assumptions one by one and have participants identify which of the disruptions could undermine it. • These will be the story elements in a scenarios exercise in module 3. | 40 mins |
| WRAP-UP | <ul style="list-style-type: none"> » Conclusions, reflections and next steps (including logistics about where to be and when). | 15 mins |

MILESTONES

The purpose of this module is to introduce participants to building skills in systems thinking and taking a futures-oriented approach. Participants will explore prevailing indicators of change that have the potential to reshape the policy landscape, some of which may have eluded their attention. Through a structured exercise, participants are prompted to seek corroborative evidence of these transformative shifts and envision their future implications on the broader socio-economic fabric. This process stimulates participants' creativity and prompts them to critically examine key policy assumptions that have been ingrained consciously or unconsciously. While capturing noteworthy insights on policy implications for future deliberations is encouraged, extensive notetaking during this module is not necessary for final reporting purposes.



1. FACILITATION SCRIPT IN PLENARY

- » **GIVE A BRIEF SUMMARY OF THE FIRST SESSION** and a reminder about the purpose of the exercise.
- » **REMAND PARTICIPANTS THERE ARE (ALMOST) NO WRONG ANSWERS IN THESE TYPES OF EXERCISES.** Foresight is inherently speculative. All forms of contribution are welcome, from traditional expertise to personal or anecdotal data. Getting everyone comfortable with engaging in the exercise is a top priority.
- » **REMAND PARTICIPANTS THAT THE SESSION IS FULLY EXPECTED TO RAISE CONFLICTING IDEAS.** This is a subjective exercise, in which opposite implications may be imagined from the same disruption. All are possible, even if only one – or none – ever comes to pass. Highlighting this uncertainty and the diversity of possible implications is an important part of the exercise.
- » **REMAND PARTICIPANTS THEY ARE FREE TO ANSWER FROM A PROFESSIONAL OR PERSONAL PERSPECTIVE.** If the immediate thought that enters their mind about a given disruption pair is how it could impact their children's lives or their social circle, that should be encouraged. Including emotions and personal experience provides valuable context in foresight processes.
- » **BRIEFLY INTRODUCE EACH OF THE SELECTED DISRUPTIONS** at the beginning of the session.
- » **ASK INDIVIDUAL PARTICIPANTS TO SELECT THE DISRUPTION PAIR THEY ARE MOST INTERESTED IN DISCUSSING** and join a breakout group based on that.
 - *This helps ensure active participation among participants.*
 - *If groups are imbalanced, ask some participants in the largest group(s) to switch to one of the smaller ones.*



2. CROSS-IMPACTING EXERCISE IN BREAKOUT GROUPS (assign one facilitator per group)

- » **GIVE PARTICIPANTS THREE TO FIVE MINUTES OF SILENCE** to read the disruption briefings. Encourage them to take notes.
- » **HAVE PARTICIPANTS WHO DISCUSSED EITHER OF THE DISRUPTIONS GIVE A BRIEF SUMMARY** of the major themes discussed during the previous sessions. Spend no more than five minutes on this step.
- » **ASK PARTICIPANTS HOW THESE TWO DISRUPTIONS MIGHT RELATE TO ONE ANOTHER** (e.g. what connects them, how could they co-occur?)
- » **BEGIN EXPLORING THE FUTURE:** ask participants to imagine what the world might look like in 2040 if these disruptions were to co-occur and identify what else might be impacted by this change. Give them 30 seconds in silence to collect their thoughts.
 - *If this exercise is conducted in-person, have participants write down a “headline” summary of their idea on a Post-it note.*
 - *Think about creative ways to group and cluster Post-it notes. This could be in common pre-set categories in futures exercises that encourage thinking about society, technology, economy, environment and governance (STEEG), or political, economy, society, technology, legal and environment (PESTLE).*
 - *If online, request that participants keep their cameras on, do not multitask and use the “raise hand” function to indicate when they want to speak.*
- » **ENSURE ALL PARTICIPANTS HAVE AN OPPORTUNITY TO PARTICIPATE.** Begin the session’s futures-exploration section with a round-robin where each participant shares the first implication of the disruption pair that came to mind.
 - **Note:** *If discussions are very quiet or dominated by a few individuals, you may wish to return to this round-robin method, whereby one participant at a time is invited to share in a fixed order.*
- » **PUSH PARTICIPANTS FURTHER INTO THE FUTURE:** continually ask them to think about the possible knock-on effects of the ideas raised by others. Questions such as “What might happen next?” are useful here.
- » **PUSH PARTICIPANTS TO EXPLORE DOMAINS THAT HAVE NOT YET BEEN DISCUSSED IN DEPTH.** Think back to sections of the STEEG or PESTLE map that have gotten less attention.
- » **FINAL FIVE-TEN MINUTES:** synthesise the session by having participants identify the threads of conversation which were the most notable to them.
- » **REPORTING BACK:** Only share back to the plenary 1-3 of the most notable points identified by participants, in 30 seconds or less. These conversations are often too complex to summarise neatly, and the most common risk is that the larger audience stops listening.



3. ASSUMPTIONS VALIDATION EXERCISE IN PLENARY

- » **PRESENT THE PRELIMINARY LIST OF ASSUMPTION TO ALL PARTICIPANTS.**
- » **EXPLAIN WHERE THESE ASSUMPTIONS CAME FROM AND WHAT THEY REPRESENT** (e.g. underlying beliefs about how the future will unfold or how the world works).
- » **CIRCULATE THE LIST OF ASSUMPTIONS ON A PIECE OF PAPER TO EACH PARTICIPANT** (or share them on a screen if on-line).
- » **GIVE PARTICIPANTS EACH 3-5 MINUTES** to read the list and propose amendments to it.
- » **GO THROUGH THE LIST OF ASSUMPTION ONE BY ONE** and ask participants if they agree with how this assumption is worded.
 - *After each proposed amendment, ask if others are in agreement or have alternative wordings to propose.*
 - *After going through the list, ask participants to identify if there are any core assumptions missing from the list.*



4. CLUSTERING EXERCISE TO IDENTIFY SCENARIOS IN PLENARY

- » **WRITE DOWN THE LIST OF ASSUMPTIONS** in one column and the list of disruptions in another (potentially on two side-by-side white boards or flip charts)
- » **EXPLAIN PARTICIPANTS THAT THE FINAL ACTIVITY OF THIS SESSION IS ABOUT** identifying the ways that the disruptions the group has been exploring could undermine some of the foundational assumptions underlying strategic thinking within the organisation or in the given policy that is being stress-tested.
- » **GO THROUGH THE LIST OF ASSUMPTIONS FROM TOP TO BOTTOM** and ask participants to raise their hand and identify which of the disruptions could undermine or otherwise challenge this assumption.
 - *Encourage a brief explanation as to how the disruption could undermine the assumption.*
 - *Repeat this for each assumption.*
 - **Note:** *disruptions can be paired with several of the assumptions.*

MODULE THREE: CREATING SCENARIOS

This module guides participants through a scenario-building exercise, a policy analysis tool that provides a narrative to describe a set of possible future conditions. Scenarios are used to help participants envisage a possible future and explore its direct and indirect consequences.

CREATE

3

CONTEXT

Building on the exploration of disruptions (Module 1) and the understanding of the potential interactions between these disruptions (Module 2), participants in this module are guided to create several internally consistent narratives of how the future might unfold. Participants build skills in systems thinking as they explore complex interactions between emerging trends, drivers of change and the ever-evolving futures landscape. As participants weave the various disruptions together into a coherent and plausible story about the future, they build a clear and concise mental model of what one possible future could look like.

AUDIENCE

Each root scenarios would ideally be developed in a breakout group with **six to nine participants**.

TIMING

Typically, this module would run for **two to three hours**. The timing can be extended for a deeper discussion or greater development of the scenarios.

FACILITATOR DIFFICULTY LEVEL

Foresight experience is beneficial for facilitators of this module. This module requires the facilitator to help participants keep multiple factors – and their implications – in mind at the same time. An experienced facilitator, or a foresight analyst, is preferred.

WORKSHOP AGENDA

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|--|---|-------------|
| INTRODUCTION | <ul style="list-style-type: none"> » Session outline and introduction. » Root scenarios presentation. | 20 mins |
| SCENARIOS DEVELOPMENT (IN BREAKOUT GROUPS) | <ul style="list-style-type: none"> » Development and exploration of scenarios: <ul style="list-style-type: none"> • What are most relevant and important disruptions (e.g. which ones drive the story?) • How do the various disruptions at play interact with one another? How might these demonstrate how we arrived in this future? • What does the world of 2040 look like under this scenario? (Explore what it means across all the STEEG categories) • What are some relevant signals for the plausibility of this scenario? | 60 mins |
| SCENARIO SUMMARISATION (IN BREAKOUT GROUPS) | <ul style="list-style-type: none"> » How would you summarise the core narrative of this scenario in one paragraph? » What details are missing from the summary? | 25 mins |
| SHORT BREAK | | |
| SCENARIO PRESENTATION (IN PLENARY) | <ul style="list-style-type: none"> » Each group presents a one-minute scenario summary. » Opportunity for clarifying questions. | 30 mins |
| WRAP-UP | <ul style="list-style-type: none"> • Conclusion, reflections and next steps. | 15 mins |

MILESTONES

The purpose of this module is to have participants co-create an internally consistent narrative of a possible future. By projecting into the future and considering the wider socio-economic ramifications of these disruptions, participants will activate their creative thinking and challenge underlying assumptions.

IMPORTANT STEPS BETWEEN SESSIONS

It is crucial to take thorough notes during this module to capture the key insights and details of the scenario developed for comprehensive reporting and future reference.

- » **Refining scenarios:** It is often necessary for facilitators to refine scenarios between modules to ensure quality and consistency and to edit out instances where different scenarios have too much overlap. It is important the scenarios demonstrate different future possibilities to allow for a broader exploration of potential futures and a more comprehensive understanding of the uncertainties and possibilities that may arise.
- » **Identifying strategic focus areas:** Prior to the strategy development sessions, organisers should collect a list of strategic focus areas that feature or will feature in the organisation's strategy. These can be the main domains covered in the strategy document being stress-tested. If a strategy does not exist already, then a quick exercise to identify what the areas of responsibility or mandate are for the organisation that should be addressed in the strategy. These can be identified in a short brainstorm with relevant stakeholders or an interview with the responsible manager overseeing the part of the organisation undertaking this process. This list will be briefly validated by participants during the following session.



1. FACILITATION SCRIPT IN PLENARY

- » **GIVE A BRIEF RECAP OF THE FIRST TWO SESSIONS AND A REMINDER ABOUT THE PURPOSE OF THE EXERCISE** which is to construct a set of scenarios wherein core organisational assumptions are challenged based upon the disruptions explored in previous sessions.
- » **EXPLAIN THAT THIS MODULE IS FIRST AND FOREMOST A STORYTELLING EXERCISE.**
- » **INTRODUCE THE LIST OF ROOT SCENARIOS.**
 - *"This is a world where the assumption _____ is undermined by the following disruptions"*
- » **EXPLAIN TO PARTICIPANTS** that they should choose one of the root scenarios to elaborate upon.
- » **EXPLAIN THAT THE GROUP CAN CHOOSE WHICH OF THE DISRUPTIONS TO EMPHASISE MORE, LESS, OR NOT AT ALL** in their construction of a more detailed scenario that undermines one or more core assumptions.
- » **THE STORIES SHOULD HAVE A LOGICAL STRUCTURE CONSISTING OF A CLEAR AND CONCISE DESCRIPTION OF HOW THESE DISRUPTIONS CO-OCCURRED,** how this changed the world and what the implications of this were for several sectors of society or important areas of interest for your organisation.



2. FACILITATION SCRIPT IN BREAKOUT GROUPS

- » **RE-EXPLAIN THAT THE PURPOSE OF THE ACTIVITY IS COLLECTIVE STORY-TELLING** informed by the discussions in previous modules.
- » **THE ELEMENTS THEY DRAW ON CAN BE DIRECTLY IN THE SCENARIO BRIEFINGS** given to participants or taken from any of the discussions in the previous modules.
- » **RE-INTRODUCE THE CORE ASSUMPTION(S)** being undermined or challenged as a central theme of the scenario. Highlight the disruptions that are being used in the exercise.
- » **ASK PARTICIPANTS TO IDENTIFY** which of the assumptions they think is most directly and immediately disruptive to the core assumption. There does not need to be “one” most important one. If there are different ideas, explore ways of reconciling them.
- » **HOW WE GOT HERE: Ask participants to identify how the other disruptions might interact with one another to lead into a future where this disruption is undermined? Work to include at least 3 total disruptions into the narrative.**
 - **Note:** *the scenarios should generally exclude actions taken by your organisation or government (or at least this should not be the central focus). This is an exercise building (mostly) exogenous scenarios. In Module 4, participants will discuss strategies to respond to and mitigate these scenarios.*
- » **SCENARIO ELABORATION AND IMPLICATIONS: Ask participants to describe what this future looks like across several domains.**
 - *Here it could be useful to return to a cascade exercise and fill out implications on post-it notes across the various STEEG or PESTLE domains (Society, Technology, Economy, Environment and Governance or Policy, Economy, Society, Technology, Legal, Environment).*
 - *Other prompt questions to ask if discussion is slow:*
 - › *Who would be the winners and losers in this future? How might that change behaviour and incentives?*
 - › *Are people guided in their actions by what others do around them? How might most people react in this future? Who will they be guided by?*
 - › *How might this future shape geopolitics? How would it shape domestic politics in your home country?*
 - › *What will be the intersection between government and private industry in this future?*
- » **HAVE PARTICIPANTS BOLSTER THE “HOW WE GOT HERE” SECTION** with signals in the present that demonstrate that this scenario could unfold.
- » **SUMMARISATION EXERCISE: In the final 20-25 minutes ask participants to attempt to summarise their understanding of the co-created narrative in 30 seconds or less.**
 - *Give participants 3-5 minutes in silence to write out their one paragraph summary narrative and produce a title for it.*
 - *Have participants present their narrative in a round robin. If later participants have little to add to the summary, they can focus more on adding important details they think should be included in the single summary. The goal is to have a coherent one paragraph scenario ready for the end of the session.*
 - *Discuss which parts of the various narratives to keep and weave into a shared summary.*
 - *Discuss a shared title.*
 - *Identify one participant who will present the agreed-upon summary back to the plenary.*



3. FACILITATION SCRIPT IN PLENARY

- » **HAVE EACH OF THE GROUPS PRESENT THEIR SCENARIOS AND FIELD QUESTIONS OF CLARIFICATION AFTER EACH PRESENTATION.** These questions should attempt to identify inconsistencies, contradictions or omissions from the summary narrative that should be addressed.
- » **AFTER THE CLARIFICATION QUESTIONS, CONCLUDE THE SESSION BY FORESHADOWING THE NEXT MODULE** on vision-building and strategy development wherein participants will explore ways to respond to each of the scenarios.

MODULE FOUR: ENVISIONING AND STRATEGISING

In this module, participants use the future scenarios built in Module 3 as a foundation for envisioning successful policy strategies for each alternative future. Because the scenarios have been constructed to represent different plausible futures, participants engage in in-depth discussions and analysis to formulate policy strategies tailored to each scenario. Participants gain valuable insights by imagining the potential opportunities and challenges stemming from each scenario and developing adaptive policy approaches that address the challenges and capitalise on the opportunities presented by each scenario.

CONTEXT

The action of co-creating the scenarios considered as part of Module 3 facilitates buy-in and acceptance, allowing participants to quickly adapt a futures-oriented mindset to envisage success. Scenarios are designed to target the foundations of their organisation’s policy thinking in ways that would be difficult to dismiss. Participants develop the ability to articulate how certain developments could evolve to pose problems for the organisation at a foundational level. These problems will require more than a simple technical solution. Ultimately, participants emerge from this exercise with a comprehensive set of policy strategies tailored to each scenario, giving them a solid foundation for effective policy making in an ever-evolving and uncertain future.

AUDIENCE

*Each scenario would ideally be discussed in a breakout group with **six to nine participants**.*

TIMING

*Typically, this module would run for **two to three hours**. The timing can be extended for a deeper discussion, or to cover a broader suite of recommendations.*

IDENTIFICATION OF FOCUS AREAS (BEFORE THE SESSION)

Prior to the strategy development sessions, organisers should collect a list of strategic focus areas that feature or will feature in the organisation’s strategy. These can be the main domains covered in the strategy document being stress-tested. If there is not a strategy already in existence, then these focus areas can be identified in a short brainstorm with relevant stakeholders or an interview with the manager who approved the foresight process. For example, the domains for a team designing human resources policies might include focus areas such as recruitment, training and people management. This list will be briefly validated by participants during the session.

FACILITATOR DIFFICULTY LEVEL

Foresight experience is beneficial for facilitators of this module. This module requires the facilitator to help participants keep multiple factors – and their implications – in mind at the same time. An experienced facilitator, or a foresight analyst, is preferred.

WORKSHOP AGENDA

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|--|--|-------------|
| INTRODUCTION (IN PLENARY) | » Overview of the session on scenario-specific strategy development. | 5 mins |
| VALIDATING STRATEGIC FOCUS AREAS | » Participants review the list of strategic focus areas and provide feedback on omissions and necessary reframing. | 15 mins |
| PRESENTATION OF SCENARIOS | » Recap of the scenarios developed and updates made between the sessions. Participants choose which of the scenarios they want to develop a catered strategy for. | 5 mins |
| EXPLORATION OF SCENARIO IMPLICATIONS (IN BREAKOUT GROUPS) | » What actions would you take today if you knew this specific future were going to come to pass? » Identify the challenges and opportunities this specific strategy would bring across each of the strategic focus areas: <ul style="list-style-type: none"> • What specific policies, programs or initiatives would need to be adjusted if this scenario were to play out? • What actions would we ideally be taking today if we knew this scenario were going to play out? » Synthesis of key elements of strategy. | 60 mins |

SHORT BREAK

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|---|--|-------------|
| STRATEGY PRESENTATION (IN PLENARY) | <ul style="list-style-type: none"> » Presentation of scenario specific strategies to the whole group by one representative. » Identification of synergies and tension points between different scenario-specific strategies. | 40 mins |
| WRAP-UP | <ul style="list-style-type: none"> » Conclusion, reflections and next steps. | 10 mins |

MILESTONES

The purpose of this module is to articulate successful policy strategies for each scenario. Participants should assume this scenario has come to bear and consider the implications in detail. This includes articulating how certain developments could evolve to pose problems for the organisation at a foundational level. A comprehensive set of policy strategies tailored to each scenario should be developed at the end of this module.



1. FACILITATION SCRIPT IN PLENARY

Validation of list of strategic focus areas:

- » **GIVE A BRIEF OVERVIEW OF THE GOAL OF THE SESSION** to develop of scenario-specific strategies.
- » **THE FIRST ACTIVITY IS TO VALIDATE A LIST OF FOCUS AREAS** of the organisation's strategy being stress-tested or developed. This activity is similar to the assumptions validation exercise in module 2.
- » **PRESENT THE LIST OF KEY STRATEGIC FOCUS AREAS AND GIVE TO EACH PARTICIPANT.** These are the elements covered by the strategy that is being stress-tested or areas that the strategy being built is supposed to address.
- » **GIVE THEM 2 MINUTES TO REVIEW THE CATEGORIES.**
- » Ask them to identify any key areas that are missing or alternative ways of grouping the list. Move on to strategy development after no more than 15 minutes of discussion.

Strategy development exercise introduction.

- » **GIVE A BRIEF RECAP OF THE SCENARIOS CONSTRUCTED IN THE LAST SESSION.** Explain any edits made by the facilitators since the end of the last module.
- » **EXPLAIN THAT THE GOAL IS TO DESIGN STRATEGIES WE WOULD DESIGN AND BEGIN IMPLEMENTING TODAY** if we knew that this specific future was coming.
 - *This strategy should involve ways to avoid things that can be prevented and adapt to the things that cannot be prevented.*
- » **LET PARTICIPANTS CHOOSE WHICH BREAKOUT GROUP AND SCENARIO THEY WANT TO DESIGN A STRATEGY FOR.** There is no requirement that participants work on the strategy that responds to the scenario they were involved with building in the previous module.



2. FACILITATION SCRIPT IN BREAKOUT GROUPS

Scenario-specific strategy development.

- » **BEGIN BY GETTING THE GROUP TO IDENTIFY** the specific challenges and/or opportunities the scenario would present across each of the focus areas of the strategy.
- » **GO THROUGH THE LIST OF FOCUS AREAS AND ASK PARTICIPANTS TO** provide actions that could be taken today to be better prepared to avoid or adapt to the challenges and seize the opportunities identified. Guiding questions:
 - *What actions would we ideally be taking today if we knew this scenario were going to play out?*
 - *What specific policies, programs or initiatives would need to be adjusted if this scenario were to play out?*
 - *Encourage participants to be as detailed as possible in the proposed changes or additions to the strategy that they are proposing.*
- » **EXTRACTING A SOLID A LIST OF SPECIFIC POLICIES AS POSSIBLE HERE WOULD BE HIGHLY BENEFICIAL** to generating impact from this process. Quality of outputs is more important than quantity.
- » **IN THE FINAL 10 MINUTES, HAVE PARTICIPANTS TRY TO SUMMARISE THE KEY ELEMENTS** of the scenario-specific strategy that has been developed.



3. FACILITATION SCRIPT IN PLENARY

Strategy presentation and conclusion.

- » **HAVE A FACILITATOR OR A VOLUNTEER FROM EACH GROUP PRESENT** a brief summary of the scenario-specific strategy their group developed.
 - *This should take the form of: "Our scenario was _____. To be prepared for this future, we have the following strategic recommendations..."*
- » **AT THE END OF THE PRESENTATIONS,** ask participants if they see any tensions or synergies between the proposed strategies. Take careful note of these.
- » **CONCLUDE THE MODULE BY EXPLAINING** that the final module will focus on harmonising the strategies built here with the aim of developing a scenario-agnostic strategy.

NOTE TAKING TEMPLATE

Strategic focus area

Challenges

Opportunities

Actions

FOCUS AREA 1

FOCUS AREA 2

FOCUS AREA 3

FOCUS AREA 4

FOCUS AREA 5

MODULE FIVE: RECOMMENDING POLICIES

RECOMMEND

In Module Five, participants go through the process of comparing and contrasting the scenario-specific strategies across various policy domains. They then assess whether the recommended actions in each of the sector-specific strategies would face issues should a different scenario play out. If not, then these actions are deemed to be “no-regrets” policies and endorsed as contingency plans for a possible future. By the end of this module, participants will be left with a set of recommendations that improve resilience across a range of possible futures. In instances where there are conflicts between the optimal approaches for one scenario or another, participants are guided to develop “good-bet” actions, where they weigh the trade-offs between approaches and decide how best to position themselves despite the uncertainty. This involves a subjective brainstorm, assessing the plausibility and potential impact of one outcome or another, as well as exploring which variables could be monitored to assess whether the likelihood of one scenario or another is increasing. This often takes the form of contingency plans for potentially challenging scenarios that policy planners may not yet have adequately considered.

5

CONTEXT

Scenario-specific strategies are insufficient for future-ready policy making because there is no way of knowing which of the scenarios – if any – will play out. This session is structured entirely around the group's focus areas and asks participants to recommend action steps in specific domains that are well-suited to all the scenarios. This is the most challenging part of the foresight process but essential to realising immediate impact.

AUDIENCE

Each scenario would ideally be discussed in a breakout group with **six to nine participants**.

TIMING

Typically, this module would run for **two to three hours**. The timing can be extended for a deeper discussion of certain recommendations or to cover a broader suite of recommendations.

FACILITATOR DIFFICULTY LEVEL

Foresight experience is beneficial for facilitators of this module. This module requires the facilitator to help participants keep multiple factors – and their implications – in mind at the same time while also translating wide ranging discussions into specific recommendations. An experienced facilitator, or a foresight analyst, is preferred.

WORKSHOP AGENDA

| <i>Agenda item</i> | <i>Contents and discussion questions</i> | <i>Time</i> |
|---|---|---------------|
| INTRODUCTION | » Overview of the session. | 5 mins |
| PRACTICAL ACTIONS (IN BREAKOUT GROUPS) | » Participants choose their focus areas. <ul style="list-style-type: none">• Assess each of the scenario-specific recommendations.• Are there “no regrets” actions that would be wise in all scenarios?• Are there “good bet” actions which are helpful in some scenarios and unlikely to be overly harmful in others?• Are there necessary contingency plans which should be developed for certain scenarios? What are the factors to monitor or determine whether a contingency plan should be implemented? | 90 - 120 mins |
| SHORT BREAK | | |
| PRESENTATION OF RECOMMENDATIONS | » Each of the groups present their recommended action steps in each of the strategic focus areas. | 15 mins |
| WRAP-UP | » Conclusion, reflections, and next steps (e.g. report writing). <ul style="list-style-type: none">• Participants reflect on their takeaways from the session.• Organisers articulate the next steps which will follow from the exercise. | 20 mins |
| EVALUATION | » Participants to fill out evaluation form. | 10 mins |
| CLOSING REMARKS | » High-level official with involvement or at minimum familiarity with the process to deliver closing thoughts on the ways the outputs of this process will inform future decision-making. | 10 mins |

MILESTONES

A comprehensive final report should be developed after the foresight process that highlights the main findings, key insights and policy implications concisely and accessibly. The report should describe the methodology employed, including the co-creation process for developing scenarios and the assumptions they challenge. It should present the scenarios developed, detailing the driving forces, assumptions and potential socio-economic impacts associated with each. It should outline the identified risks, opportunities and critical uncertainties policy makers need to consider.

The report should provide a brief analysis of the policy implications for each scenario, suggesting actionable strategies and interventions to tackle the challenges and take advantage of the opportunities presented. Its take-home message should emphasise the need for flexible policy frameworks that can adapt to changing circumstances. Visual aids such as graphs, charts and infographics can help communicate complex information.

Lastly, the report should always link back to policy actions for today. It could discuss potential implementation considerations, outlining potential partnerships, resource allocation and evaluation mechanisms to ensure successful policy execution. It could also include contingency plans that could be developed today and deployed in the future should a specific disruption play out. By encompassing these elements, the final report will serve as a valuable resource for policy makers, providing them with the insights, strategies and recommendations necessary to navigate a dynamic and uncertain future.



1. FACILITATION SCRIPT PRIOR TO THE SESSION

- » Group the recommendations from module 4 into their relevant focus area.



2. FACILITATION SCRIPT IN PLENARY

Overview of the module

- » **THIS IS THE FINAL STEP IN THE PROCESS.** The goal is to extract a set of tangible recommendations or proposed action steps for the organisation to become more resilient. This is done by comparing the different scenario-specific strategies and exploring how to harmonise them.
- » **DIVIDE THE GROUP INTO BREAKOUT GROUPS** each focused on one or more of the focus areas identified in the previous session. Participants should select the focus area they are best equipped to discuss.



3. FACILITATION SCRIPT IN BREAKOUT GROUPS

Identifying action steps to enhance resilience.

- » **PRESENT PARTICIPANTS WITH THE LIST OF SCENARIO-SPECIFIC RECOMMENDATIONS** relevant to this breakout group. This list should highlight ideas that came out of multiple groups.
- » **SELECT ONE OF THE RECOMMENDATIONS.**
 - *Ask participants if the recommendation would be wise across all scenarios and whether it might come into tension with any of the other recommendations. Give participants a few minutes to discuss.*
 - *If a recommendation is advisable in all of the scenarios developed, this can be listed as a “no regrets” action. These are actions that can be taken to improve resilience across all scenarios or mitigate risks across a wide range of possible futures with no downsides in any of the future scenarios explored. Feel free to rephrase the recommendation to maximise contribution to resilience (e.g., preparedness for a range of possible futures and disruptions).*
 - *If a recommendation would not be wise under a given scenario, ask participants if there is a way to reframe the recommendation in a way that minimises its vulnerability to the challenging scenario without jeopardising its advisability in others. This can become a “good bet” action.*
 - *If there is not a way to reframe the recommendation, this action may become a contingency plan to implement under certain conditions. Ask participants to identify what factors should be monitored in order to assess whether and when a contingency plan should be implemented.*
 - *If there are tensions between recommendations, have participants discuss ways to resolve these.*
 - *Push participants to be as specific as possible in their recommendations. The priority should be on a small list of well formulated recommendations. The small list should include practical thoughts about how to implement the recommendations (e.g., how would this be financed? Who would be responsible for implementing this recommendation?).*
- » **RED TEAMING (TIME PERMITTING)**
- » **HAVE PARTICIPANTS SWITCH WITH ANOTHER GROUP AND COMMENT/CRITIQUE THE RECOMMENDATIONS MADE IN THAT DOMAIN.** The ideal way to do this is to have one designated group representative and the facilitator stay behind to explain and defend the recommendations made by that group to the participants from another.
- » **THIS IS A LOWER PRIORITY THAN THE REFINEMENT OF RECOMMENDATIONS BY DOMAIN-EXPERTS.** If groups have finished early, this is an exercise to undertake to increase the robustness of the recommendations and their coherence with the recommendations developed by other groups.



4. FACILITATION SCRIPT IN PLENARY

Presentation of strategic recommendations.

- » **HAVE FACILITATORS PRESENT A SUCCINCT SUMMARY** of the major recommendations developed by the group. No more than 1 minute per group.
 - *Give participants the opportunity to ask questions.*
- » **GIVE PARTICIPANTS A FEW MOMENTS** to think about their major takeaways from the overall foresight process. Ask for volunteers to share to their thoughts to the plenary.
 - *"If you met a senior leader in the elevator and had to make one recommendation to them based on this foresight exercise in 30 seconds or less, what would it be?"*
- » **HAVE PARTICIPANTS FILL OUT A BRIEF QUESTIONNAIRE** (ideally anonymous and online) reflecting on their experience in the foresight process.
- » **HAVE A MEMBER OF SENIOR LEADERSHIP** reflect on the process overall and provide closing remarks.