BCG HENDERSON INSTITUTE SCENARIOS 2050

Beyond Tomorrow: Four Scenarios for the World of 2050

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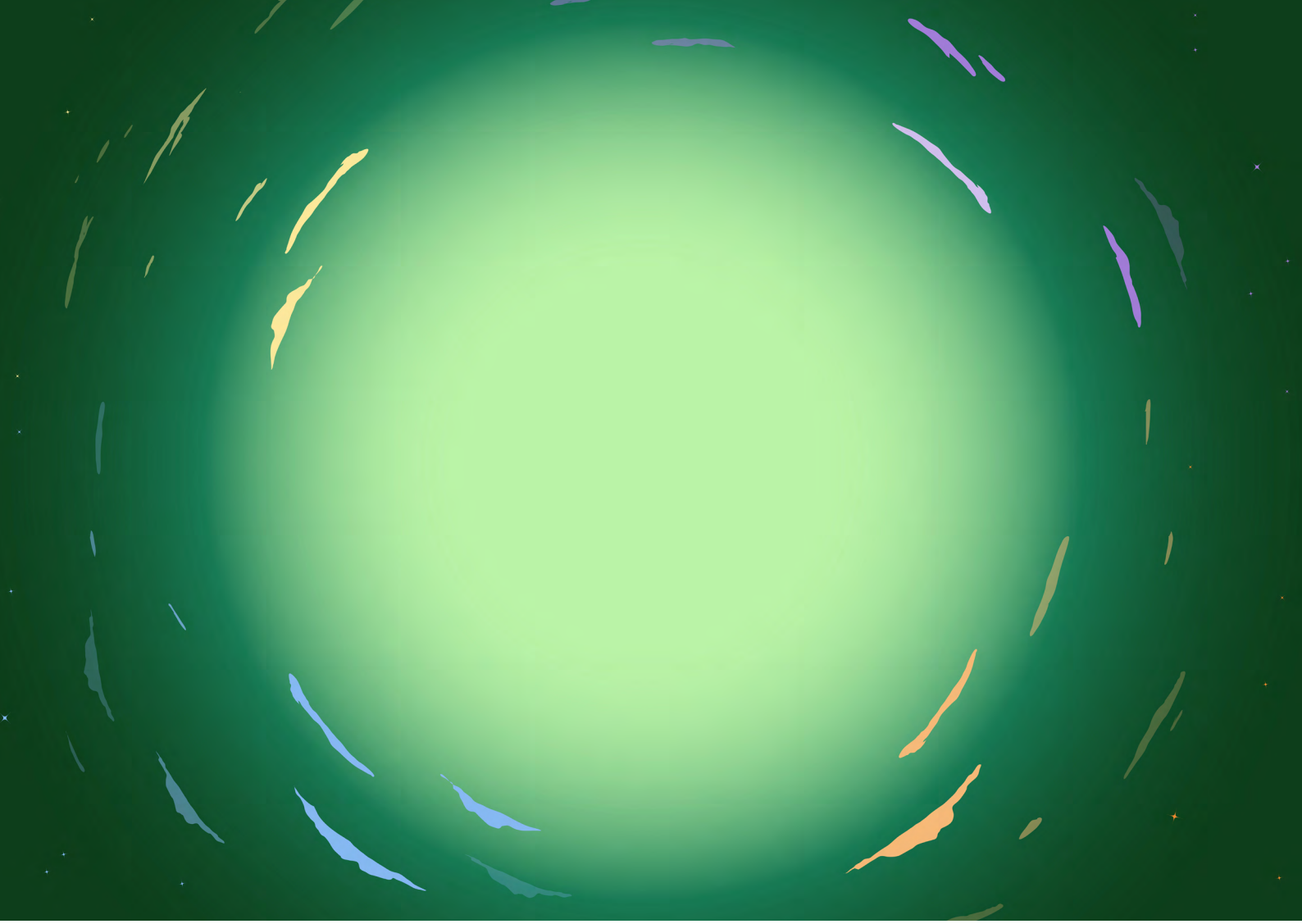


Preface

For leaders balancing a challenging present with near-term uncertainty, the world of 2050 can seem remote. But considering the future can reveal lessons for today and provide pathways to long-term competitive advantage. The decisions leaders make over the next 5 years will shape the next 25.

In this report, we set out four distinct scenarios for 2050 that push boundaries but remain plausible. Unlike many scenario exercises, which are often limited to speculative, "what if" questions, our four possibilities are based on a detailed quantitative analysis of a hundred megatrends and a century of historical data, as well as dozens of interviews with global experts on topics ranging from macroeconomics to space engineering.

In addition, we explore what it would take for organizations to thrive in these scenarios—and consider how best to prepare today for the challenges and opportunities they present.

This report and the scenarios are tools not for predicting the future but for engaging proactively with it. By considering multiple possible futures, leaders can identify early warning signs and tactical moves that will build resilience and secure advantage in the face of uncertainty.

CHAPTER 1

Imagining 2050

What will the world be like in 2050?

For CEOs today, this question may feel unfamiliar, perhaps even uncomfortable. Accustomed to the rhythm of five-year plans and quarterly results—punctuated by the need to respond to present-day crises—looking more than two decades into the future is far from common practice. While this is understandable, it's also critical that leaders maintain a long-term view.

Over a 25-year time frame, some trends—such as demographic shifts—are relatively easy to forecast. The populations in China and many of the OECD (Organization for Economic Co-operation and Development) countries are aging fast, especially compared with those of Africa and the Global South. And, given current trajectories, it will be a warmer world, with more frequent and extreme weather events and stress on food and water systems.

But for other strategically relevant dimensions, a wide range of outcomes are possible. Today, AI is booming—but what will its evolution and governance bring? Geopolitical and trade frictions are rising—will they intensify or ease? Inequality is widening—what, if anything, will governments do to address it?

To help leaders navigate such unknowns, we developed four scenarios that represent possibilities for the world of 2050. (See Appendix 1 for suggestions on how to use the scenarios.) Our scenarios are not forecasts, nor do they attempt to predict the unpredictable—black swan shocks, such as the emergence of the Singularity or a war in space, that are not very likely and would represent significant discontinuities. (See chapter 6 for a discussion of low-probability, high-impact potential events.) Rather, our scenarios provide tangible potential economic environments for imagining strategy. It's a powerful exercise: across the four scenarios, the spread of outcomes is staggering. The only unacceptable strategy? Planning for just one future.

Four Visions of the Future

Each scenario represents a comprehensive picture of a world in which we may have to live and operate. It gives leaders an immersive environment for strategic reflection, enabling them to consider how today's assumptions would need to evolve, what new risks would emerge, and what moves should be made in the short and medium terms to best position their organization to succeed.

Our development process resulted in four unique scenarios that we explore in detail in this report:

AI Abundance. The explosive rise of AI technologies eventually leads to global cooperation on strict regulatory standards—enabling exceptional productivity growth, plentiful low-carbon energy, and governments that prioritize stability over individual liberty.

Battling Blocs. The world transitions to a tense stalemate among economically decoupled and mutually distrustful blocs. International trade and cooperation decrease, while defense spending rises dramatically as national governments centralize power and control of critical resources.

Climate Coalition. An onslaught of extreme weather shocks drives nations to prize resilience over unbridled economic growth—and a multilateral agreement on carbon standards unlocks green innovation and infrastructure buildout.

Digital Darwinism. With governments and institutions in retreat, corporations dominate a low-regulation, rapidly warming world. Inequality soars, with work increasingly taking place in the gig economy, while huge leaps are made for the wealthy in bionics and longevity technology.

By design, none of these is a comfortable or familiar scenario. Planning for the challenges of these potential futures means asking difficult questions, but the answers will yield richer, more robust strategies for succeeding in the next 25 years.

How We Built the Scenarios

Our scenario-building process comprised extensive megatrend analysis, expert interviews, and pressure testing. For the most critical dimensions—such as technological development, global trade and power shifts, energy transition, and governance structures—we identified a range of plausible future developments and explored their relationships. We then developed logically consistent and contrasting futures by combining possible endpoints—and these became our four scenarios.

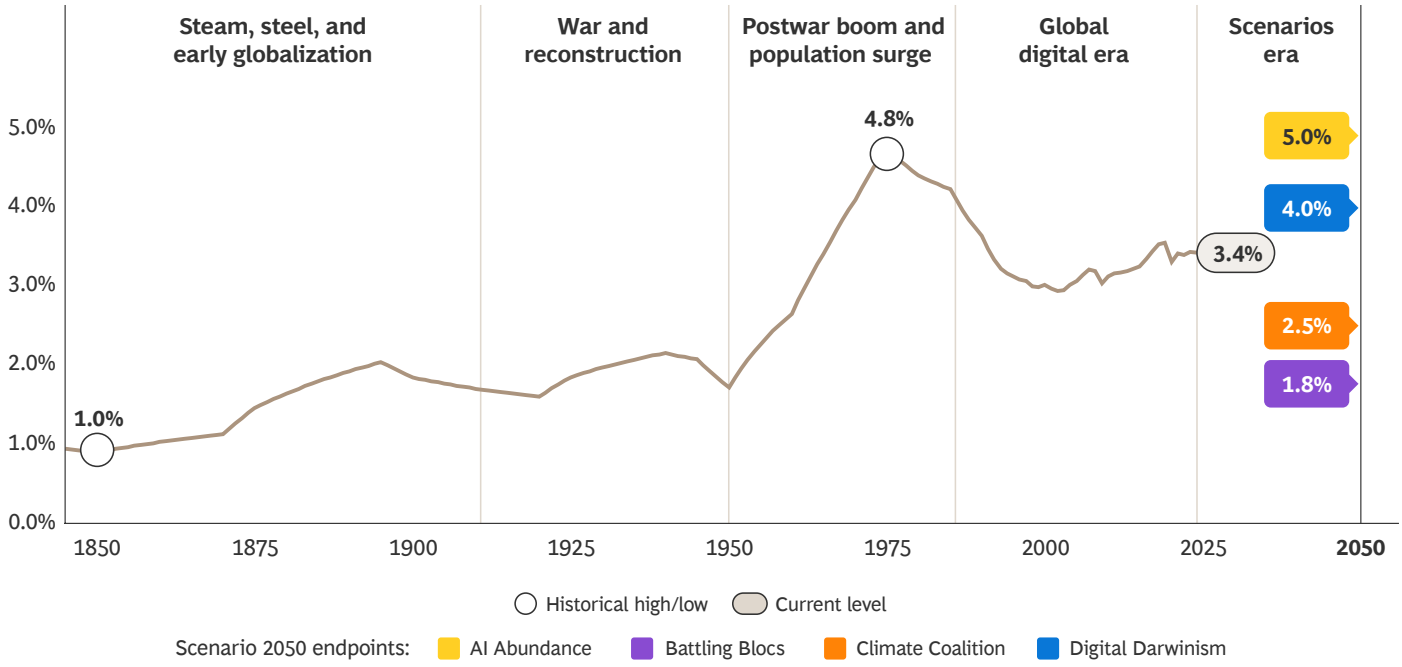
To create a comprehensive view of each scenario's environment, we combined historical data with forward-looking assessments to extrapolate how 20 critical metrics might evolve by 2050. These include standard economic statistics such as GDP growth as well as broader measures along geopolitical, societal, and environmental dimensions. (For a more detailed discussion of methodology, see Appendix 2.)

While not intended as precise projections of the future, these metrics offer a quantitative view of how the scenarios differ both from each other and from the present. (For an example of our approach to the metrics in this report, see Exhibit 1.)

EXHIBIT 1

An Example of Our Methodology Using GDP Growth Over Time

GLOBAL REAL GDP GROWTH (25-YEAR BACKWARD ROLLING CAGR)

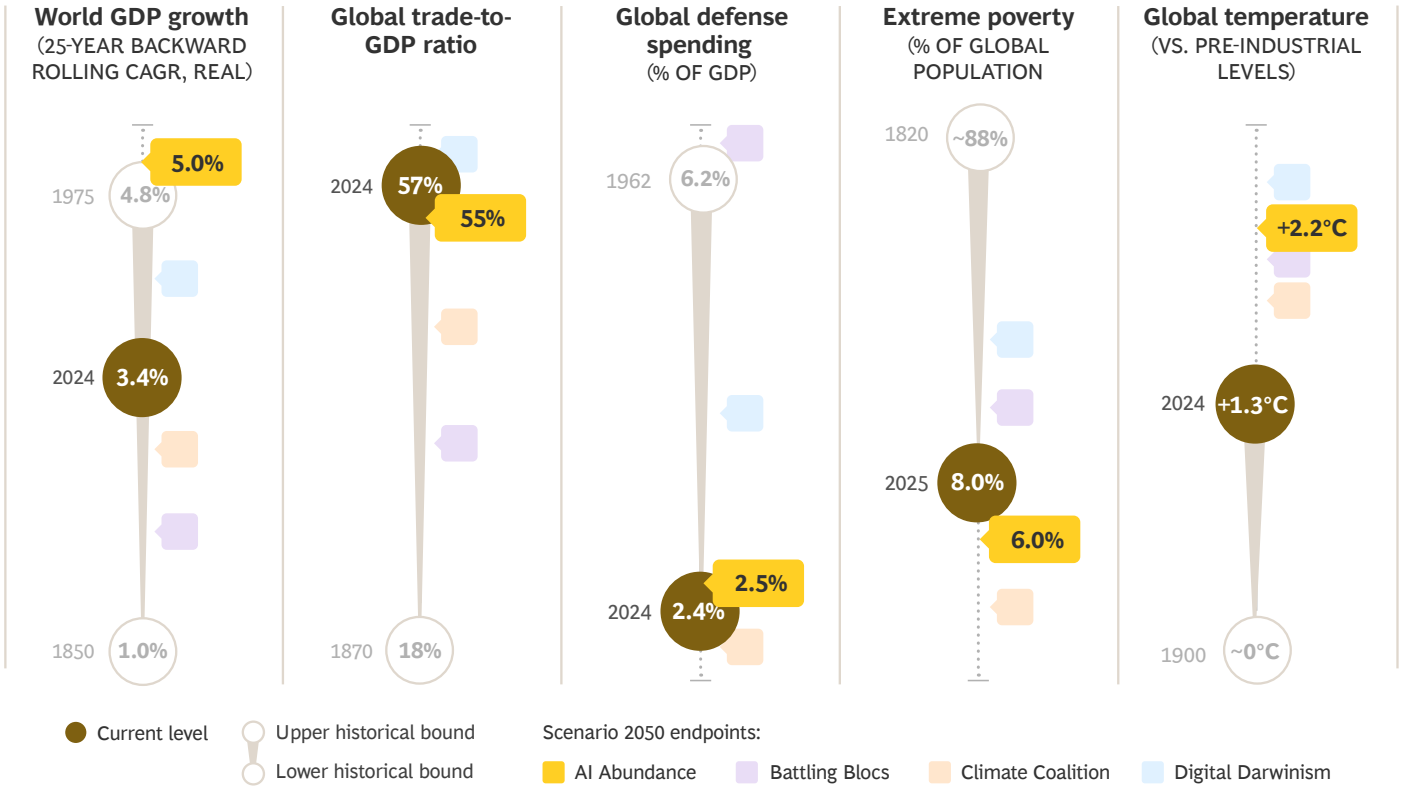


Sources: Maddison Project; World Bank; BCG Henderson Institute analysis.

CHAPTER 2

2050 Scenario: AI Abundance

Productivity is high, energy is cheap and plentiful, and the economy is thriving. Global regulation of AI has resulted in a suite of powerful, trusted models and supporting tech stacks that have revolutionized sectors including energy and industrial R&D. New technology and heavy investment are required to mitigate decades of ecological damage. The average person works a four-day week and relies on an expanded social safety net. Here's how AI Abundance compares with historical norms and other scenarios on five key metrics:



Sources: Intergovernmental Panel on Climate Change, Sixth Assessment Report; Maddison Project; OECD; Our World in Data; Stockholm International Peace Research Institute; World Bank; World Meteorological Organization; BCG Henderson Institute analysis.

An AI-Powered Tech Boom

The AI Abundance scenario is characterized by tech-led multilateralism. Superpowers are determined by their compute capabilities. And AI technologies drive all aspects of society, providing efficiency and rapid, adaptable innovations.

It wasn't always this way. In the 2030s, a series of sophisticated, AI-enhanced cyberattacks damaged critical infrastructure and caused mass panic. The strikes incapacitated hospitals, energy grids, and transport systems, affecting more than a billion people. Financial systems, institutions, and government operations were also targeted. These attacks, known as the Compute Wars, came to an end with the signing of the Compute Ledger Treaty of 2035.

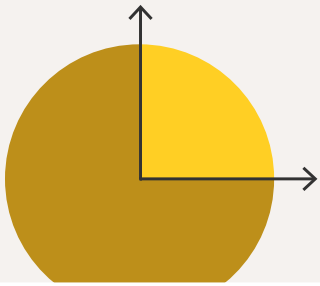
The treaty set strict standards for transparency, models, data use, energy use, and tech stacks—and, critically, established a powerful international regulatory agency to provide oversight, ensure compliance, and shape future policies for frontier AI models. These moves led, by 2050, to an ethic of open and responsible research across the scientific and tech communities that radically accelerated progress.

Critically, AI's rapid evolution has sparked an industrial and robotics revolution. Together, these technologies have transformed manufacturing and services, while advances in new materials and robot-led mining, processing, and recycling have eased the scarcity of critical minerals. AI-driven breakthroughs in solar-cell materials, long-term battery technology, and grid efficiency ensure plentiful, cheap, reliable, and renewable power. Global GDP has more than tripled from 2025 to 2050—a level of economic performance akin to the post–World War II boom in advanced economies of the 1950s to 1970s but fueled by soaring productivity, rather than population growth or globalization.

Work has been transformed. AI and robots have displaced much of what people used to do—and erased the wage premium for expertise in many professions. Employment opportunities mostly focus on the caring professions, AI oversight and judgment roles, and manual trades, such as plumbing and electrical work.

Global **GDP has tripled by 2050**, fueled by annual productivity gains of 5.7%

The average employee works **25% fewer hours** than in 2025



Allowing people to spend more time on family and leisure

In 2025, the average worker was employed for approximately 2,100 hours per year. Hours worked annually varied widely, however: for example, approximately 2,350 annual working hours in India and China; 1,800 in the US; and 1,500 in Europe. Now, the average number of hours worked worldwide has fallen by about 25%, to approximately 1,600 per year. (See Exhibit 2.) Regional variation is still common, and in some parts of the world four- or even three-day workweeks are the norm.

With work less central to identity, new lifestyles are emerging as people search—sometimes uneasily—for meaning and identity beyond employment. However, while many countries, especially China and the OECD nations, still grapple with the challenges of aging populations, the efficiency gains from new technology have largely offset the negative economic consequences.

Healthy life expectancy has increased globally—the average person can now expect to live 70 years in good health—up from 63 in 2024. The aging population, rapid innovations in technology, and widespread, affordable health care coverage mean that health care utilization has increased—and health care spending now claims 13% of global GDP (up from 10% in the 2020s). The reduced need to work, coupled with universal childcare thanks to productivity growth, makes it easier to choose to raise a family. Fertility rates have stabilized at 2.15 births per woman (down from 2.24 in 2025).

To preserve social cohesion, the benefits of technological progress are shared beyond company executives and investors. Most nations have robust programs for income redistribution, such as an expanded social safety net or a basic income for some citizens. In addition, the rise of low-cost AI, open science, and the treatment of data as a public good have enabled developing nations to accelerate their growth and innovation.

But there are tradeoffs as well. For example, civil society is more constrained because of guardrails placed on digital platforms to combat misinformation. While these promote social cohesion, they also restrict some forms of personal expression.

EXHIBIT 2

In AI Abundance, Average Working Hours Have Fallen by 25% in 2050

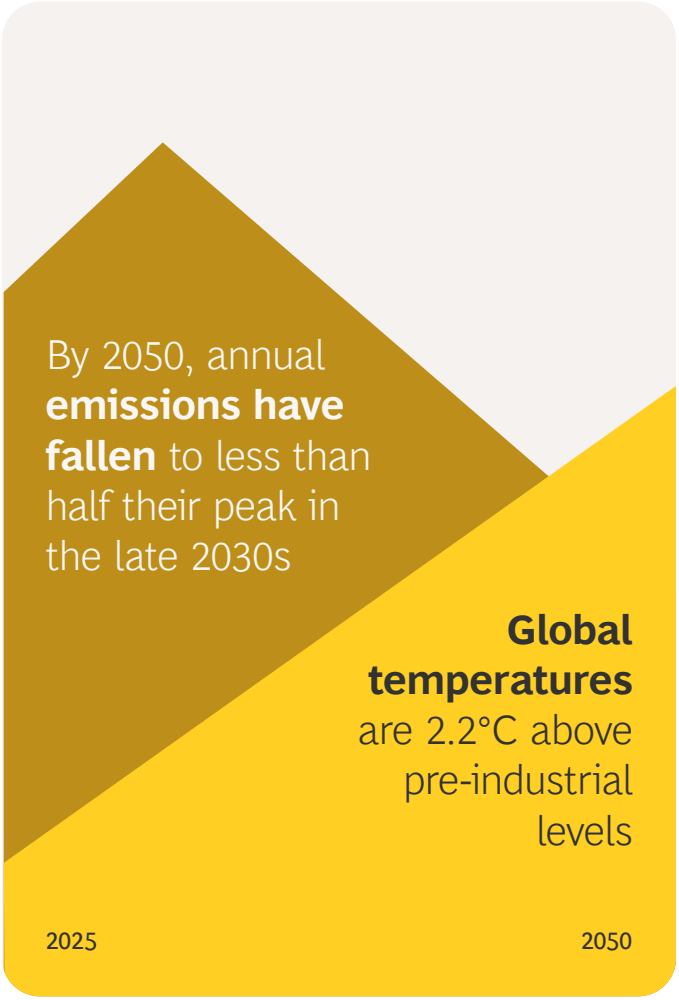
AVERAGE ANNUAL HOURS WORKED PER WORKER

Sources: Our World in Data; Penn World Table; Maddison Project; BCG Henderson Institute analysis.
¹Europe includes Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland, and UK.

A Hotter World, Attempting to Heal

Given the impact of continued high greenhouse gas emissions in the 2030s and 2040s, average temperatures in 2050 have reached 2.2°C above pre-industrial levels, and several tipping points have been breached. But human-generated emissions are now dropping fast, and AI-supported breakthroughs in new materials and direct carbon removal, as well as a robust global carbon market, are cleaning up the atmosphere and resolving energy system challenges. By 2050, annual human-generated emissions have fallen to less than half their peak in the late 2030s—putting the world on a delayed but credible path to net zero emissions.

Plenty of work remains to be done in 2050, and some damage, in the wake of fish stock collapses, pollinator loss, water stress, and other factors, can never be undone. While biodiversity loss is slowing because of targeted restoration and agricultural reforms, massive challenges remain. Food production is more expensive because it requires additional labor and tech-driven innovations (for example, precision agriculture and improvements in food waste management) to compensate for warming-related yield reductions and the loss of ecosystems. And while there is some international collaboration on climate mitigation—especially on phasing out carbon-based fuels in favor of renewables—significant debate about how the costs of Earth's recovery will be shared continues.



How Did We Get Here?

2026–2031

Chasing wealth and the next technological edge, AI entrepreneurs pressed forward with new models. Governments—seeking economic and intelligence benefits from local AI champions—refrained from regulation. The result: an explosion of new, energy-hungry models. The energy required to train frontier models doubled each year, grids struggled, power prices soared, and emissions grew unchecked.

Electric Bill Too High? Blame AI.

2032–2034

AI rivalry intensified, kicking off a new phase: the Compute Wars. Starting in 2032, a series of cyberattacks hit critical infrastructure, including hospitals. The perpetrators, though never identified, were generally assumed to be state actors, allied with local groups in an attempt to slow the progress of rivals.

Hospital Patients Are Collateral Damage in Escalating Compute Wars

2035

The attacks brought society to its knees, and governments to the table. The Compute Ledger Treaty of 2035 required that all AI models with more than 10 trillion parameters be disclosed and open to auditing. It set standards for data interoperability, GPUs, and energy intensity—and established both a global regulatory agency and a new framework for international collaboration on organized cyber-crime rings.

World Leaders Ratify Treaty to Bring AI to Heel

2038

Ultra-high-efficiency energy storage and near-lossless transmission became commercially viable as a result of alternate battery materials and new high-temperature superconductors developed with the help of AI.

Don't Worry, Just Leave the Lights On

2041

Breakthroughs in self-calibrating hardware, perception models, dexterous manipulation, and agentic AI finally made general-purpose robots a reality, transforming global industry and retail applications. Robotics as a service emerged as a dominant industrial model, and consumer use of robots became common in developed nations.

Have You Got One Yet? Personal Robots Go Mainstream

2041–2042

Continued ocean warming led to new fish migration patterns and fishery collapses. Early carbon market dividends began to dampen the impact via coordinated investments in habitat protection and a rapid buildup of aquaculture.

West African Nations Raise the Alarm as Fish Stocks Collapse

2045

As AI transformed society, OECD nations sought to strengthen social cohesion and quality of life. They agreed on a common framework to provide citizens with a personal income and social support, decoupled from employment, and funded by AI productivity gains and new taxes on automation.

Your AI Dividends Are in the Mail

AI Abundance: This Scenario in Numbers

Macroeconomics and technology

1	**World GDP growth** (25-year backward rolling CAGR, real)		3.4% → 5.0%
2	**Labor productivity growth** (high-income countries)		2.0% → 5.7%
3	**Global ICT spending** (% of GDP)*		4.0% → 10%
4	**Digital services trade restrictiveness** (index range 0–1)*		0.13 → 0.02

5	**Global trade-to-GDP ratio**		57% → 55%
6	**Regional share of world GDP**	North America	27% → 27%
		European Union	21% → 14%
		China	19% → 22%
		India	4% → 6%
		Rest of world	29% → 31%

Geopolitics and society

7	**Global defense spending** (% of GDP)		2.4% → 2.5%
8	**Democracies** (% of countries)*		49% → 60%
9	**Share of wealth held by richest 1% of population**	EU	25% → 24%
		US	35% → 30%
		China	30% → 30%
		India	40% → 35%
10	**Share of global population living in extreme poverty***		8% → 6%

People and work

11	**Labor force participation rate**		80% → 74%
12	**Annual hours worked per worker**		2,100 → 1,600
13	**Fertility rate** (births per woman)		2.24 → 2.15
14	**Global health spending** (% of GDP)		10% → 13%
15	**Healthy life expectancy** (years)		63 → 70
16	**Human happiness** (index range 0–10)*		5.4 → 6.5

Planet and resources

17	**Share of unabated fossil fuels in primary energy supply***		81% → 45%
18	**Low-carbon share of electricity generation***		41% → 85%
19	**Global temperature increase vs. pre-industrial levels**		+1.3°C → +2.2°C
20	**Biodiversity health** (index range 0–1)*		0.73 → 0.65

Current level 2050 – AI Abundance

Source: BCG Henderson Institute analysis.
Note: See Appendix 2 for metrics methodology, definitions, and sources. ICT = information and communications technology.
*Select explanations: **3.** As defined by IDC Worldwide black book and including hardware, software, and IT services. **4.** Digital services trade restrictiveness based on OECD Index measuring how restrictive a country's regulations are for digitally delivered services (0 = no restriction; 1 = maximum restriction). **8.** Defined as countries rated a Liberal or Electoral Democracy in V-Dem's "Varieties of Democracies" Report. **10.** Extreme poverty as defined by SDG 1 poverty line: below $2.15/day (2017 PPP). **16.** Life Evaluation Score from the World Happiness Report, where adults rate current life (0 = worst possible; 10 = best possible). **17.** The proportion of total primary energy supply derived from fossil fuels (coal, oil, and natural gas) for which emissions are not captured at source through carbon capture and storage (CCS). **18.** Electricity generated from renewables, biomass, and nuclear sources as a percentage of total electricity generated. **20.** Based on the International Union for Conservation of Nature "Red List Index" aggregating the extinction risk of species (1 = least concern for all species; 0 = all species extinct).

Implications for Business Leaders

If 2050 were to resemble AI Abundance, what steps might leaders want to take now and in the coming years to prepare?

Rethink competitive advantage for a world of democratized technology and AI-only rivals. Open compute platforms and abundant, low-cost data, for example, are likely to disrupt any business that competes on a foundation of proprietary data and technological superiority. And even today's most efficient companies would have to find ways to compete—or collaborate—with low-cost and highly adaptable AI-only firms run by AI agents with little or no human involvement. (See the sidebar "The Rise of AI-Only Firms.")

Strengthen regulatory intelligence and influence. Getting ready for a business world governed by strict multilateral agreements on technology and carbon would require companies to sharpen their abilities to sense regulatory trends, map stakeholders, and secure a seat at the table to help shape policies. Leaders would want to be part of working groups developing global AI, data, and sustainability-related standards. It's likely that AI and climate regulation would evolve harmoniously, with AI regulations seeking to maximize technology progress while minimizing environmental damage. Even so, it would be wise to design distinct but interconnected regulatory compliance systems in case objectives diverge.

The Rise of AI-Only Firms

In the AI Abundance scenario, technology makes the rise of AI-only firms possible—and the business economics make it irresistible. These businesses would take the form of networks of hyperspecialized AI agents, coordinated by a central agent and operating entirely without human employees.

AI-only firms would be formidable competitors. Their cost structure would be ultra-low, largely comprising compute costs—which grow less expensive each year—and energy, which in this scenario is abundant and cheap. They could offer high-quality, always-on service combined with continuous learning and unprecedented adaptability.

Some industries are expected to be affected before others. The slower development of multi-agent coordination and physical-world interaction means AI-only firms are most likely to emerge first in digital-native sectors with minimal physical interfaces—such as software development, digital marketing, and algorithmic trading—where tasks can be fully virtualized.

Before AI-only rivals arise, traditional incumbents need to prepare. Becoming AI-first by leveraging agentic AI to redesign workflows and systems can narrow the future structural and cost advantage of this new kind of competitor. And while AI will outpace humans in knowledge and reasoning, other human strengths will remain valuable. For example, although AI may accelerate the generation of ideas and the scaling of offerings, people will be essential for agenda setting, taste making, assessment of ideas, and delivery of empathy and authenticity.

In addition, rather than competing with AI-only rivals, incumbents might also seek to be a key part of those rivals' business ecosystems—for example, by playing an interface role between the virtual and physical worlds or by acting as the sales force in high-trust business-to-business sectors.

Dig deeper:

Why CEOs Need to Prepare for AI-Only Rivals

Boost adaptability and trust. To quickly scale new offerings, organizations would need to embrace open compute and data markets. Given that standards are likely to evolve rapidly, a diverse and modular compute architecture (multicloud, multiregion, and multiprovider storage) would be necessary to ensure adaptability and resilience.

To protect against the increasing risk of stranded assets as tech cycles compress, it could make sense to boost operational agility—through investments in modular factories that can rapidly adapt to new innovations, for example, or in an entirely autonomous infrastructure that can reshape itself. (See the sidebar "Physical AI Redefines Industrial Operations.")

Moreover, security, transparency, and traceability would be table stakes in this scenario, so leaders would need to invest in a digital trust architecture—encompassing watermarking, provenance, and cyber resilience—to guarantee data integrity and ensure that increasingly interlinked and automated systems are fail-safe.

Enhance climate resilience. With climate impacts projected to intensify significantly, leaders would want to double down today on identifying and mitigating climate risks to all business systems. These moves would include securing strategic climate-resilient inputs through multiyear clean-energy contracts and secondary vendors and embedding climate risks in all capital-planning decisions.

Reimagine work for a world of exponential productivity gains. With fewer traditional jobs and the nature of work being radically redefined, companies would want to make use of employees' spare time for upskilling and reskilling. In addition, organizations would be investing heavily to explore, build, and scale winning operating models that leverage agentic workflows and new forms of human-machine collaboration. And they would also want to expand new workforce models that embrace part-time workers and those with "portfolio careers," who are balancing multiple part-time roles. Finally, to maintain their license to operate, companies should expect to shoulder more social responsibility as rapid tech developments disrupt workforces and redistribution models.

Physical AI Redefines Industrial Operations

In AI Abundance, cheap energy and open science accelerate "physical AI"—robots that perceive, reason, and act autonomously. As a result, tasks that were once too variable or cost-prohibitive to automate would now be possible, even for small and midsize enterprises. These would include force-sensitive component insertion and surface treatments, like painting and polishing, controlled by AI camera systems.

This new generation of robotics would deliver unmatched speed and precision in repetitive tasks. More importantly, these robots would be able to master less structured tasks by reinforcement or imitation learning and would have the judgment to develop and act on fresh insights in unpredictable situations.

To keep pace, firms need to invest today to plan for a new physical-AI stack, partner with vendors and integrators, prioritize proven use cases, rethink operating models, and reskill operators into robot technicians, fleet coordinators, and AI-aided inspectors.

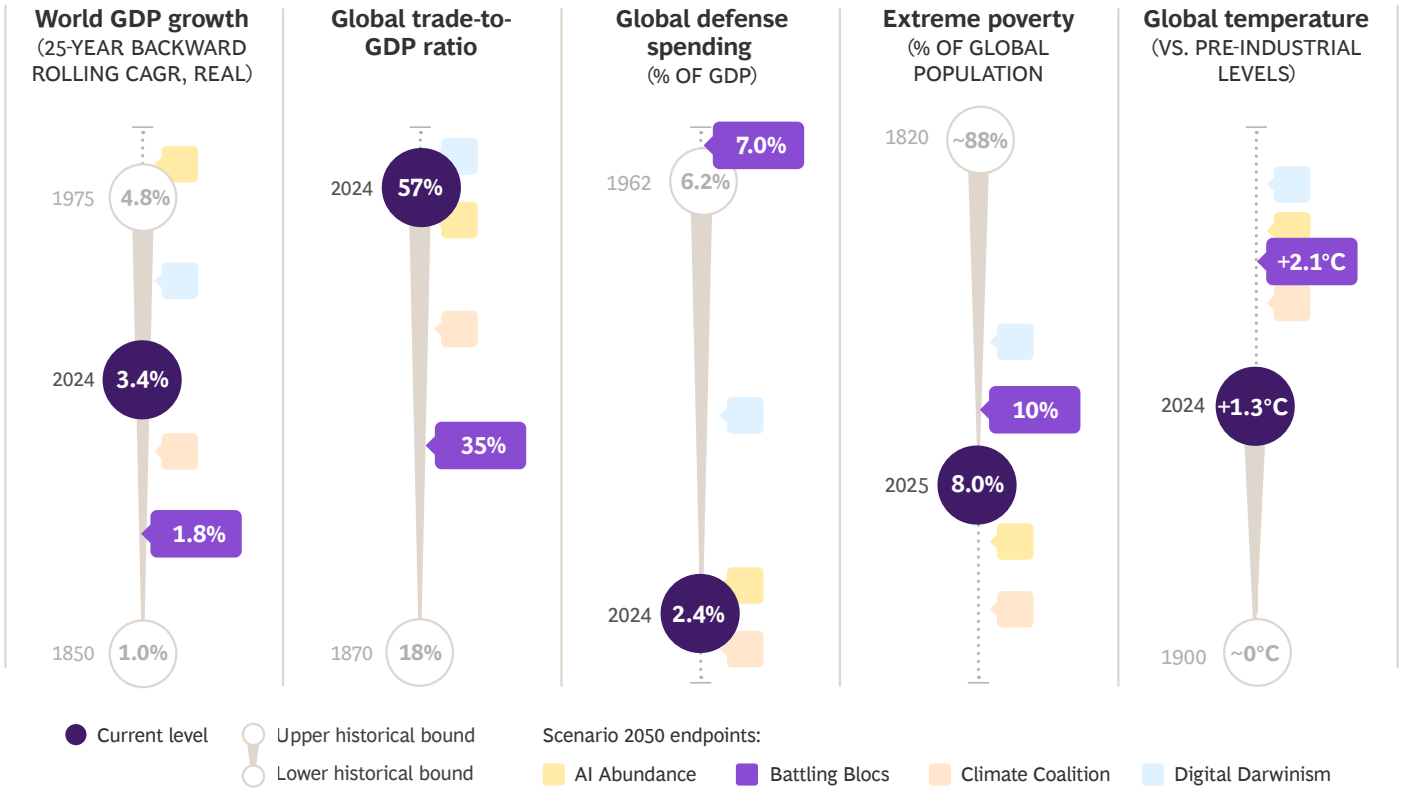
Dig deeper:

Physical AI: Powering the New Age of Industrial Operations

CHAPTER 3

2050 Scenario: Battling Blocs

The world has pulled back into a set of rigid blocs that prize security and self-sufficiency over global collaboration. Tariffs—as well as capital and export controls—have decoupled the world's economies and fractured supply chains. GDP and productivity growth have both slowed since 2025, while defense spending has soared to 7% of global GDP. Here's how Battling Blocs compares with historical norms and other scenarios on five key metrics:

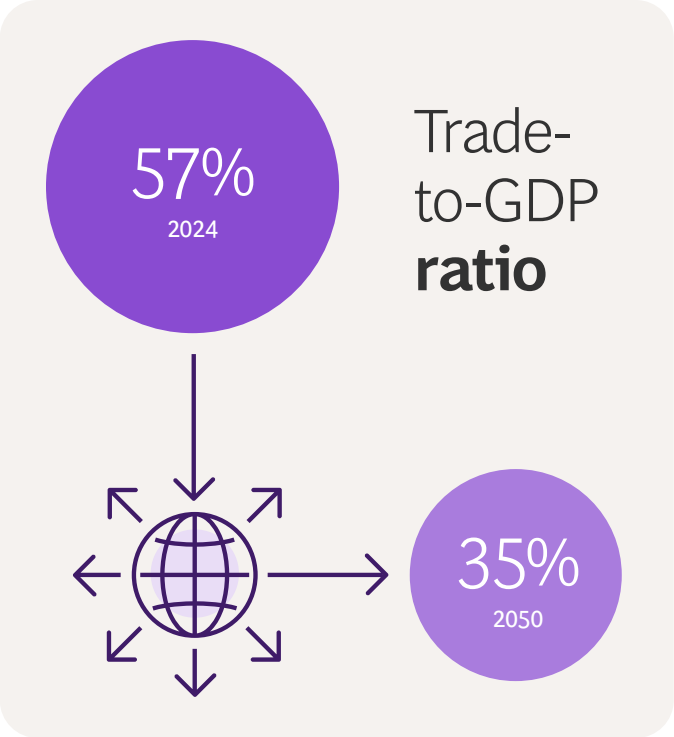


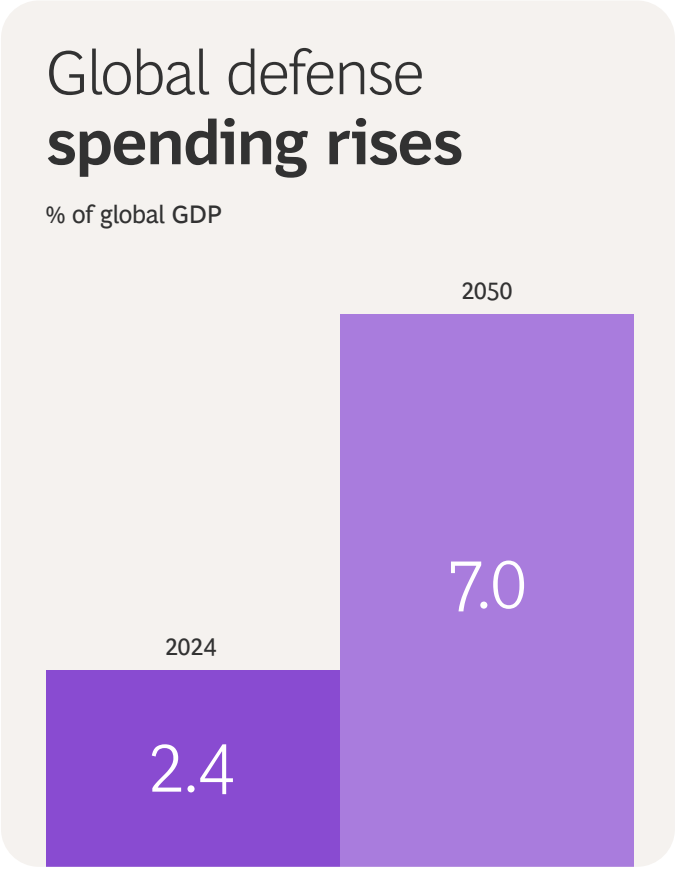
Sources: Intergovernmental Panel on Climate Change, Sixth Assessment Report; Maddison Project; OECD; Our World in Data; Stockholm International Peace Research Institute; World Bank; World Meteorological Organization; BCG Henderson Institute analysis.

A Blurred Line Between Governments and Businesses

Tension and mistrust characterize the Battling Blocs scenario. Nearly all economic activity takes place within closely connected groups of sovereign nations, bound together by economic alliances focused on critical resources. No superpowers dominate all spheres of activity as in the 20th and early 21st centuries—instead, this is a multipolar world. Global collaboration is rare. Overall, the volume of trade has fallen back to Cold War levels: down to 35% of global GDP, from 57% in 2024. (See Exhibit 3.)

The line between governments and business has blurred, with state capitalism increasingly the norm. Government influence over companies—through investment, regulation, and board representation—is pervasive, but especially strong in key sectors like defense and critical manufacturing. Traditional multinationals are almost a thing of the past: either they have chosen to align themselves to a single bloc or they struggle to manage a complex web of loosely held, regional joint ventures.





Stagnation, Not Inspiration

Private sector dynamism has suffered. The majority of ambitious innovation focuses on defense, dual-use technologies, and products and services that contribute to bloc self-reliance. Other domains, such as consumer products and health, receive less investment and focus. Although subsidies keep energy affordable, the reliability of power systems is uneven and blackouts are common. Overall, natural resource constraints are aggravated by the need for redundant supply chains, along with a lack of efficiency gains and slower tech innovation.

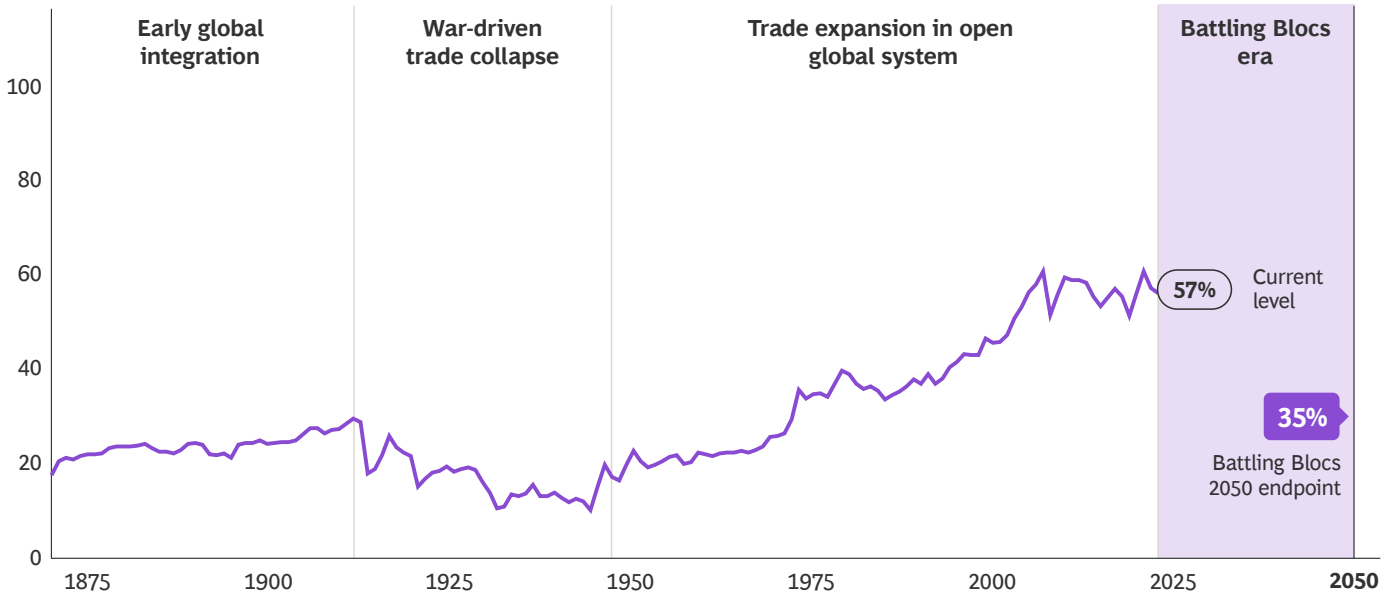
Consequently, the economy is sluggish: GDP growth since 2025 has been just 1.8% per year, largely driven by government spending on national security, pensions, and the mitigation of climate impacts.

Work is seen as a patriotic duty, and options are limited. With an aging population and reduced migration, many young people work long hours yet struggle to find meaning. Stability is maintained through stronger media controls, surveillance, and redistributive economic policies—and while blocs differ on the amount of speech and liberty they tolerate, democratic norms have eroded in all, to varying degrees. In 2050, just 25% of countries are liberal or electoral democracies, down from 49% in 2024.

EXHIBIT 3

In Battling Blocs, World Trade in 2050 Has Fallen to Levels Last Seen at the End of the Cold War

SUM OF WORLD EXPORTS AND IMPORTS (% OF GDP)

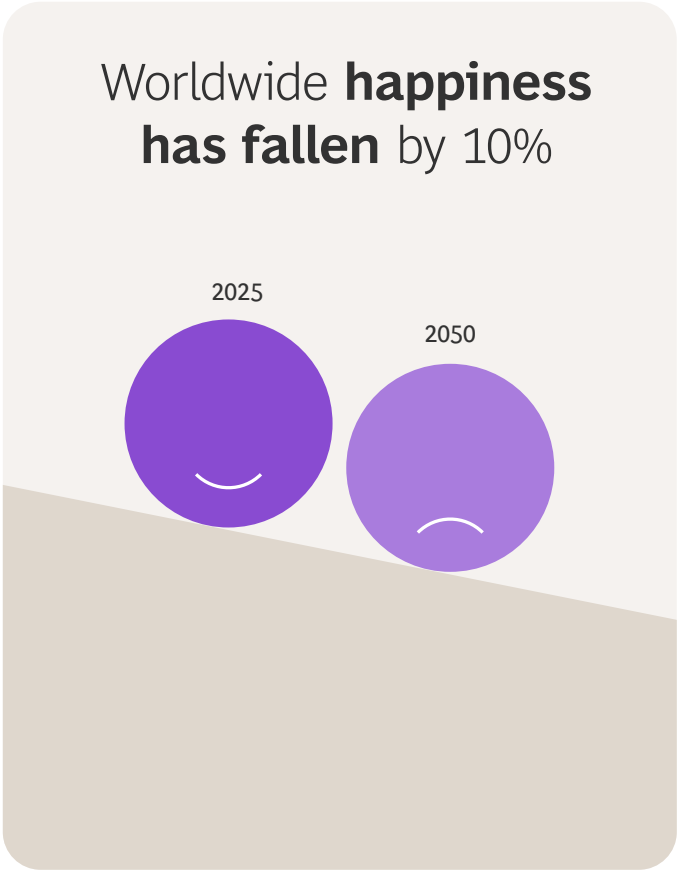


Sources: Mariko J. Klasing and P. Milionis, "Quantifying the Evolution of World Trade, 1870–1949," Penn World Table, 2014; BCG Henderson Institute analysis.

Living standards are stagnant. The cost of essentials is higher, while in some regions, a growing number of people experience shortages of food and water. These factors, plus limited freedom of choice, stagnant growth, and feelings of global insecurity, have led to a 10% reduction in the human happiness index since 2025.

The increased pessimism is also reflected in declining fertility numbers, which, after rising slightly in response to strong pronatalist incentives in the prior decades, have fallen back. The rate of extreme poverty is on the rise—increasing from 8% in 2025 to 10% in 2050 owing to trade barriers, regional conflicts, and climate-aggravated food insecurity.

Despite increases in both global temperatures and extreme weather events, the distrust between blocs has put an end to multilateral climate initiatives. Climate, too, is a geopolitical battleground. Each bloc is going it alone—focusing on regional adaptation rather than global decarbonization. Some are even using climate to gain relative advantage via geoengineering techniques—for example, using cloud seeding, where tiny particles of materials like silver iodide are released into clouds to precipitate rainfall. But as a result, the average global temperature has reached 2.1°C degrees above pre-industrial temperatures in 2050 and is on a trajectory to reach approximately 3.5°C in 2100.



How Did We Get Here?

Trade War Continues

2026–2029

A major tariff war caused geopolitical tensions to escalate. Shifting supply chain economics, combined with rising export controls, forced the private sector to adapt.

2029–2032

In country after country, nationalist and populist leaders took the helm. Promising to reverse the effects of the trade war, they sought to build self-sufficiency through energy independence and privileged access to scarce production inputs.

Nationalism Wins at the Ballot Box

Goodbye, Global Internet

2033–2034

A new Cold War kicked off as nations moved to gain advantage and destabilize rivals. This phase culminated in 2033 with a series of major cyber attacks on ports and power grids. In response, leaders erected digital barriers to users from rival blocs, effectively splintering the internet.

2035

With distinct economic blocs hardening because of intensifying rivalry, many nations left the WTO, and by 2035, lacking the participants and funding needed to fulfill its mission, the organization closed its doors.

World Trade Organization Collapses

How Long Until a Third World War?

2036–2039

The new Cold War started heating up. Regional conflicts among proxy states allied with the major powers broke out. A third world war was narrowly avoided in 2038 following a confrontation in the Western Pacific.

2039–2040

By the late 2030s, extreme weather had intensified. A series of heat waves across South Asia and the Middle East doubled annual heat-related deaths, while floods and wildfires drove steep real estate losses across the US, Southern Europe, and coastal China. Insurer withdrawals from markets and mounting claims caused property values to fall, triggering loan defaults and tightening credit conditions across regional and global financial markets.

Real Estate Losses Trigger Credit Crisis

2041–2050

By the early 2040s, the United Nations and its network of agencies and programs was a shadow of its former self. Chronic funding challenges had shrunk the scope of global-level development, and bloc-based security forums had replaced the UN Security Council as the loci of peacekeeping, with ad hoc crisis management of interbloc conflicts. The UN system survives only as a technical coordinator for risks no bloc can manage alone—such as satellite coordination, nuclear stability boards, and cyber incident hotlines.

The Disunited Nations?

Battling Blocs: This Scenario in Numbers

Macroeconomics and technology

		Current level	2050 – Battling Blocs
1	**World GDP growth** (25-year backward rolling CAGR, real)	3.4%	1.8%
2	**Labor productivity growth** (high-income countries)	2.0%	1.0%
3	**Global ICT spending** (% of GDP)*	4.0%	6.5%
4	**Digital services trade restrictiveness** (index range 0–1)*	0.13	0.26

Geopolitics and society

		Current level	2050 – Battling Blocs
5	**Global trade-to-GDP ratio**	57%	35%
6	**Regional share of world GDP**		
	North America	27%	26%
	European Union	21%	18%
	China	19%	21%
	India	4%	8%
	Rest of world	29%	27%
7	**Global defense spending** (% of GDP)	2.4%	7.0%
8	**Democracies** (% of countries)*	49%	25%
9	**Share of wealth held by richest 1% of population**		
	EU	25%	25%
	US	35%	35%
	China	30%	30%
	India	40%	40%
10	**Share of global population living in extreme poverty***	8%	10%

People and work

		Current level	2050 – Battling Blocs
11	**Labor force participation rate**	80%	83%
12	**Annual hours worked per worker**	2,100	2,070
13	**Fertility rate** (births per woman)	2.24	2.20
14	**Global health spending** (% of GDP)	10%	10%
15	**Healthy life expectancy** (years)	63	65
16	**Human happiness** (index range 0–10)*	5.4	4.9

Planet and resources

		Current level	2050 – Battling Blocs
17	**Share of unabated fossil fuels in primary energy supply***	81%	75%
18	**Low-carbon share of electricity generation***	41%	55%
19	**Global temperature increase vs. pre-industrial levels**	+1.3°C	+2.1°C
20	**Biodiversity health** (index range 0–1)*	0.73	0.63

Current level | 2050 – Battling Blocs

Source: BCG Henderson Institute analysis.
Note: See Appendix 2 for metrics methodology, definitions, and sources. ICT = information and communications technology.
*Select explanations: **3.** As defined by IDC Worldwide black book and including hardware, software, and IT services. **4.** Digital services trade restrictiveness based on OECD Index measuring how restrictive a country's regulations are for digitally delivered services (0 = no restriction; 1 = maximum restriction). **8.** Defined as countries rated a Liberal or Electoral Democracy in V-Dem's "Varieties of Democracies" Report. **10.** Extreme poverty as defined by SDG 1 poverty line: below $2.15/day (2017 PPP). **16.** Life Evaluation Score from the World Happiness Report, where adults rate current life (0 = worst possible; 10 = best possible). **17.** The proportion of total primary energy supply derived from fossil fuels (coal, oil, and natural gas) for which emissions are not captured at source through carbon capture and storage (CCS). **18.** Electricity generated from renewables, biomass, and nuclear sources as a percentage of total electricity generated. **20.** Based on the International Union for Conservation of Nature "Red List Index" aggregating the extinction risk of species (1 = least concern for all species; 0 = all species extinct).

Implications for Business Leaders

If 2050 were to resemble Battling Blocs, what steps might leaders want to take now and in the coming years to prepare?

Build operating model flexibility. If the world heads toward greater geopolitical tension and regional fractures, it would be important to rethink operating structures to enable relatively easy separation of markets—as well as the systems to facilitate rapid market exit and reentry. Businesses would consider new regional partnerships and supply networks that could operate semi-autonomously. A similar approach would make sense for tech infrastructure to enable rapid swapping and reconfiguration.

Leaders may also consider long-lead reshoring moves because unique and critical processing plants could become stranded as blocs shift. And beyond operations, they would explore establishing parallel corporate structures in nonaligned jurisdictions.

Secure scarce physical and human resources. Anticipating a slower-growth and resource-constrained world, leaders would move early to secure critical inputs and build redundancy in regional inventories. Another imperative would be to address emerging human capital constraints as aging demographics and potential mobility restrictions tighten labor markets. (See the sidebar "Competing for Talent.") One way to ease those constraints would be to engage early with countries that have a demographic advantage, investing in workforce development and local regulatory engagement to build an edge. (See the sidebar "The Global South Finds Its Moment.")

Competing for Talent

With blocs competing for technological, industrial, and ideological dominance, talent would become a scarce asset and a key dimension of "great power" conflict. In addition, immigration policy would shift from a focus on overall growth to a tool to sharpen geostrategic advantage.

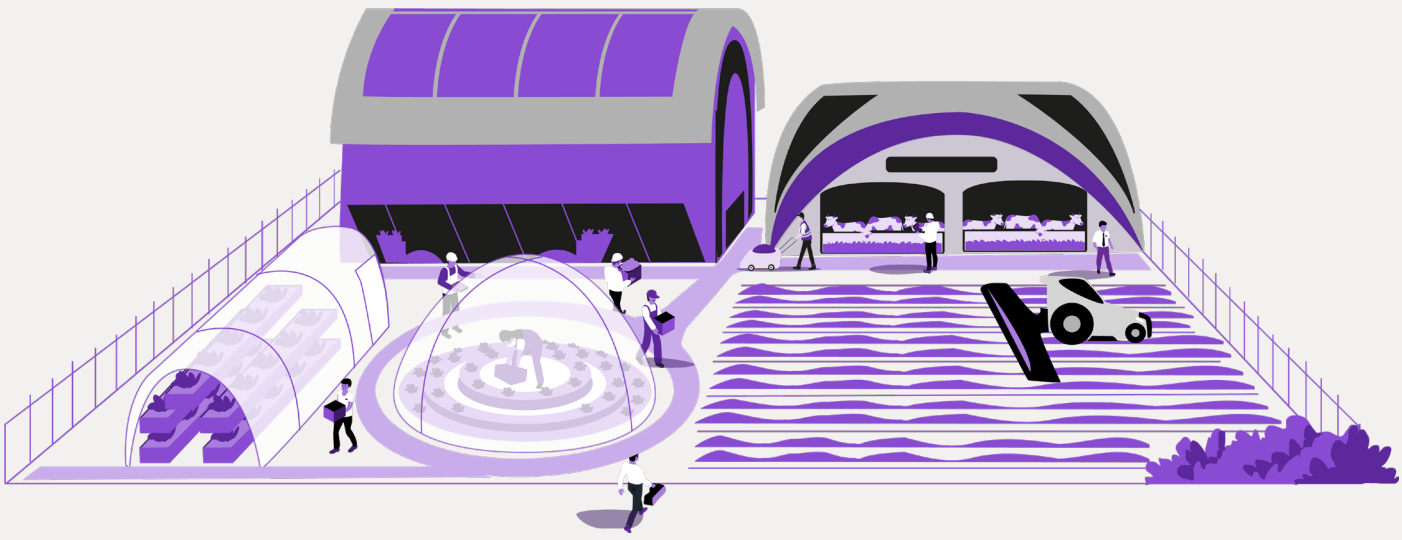
The race for talent would then play out across three distinct areas: First, in capturing the science and technology expertise to drive future-defining breakthroughs. Then, in fostering the talent density needed to build and sustain successful entrepreneurial clusters for commercial innovation. And, finally, in sustaining or creating the academic centers that will educate tomorrow's innovators.

Countries and companies wanting to win in 2050 would need to think more systematically and strategically today than their rivals. Building a geostrategic talent advantage requires an ecosystem approach, combining immigration, innovation, and education policy—along with private sector investment—to attract, develop, and retain top expertise.

Dig deeper:

Where Will Tomorrow's AI Geniuses Go?

The New Geopolitics of Global Talent



The Global South Finds Its Moment

A nonaligned or multi-aligned Global South would rise to claim its role in a multipolar Battling Blocs scenario.

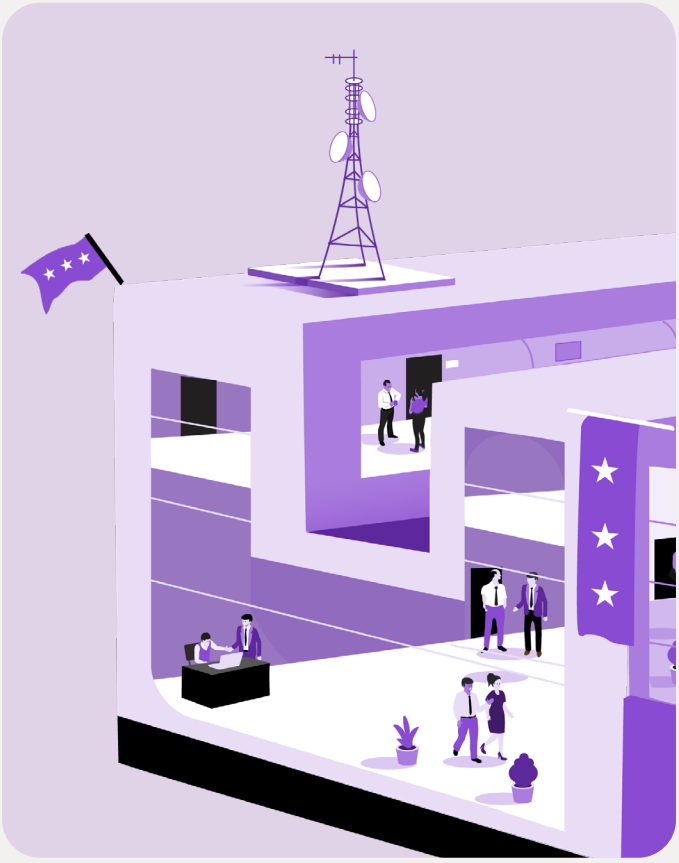
These nations offer great advantages: critical resources, young and expanding workforces, and growing consumer markets. India is projected to be the world's third largest economy by 2029—and Brazil, Indonesia, Saudi Arabia, Bangladesh, Argentina, and the Philippines are climbing rapidly. These countries have a strong focus on economic growth, are eager to trade, and have traditionally been pragmatic—balancing growth with sustainability—on climate issues. And South-to-South trade is on the rise.

To prepare for this future, businesses in the Global South would consider regionalizing supply chains, pursuing localization strategies to gain advantage in diverse and fragmented markets, and increasing their geopolitical engagement capabilities.

And those in the Global North would need to build greater familiarity with these growing markets and explore options for adding Global South locations to their operating footprint.

Dig deeper:

In a Multipolar World, the Global South Finds Its Moment



Experiment with localized and dual-use offerings. Given this scenario's shift toward stronger nationalism and populism, companies might start experimenting with localized products and branding. Some might explore dual-use or defense-related offerings that align with a bloc's self-reliance priorities and national-interest agenda; others could seek differentiation through local sourcing or "made in bloc" strategies.

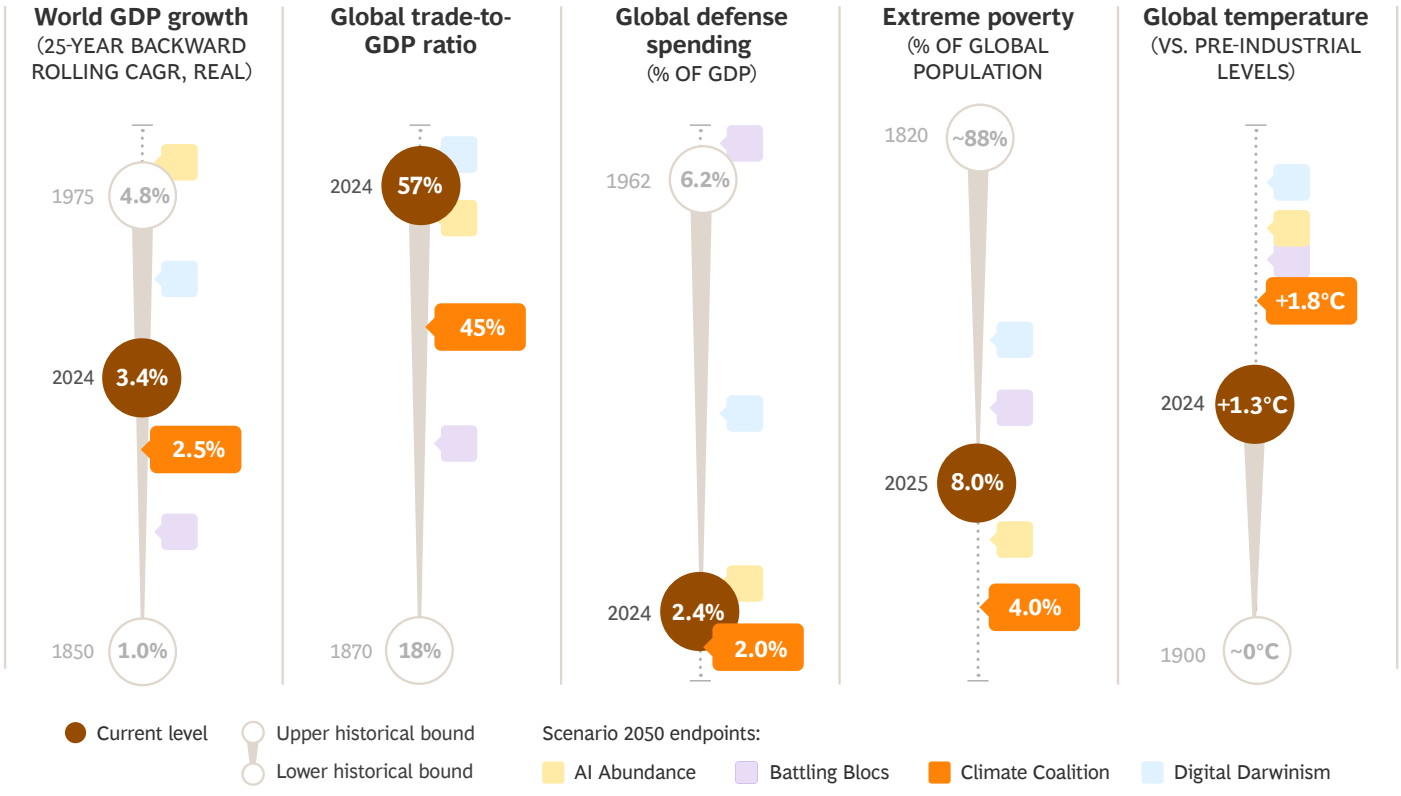
Understand and shape regulatory trends. Governments would have growing influence over the day-to-day running of businesses, and blocs would likely institute divergent regulatory systems. Given these trends, leaders would want to strengthen their engagement. Companies would need a comprehensive understanding of the bloc-specific legislative processes of all operationally relevant countries. This would reduce the risk of shocks by providing early visibility into shifting rules on trade,V data, AI, and labor.

Strengthen financial resilience. With fiat (or government-issued) currency used by bloc-leading governments and central banks to discourage business with rival blocs—through sanctions, capital flow restrictions, and increased transaction costs—companies would want to preserve financial flexibility in new ways. This could mean strengthening competencies in liquidity management, other stores of value, and new forms of banking (supported by distributed ledger technologies such as stablecoins and tokenized securities) to ensure their ability to function with relative independence across jurisdictions.

CHAPTER 4

2050 Scenario: Climate Coalition

Governments and citizens prioritize climate and societal resilience in policy decisions, infrastructure development, and consumption habits. Taxes are high, and consumer and business spending is lean. Innovation is channeled toward advances in low-carbon energy, new materials, biotech, and agriculture. Aging populations strain national budgets and stoke intergenerational tensions. Here's how Climate Coalition compares with historical norms and other scenarios on five key metrics:



Sources: Intergovernmental Panel on Climate Change, Sixth Assessment Report; Maddison Project; OECD; Our World in Data; Stockholm International Peace Research Institute; World Bank; World Meteorological Organization; BCG Henderson Institute analysis.

A Climate Success Story

In the Climate Coalition scenario, a multilateral effort to decarbonize the economy has been a huge success: warming has stabilized at 1.8°C. The world has so far avoided the worst effects of climate change, but on a daily basis, many people feel more frustration than relief. There's a sense that progress has slowed, that opportunities are fewer, and that the current generation is picking up a mess left by prior ones.

The journey to this scenario began with a series of extreme weather events in the late 2020s that inspired a global wave of citizen pressure for coordinated climate action. While a global carbon price remained geopolitically unviable, a group of industrial nations formed a "climate club" to coordinate joint action among themselves. Membership required pricing carbon domestically and implementing carbon border adjustment mechanisms (CBAMs) that ensured imports were fairly priced. A system of interoperable carbon markets and CBAMs emerged, with most major industrial nations joining by 2040, reshaping the global economy. In 2050, the price of carbon has reached $300 per ton.

To enable this decarbonization, new global and national architectures have emerged. Globally, carbon markets and CBAMs are supported by shared rules for product carbon accounting and trade provisions enabling free trade in carbon. Nationally, countries' carbon pricing has been paired with supportive industrial and regulatory policies addressing key bottlenecks such as grid investments to speed electrification, massive innovation investments to support transition material recycling and substitution, carbon capture and storage deployment, and extensive use of financial mechanisms such as carbon contracts for difference (CCfDs) to de-risk corporate decarbonization investments.

Consequently, the share of energy that comes from "unabated" fossil fuels (where carbon emissions aren't captured at the source) has plummeted from 81% in 2024 to 35% in 2050. (See **Exhibit 4.**) Electricity is generated almost exclusively from low-carbon sources. In addition, investments in natural climate solutions such as ecosystem restoration and advances in low-carbon agriculture have helped capture and reduce emissions.

Technological advances, particularly in AI, have been significant. Most innovation is directed toward decarbonization—AI has been essential to critical breakthroughs in areas like long-term battery storage technology and infrastructure buildouts to support electrification, as well as in direct carbon removals to clean up the atmosphere.

Although data centers and other AI infrastructure remain significant consumers of energy, they have seen major efficiency improvements. Moreover, emissions have been reduced across the economy owing to the low-carbon mix.

AI is a support for humans, not a substitute, and although job losses occur, they are temporary as nations and companies continuously invest in upskilling and reskilling. But populations continue to age, creating mounting demographic pressure. Advances in public health, biotech, and diagnostics have added five years to healthy life expectancy—from 63 in 2024 to 68 years today. The surge in demand for infrastructure to support climate resilience and restoration has further intensified labor shortages across the Global North. Increased migration only slightly dampens these pressures.

Robust carbon pricing and policy conditions have **driven down the share of fossil fuels** in the primary energy mix

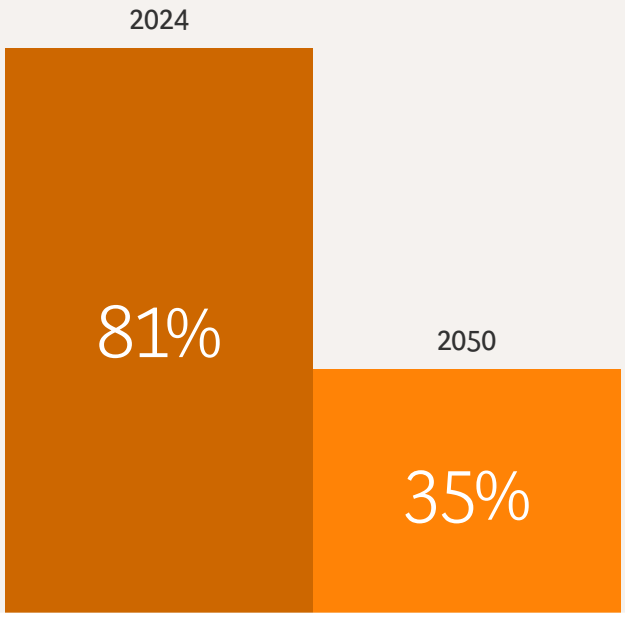
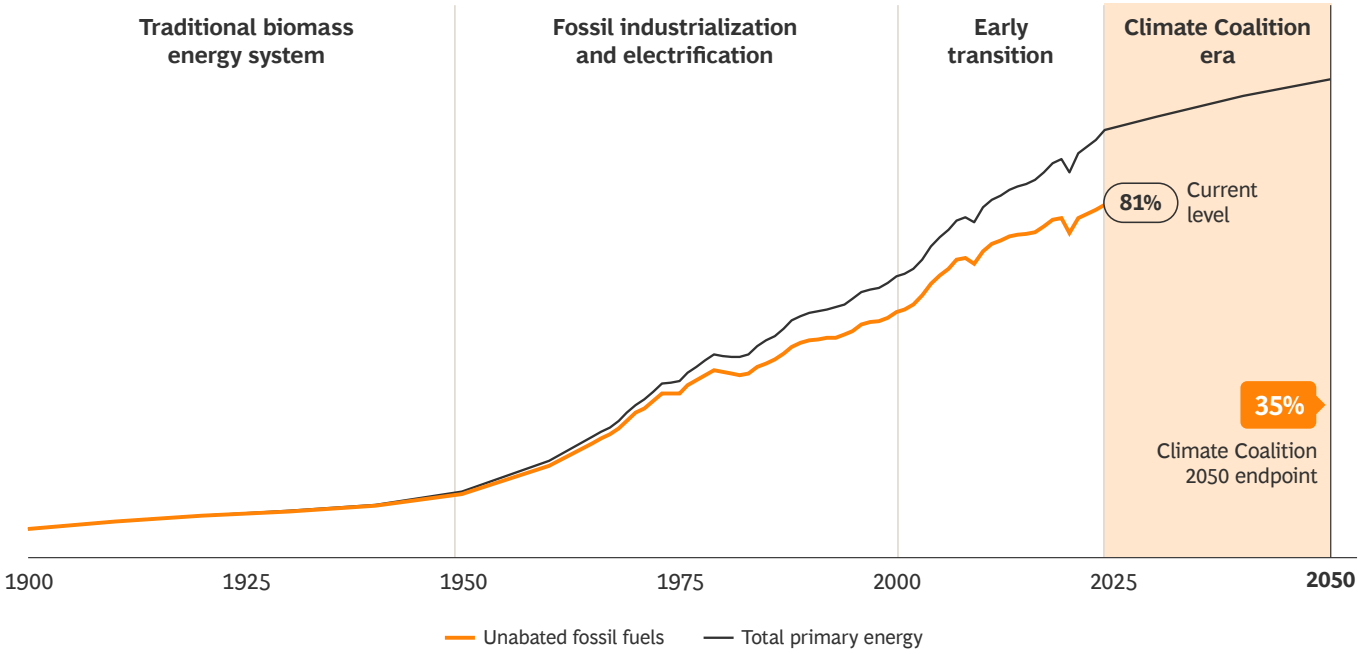


EXHIBIT 4

In Climate Coalition, Carbon Capture Technology and Renewables Are Cleaning Up the Energy Mix in 2050

SHARE OF UNABATED FOSSIL FUELS[1] (% OF PRIMARY ENERGY[2])



Sources: Energy Institute; Our World in Data; World Energy Outlook; BCG Henderson Institute analysis.
[1]Fossil fuels for which greenhouse gas emissions are not captured at the point of conversion or use through, for example, carbon capture and storage. Excludes downstream or economy-wide carbon removals, offsets, and compensation measures.
[2]Unprocessed energy sources such as coal, crude oil, natural gas, nuclear fuel, solar, wind, and hydropower.

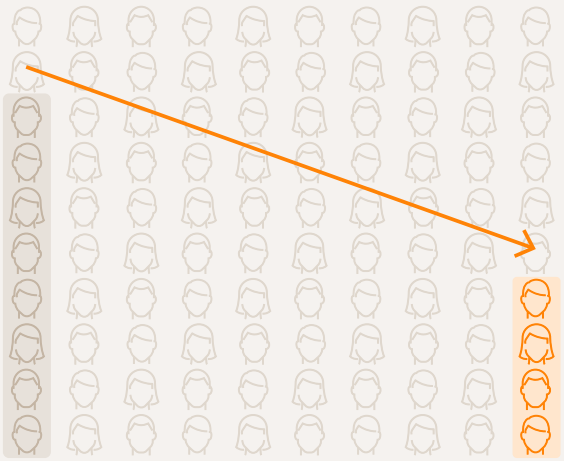
A Delicate Balance

The societal focus on decarbonization and resilience has supported slow but steady growth of an average of 2.5% per year over the past 25 years. This also reflects structural headwinds from slowing population growth, aging societies, and diminishing gains from globalization. Developing and emerging economies have seen a boost from this growth, benefiting from carbon market dividends, newly developed climate-resilient crop strains and biopesticides, and clean-energy technologies. Over the same period, extreme poverty has been halved, from 8% to 4%.

The picture is different in the developed world. With public debt high, pension liabilities heavy, and carbon market revenues earmarked for habitat restoration and carbon removal, fiscal tradeoffs are challenging. As a result, politics in advanced economies is focused heavily on intergenerational fairness. The higher cost of living means that, by 2050, working-age adults in most advanced economies have only 90% of the disposable income of people aged 65 or older—down from 120% in 2025. Seniors are also the largest demographic group. These two factors give them significant political clout.

The share of the global population living in **extreme poverty has halved**

(from 8% in 2025 to 4% in 2050)



How Did We Get Here?

2026–2029

In the last years of the 2020s, a warming planet wrought havoc across continents. A series of extreme weather- and climate-related shocks came earlier than scientists had predicted. Flooding in New York City, Guangzhou, and Singapore crippled critical infrastructure for weeks—and heat waves and wildfires led to millions of deaths in the US alone. The damage caused by these events was estimated at 0.5% of global GDP. Popular support for bold, coordinated global climate action skyrocketed.

New York City Floods in Yet Another Climate Disaster

2030–2034

Citizen pressure led to more stringent EU industrial policies on carbon. The growth of a "climate club" gained significant momentum when the US introduced carbon pricing and staged, industry-specific CBAMs in the early 2030s. China and India began bolstering their domestic emissions-trading systems and launching industrial policies to support more dramatic drops in coal use.

Influence of EU 'Climate Club' Grows

2035–2039

With the policy focus shifting from growth-at-all-costs to resilience, and the fiscal base of most nations shrinking as populations grew older, pension-funding models reached a breaking point. As a result, tax and redistribution systems needed to be transformed. In most nations, extending the carbon-adjusted VAT to everyday goods was the solution, but the shift from income to consumption taxes triggered fierce debates about fairness and intergenerational equity—and fueled a protest movement. Meanwhile, emissions continued to decline.

Protests Over Tax Winners and Losers

2040

After intense negotiations—on a carbon floor price, on IP sharing, on accounting standards, and on where the responsibility to fund transition investment lies—China and India agreed to join the "climate club," which now includes most major industrial nations.

'Climate Club' Adds China and India as Members

2040–2042

Carbon pricing and tight labor markets led to chronic inflation. Central banks initially stood back, concerned about slowing critical investment in the climate transition. That stance became untenable after the onset of runaway inflation. Tighter monetary policies ultimately helped the world avoid hyperinflation.

Runaway Inflation—Can Central Banks Tame It?

2043

Governments in the Global North agreed to increase immigration, with caveats, in an effort to take pressure off labor markets and pension systems. In many countries, to address political concerns, the solution was a two-tiered system that offered migrants some protections but no path to permanent residency.

G20 Debuts Migrant Work Compact

2043–2050

By 2048, a group of developed nations had achieved net zero, enabled by clear regulation, renewable-energy incentives, AI-powered innovations and efficiency gains, and public and private investments in natural climate solutions to draw down carbon.

First Set of Developed Nations Achieve Net Zero Emissions

Climate Coalition: This Scenario in Numbers

Macroeconomics and technology

		Current level	2050 – Climate Coalition
1	**World GDP growth** (25-year backward rolling CAGR, real)	3.4%	2.5%
2	**Labor productivity growth** (high-income countries)	2.0%	1.9%
3	**Global ICT spending** (% of GDP)*	4.0%	4.5%
4	**Digital services trade restrictiveness** (index range 0–1)*	0.13	0.02

Geopolitics and society

		Current level	2050 – Climate Coalition
5	**Global trade-to-GDP ratio**	57%	45%
6	**Regional share of world GDP**		
	North America	27%	23%
	European Union	21%	20%
	China	19%	19%
	India	4%	6%
	Rest of world	29%	32%
7	**Global defense spending** (% of GDP)	2.4%	2.0%
8	**Democracies** (% of countries)*	49%	55%
9	**Share of wealth held by richest 1% of population**		
	EU	25%	24%
	US	35%	30%
	China	30%	30%
	India	40%	35%
10	**Share of global population living in extreme poverty***	8%	4%

People and work

		Current level	2050 – Climate Coalition
11	**Labor force participation rate**	80%	81%
12	**Annual hours worked per worker**	2,100	2,070
13	**Fertility rate** (births per woman)	2.24	1.95
14	**Global health spending** (% of GDP)	10%	11%
15	**Healthy life expectancy** (years)	63	68
16	**Human happiness** (index range 0–10)*	5.4	6.0

Planet and resources

		Current level	2050 – Climate Coalition
17	**Share of unabated fossil fuels in primary energy supply***	81%	35%
18	**Low-carbon share of electricity generation***	41%	92%
19	**Global temperature increase vs. pre-industrial levels**	+1.3°C	+1.8°C
20	**Biodiversity health** (index range 0–1)*	0.73	0.69

Source: BCG Henderson Institute analysis.
Note: See Appendix 2 for metrics methodology, definitions, and sources. ICT = information and communications technology.
*Select explanations: **3.** As defined by IDC Worldwide black book and including hardware, software, and IT services. **4.** Digital services trade restrictiveness based on OECD Index measuring how restrictive a country's regulations are for digitally delivered services (0 = no restriction; 1 = maximum restriction). **8.** Defined as countries rated a Liberal or Electoral Democracy in V-Dem's "Varieties of Democracies" Report. **10.** Extreme poverty as defined by SDG 1 poverty line: below $2.15/day (2017 PPP). **16.** Life Evaluation Score from the World Happiness Report, where adults rate current life (0 = worst possible; 10 = best possible). **17.** The proportion of total primary energy supply derived from fossil fuels (coal, oil, and natural gas) for which emissions are not captured at source through carbon capture and storage (CCS). **18.** Electricity generated from renewables, biomass, and nuclear sources as a percentage of total electricity generated. **20.** Based on the International Union for Conservation of Nature "Red List Index" aggregating the extinction risk of species (1 = least concern for all species; 0 = all species extinct).

Implications for Business Leaders

If 2050 were to resemble Climate Coalition, what steps might leaders want to take now and in the coming years to prepare?

Digitize and decarbonize in tandem. With strict environmental regulation and a steep price on carbon, companies would position themselves to win in a world where environmental externalities are priced in. In operations, this would involve leveraging opportunities to digitize and decarbonize in tandem—for example, by incorporating robust monitoring, reporting, and verification (MRV) features into new accounting, resource planning, or integrated systems.

Identify and secure access to low-carbon inputs. Because demand for some materials essential to the energy transition will likely outstrip supply, prudent organizations would seek to understand and mitigate scarcity risks. However, taking a limited, industry-specific view when trying to assess which inputs will tighten, and when, would be a mistake. Instead, organizations that have a cross-sector view will gain an advantage. (See the sidebar "Negotiating Bottlenecks in the Energy Transition.")

Negotiating Bottlenecks in the Energy Transition

Climate Coalition's decarbonization imperative means all geographies and industries would be approaching the same challenges at the same time. Inevitably, competition for the same resources could lead to scarcity or to significant shifts in the economics of decarbonization efforts.

Addressing that risk requires a cross-sector systems approach that identifies blind spots and bottlenecks. For example, building wind turbines in 2025 required a combination of 18 critical materials. Although supplies of these materials are sufficient to meet the anticipated demand from the turbine manufacture sector, taking into account the needs of other sectors reveals that global demand is likely to outstrip supply for 13 of the 18 materials.

System-level insights like these would enable companies to build optionality by substituting alternate materials and prequalifying other alternate inputs. And, importantly, it would mean having a better sense of risks, remedies, and timelines before committing capital to a particular transition pathway.

Dig deeper:

The Hidden Dynamics of the Energy Transition

Prepare for shifting customer priorities—and longer R&D horizons. Promoting the contribution that products are making to decarbonization would be increasingly important for businesses, and a prelude to future climate-forward positioning. Embedding climate mitigation and resilience into the product design phase—through life cycle analysis, circular manufacturing, and modularity—would allow firms to offer new value propositions while reducing negative environmental impacts. And for some, it would be sensible to make longer-term deep tech investments in areas like materials science, bioengineering, and AI-optimized design that will drive the next wave of low-carbon breakthroughs.

Invest in emerging growth regions. Building a presence and partnerships in fast-rising hubs (for example, India and Africa) would help organizations position themselves to leverage workforce pools and capture future waves of growth. Success would depend on adapting value propositions to local demand—and developing localized financing and supply-chain models to achieve carbon-advantaged production.

Build capabilities to compete in environmental markets. Preparing for these markets would involve developing internal expertise, systems, and partnerships needed to trade and monetize carbon, biodiversity, and resource credits—for both compliance and economic advantage. And strengthening engagement with regulators would offer invaluable context on how these markets might evolve.

Develop strategies for an aging workforce. As labor tightens in the developed world, it would make sense to build aging-workforce strategies that leverage late-career pathways and multigenerational teams—as well as to double down on automation and upskilling programs to sustain productivity despite demographic strain. At the same time, in a world characterized by political tensions between generations, organizations that enable young people to thrive and that foster high-performing multigenerational collaborations will gain a talent advantage.

(See the sidebar "Building Competitive Advantage in an Aging World.")

Building Competitive Advantage in an Aging World

In Climate Coalition, aging populations, longer healthy life expectancy, and tight labor availability make delayed retirements the norm in China and OECD countries. But this situation would not be without its challenges. Midcareer workers would need to increasingly balance responsibilities for jobs and eldercare, while companies would struggle with declining job engagement from older employees.

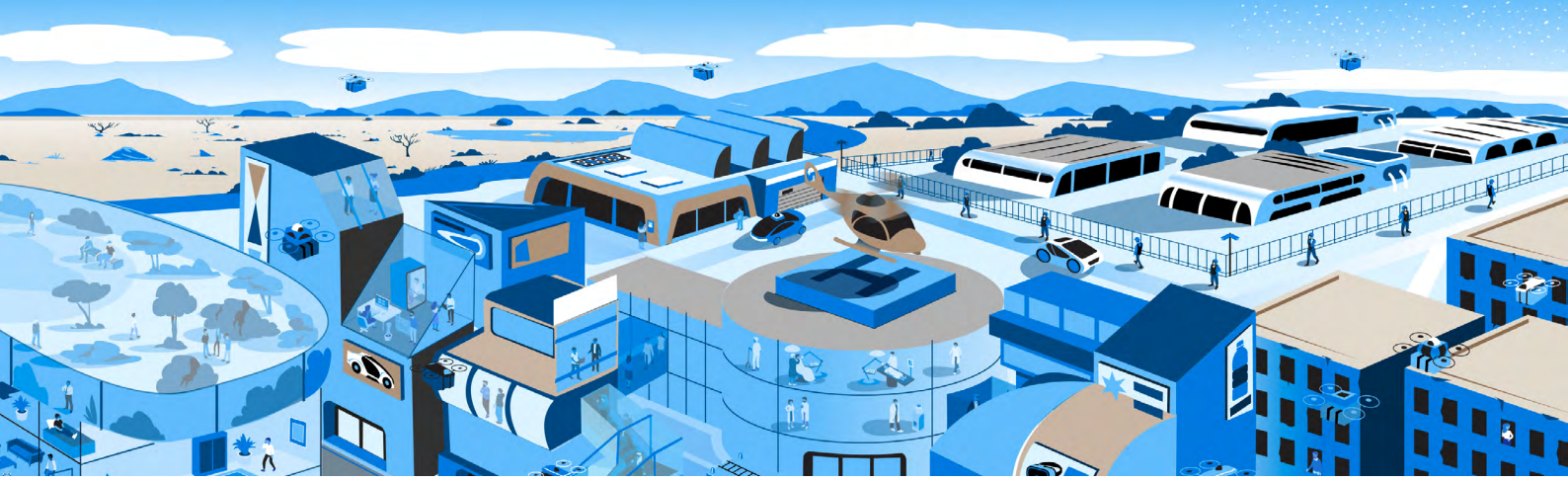
It is important for organizations to treat aging as a critical strategic megatrend—and to model its impact across all functions over time. The goal would be to understand what it means for overall performance and to develop strategies in response.

Winners could prepare the 40- to 60-year-old cohort for active senior work via upskilling, reskilling, and career coaching. Cross-generational teams could facilitate the transfer of knowledge between older and younger employees, offer meaningful caregiver support, and develop new late-career pathways with flexible schedules and clear rewards. In addition, redesigning work with AI and automation to focus human effort where it has the most impact would be a priority.

Dig deeper:

Pension Systems Are Cracking—Here's How to Fix Them

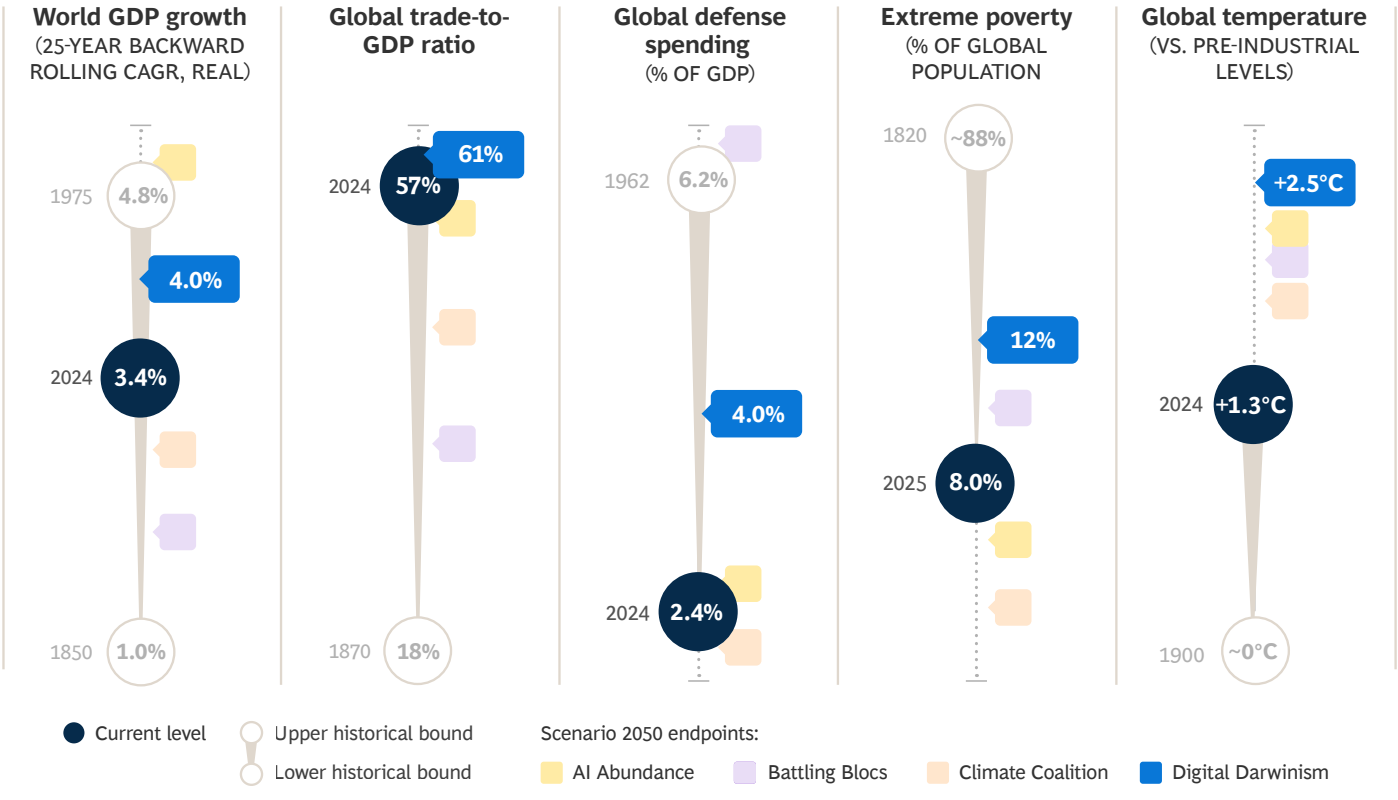
Countries with Aging Populations Can Thrive. Here's How.



CHAPTER 5

2050 Scenario: Digital Darwinism

The pace of change has never been swifter. The decision to unlock innovation with ultralight regulation has driven explosive growth for tech companies. The resulting survival-of-the-fittest ethos has diminished the role of governments. AI is everywhere, from personalized entertainment to virtual supervisors at work. But the idea of a shared reality is at risk and while economic growth is high, inequality is widening, with many people relying on insecure, gig economy jobs. Here's how Digital Darwinism compares with historical norms and other scenarios on five key metrics:



Sources: Intergovernmental Panel on Climate Change, Sixth Assessment Report; Maddison Project; OECD; Our World in Data; Stockholm International Peace Research Institute; World Bank; World Meteorological Organization; BCG Henderson Institute analysis.

Tech Elites Rule

In Digital Darwinism, wealth, longevity, and influence accrue to the tech elites in compute-rich nations—and to their investors. Everyone else lives more precarious lives. For most, chronic stress, extreme heat events, and degraded social services negatively affect mental health and healthy lifespans. Many just tune out.

AI-native firms and digital products and services are the default. AI and capital returns have far outpaced wage growth, and surging housing and equity prices have further concentrated wealth among asset owners. As a result, the richest 1% now hold nearly half of global wealth, a share not seen since the industrial societies of the early 1900s—while the middle class continues to shrink. (See Exhibit 5.)

Work has become increasingly insecure. Those with creative or high-skill expertise thrive, but most others face stagnant opportunities as AI and automation displace routine knowledge work. At the same time, gig-style and short-term contract work has expanded sharply (and is often mediated through algorithmic platforms).

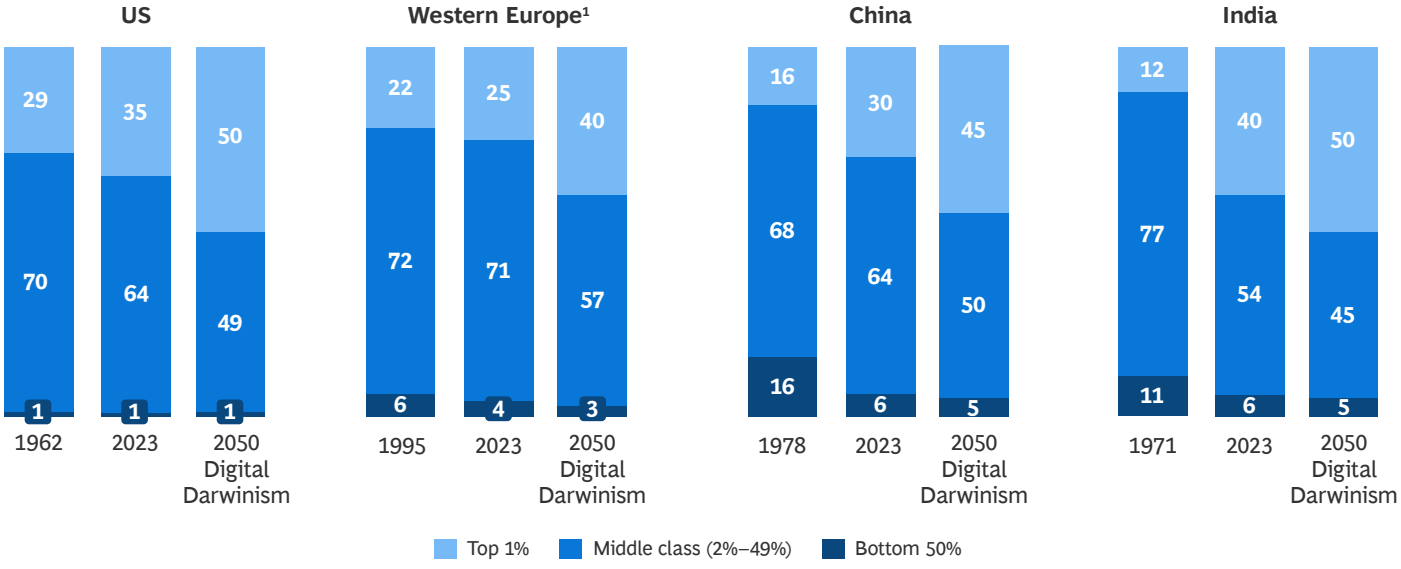
Workers now frequently operate alongside AI "cobots" that provide real-time leverage and guidance—but also leave employees feeling they are constantly under surveillance. Most people have to navigate digital overload, instability, and burnout at work. For relief, many escape into AI-generated virtual worlds tailored to personal preferences and moods. As a result, digital addiction has become a major public health concern.

Breakthroughs and knowledge are closely guarded by megacorporations. This less open and collaborative research environment has started to dampen the pace of innovation and progress. Nonetheless, economic performance is very strong. From 2025 to 2050, global GDP has grown at 4% per year—resulting in a near tripling of GDP.

EXHIBIT 5

In Digital Darwinism, Rapid Tech Growth Has Increased Wealth Inequality in 2050

SHARE OF TOTAL WEALTH HELD BY DIFFERENT SEGMENTS OF THE POPULATION (%)



Sources: World Inequality Database; BCG Henderson Institute analysis.
[1]Western Europe includes France, Germany, and UK.

A Two-Speed, Warmer World

Digital Darwinism's prosperity is far from evenly shared among nations. A fractured global order has taken shape. In this two-speed world, compute-rich regions and their tech champions dominate, extracting rents and resources from weaker economies. Yet, driven by commercial interest, global trade and supply chains remain open.

Defense spending is high, at 4% of GDP, up from 2.4% in 2024—an artifact of a prior arms race that arose when unregulated technological progress in AI, biotech, and space systems blurred the line between civilian and military capabilities. A growing number of countries are led by more authoritarian leaders who have eroded democratic values and centralized power. By 2050, only 30% of countries remain liberal or electoral democracies, down from 49% in 2024. And a new space race is underway.

Despite unchecked emissions and accelerating temperature increases, leaders prioritize adaptation over coordinated decarbonization. Unrestrained extraction and weak regulation have led to major ecosystem losses and food system stress. And adaptation projects (infrastructure resilience, green spaces, water management, early-warning systems) are driven by and directed toward wealthy enclaves, while less fortunate regions face mounting losses. (See Exhibit 6.) Conflicts driven by resource acquisition and climate-induced disruption of agricultural supply chains have reversed progress in the fight against poverty in low-income countries. In 2050, 12% of the world's population lives in extreme poverty (versus 8% in 2025).

The share of countries that are **democracies decreases**

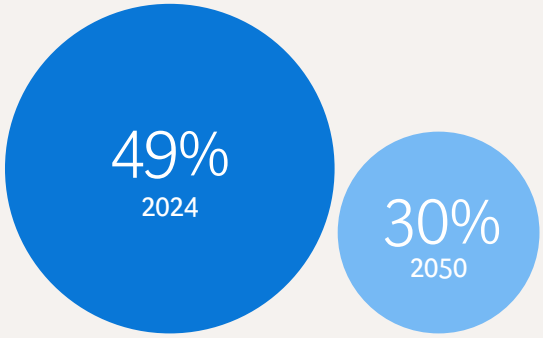
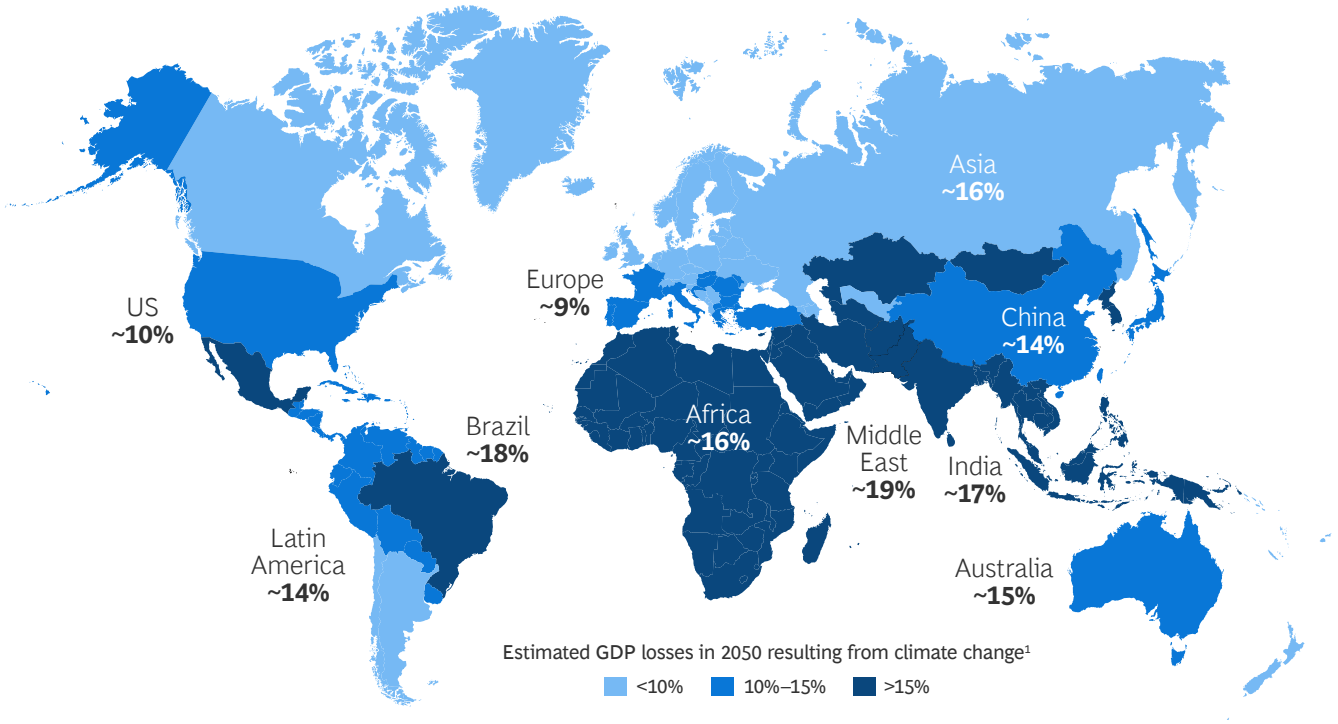


EXHIBIT 6

In Digital Darwinism, All Regions Face Economic Losses from Climate Change—but Amounts Vary



Sources: Network of Central Banks and Supervisors for Greening the Financial System; BCG Henderson Institute analysis.
[1]Figures show point-in-time GDP deviations in 2050 relative to a baseline scenario without climate damages. In cases where country-specific data was unavailable, the corresponding regional average was applied.

How Did We Get Here?

2027–2029

Shortly after AI-driven research yielded breakthroughs—in the treatment of pancreatic and lung cancers, and in the development of new electrical grid battery materials—a group of countries began marketing ultralight AI regulations in the hopes of attracting tech companies. This set off a race to the bottom with nearly all countries reconsidering their existing and proposed regulatory priorities—and unleashed tech companies.

Nations Roll Out Red Carpet for Tech Giants

2030–2034

Unfettered AI led to rapid breakthroughs in health and materials. But loosening the guardrails led to some researchers breaching long-standing ethical boundaries in areas like genetic engineering and nuclear science. And while many scientists sounded the alarm, their concerns did not lead to a decisive crackdown.

Gene Editing of Embryos Sparks Global Outcry

2032

Persuasion-focused AI flooded global markets with hypertargeted influence campaigns, disrupting elections and eroding public trust.

AI Bots Cause Election Storm

2034

The rise of AI-generated, personalized, and immersive entertainment options drove significant profits for proprietary platform owners as well as a dramatic increase in digital addiction. Public health authorities raised concerns about the rising epidemic—while civil society leaders expressed unease about these platforms' ability to shape the information landscape and influence the political environment.

WHO Estimates Digital Addiction's Annual Cost Reaches 2% of GDP

2035

A group of founders bankrolled a series of experiments in replacing traditional government councils with algorithm-driven civic platforms featuring direct digital voting and autonomous budgeting. Critics warned of the dangers of corporate control over democratic structures.

Tech Trillionaires Fund 'Platform Democracy' Pilots

2042

With municipal budgets under stress from climate costs and lower tax rates established to attract investment, many cities chose to outsource their fire, ambulance, and disaster-response services. The new corporate providers introduced tiered response packages, enabling households to pay more for faster service.

Major US Cities Privatize Emergency Services

2045–2046

As a result of decades of deforestation, large parts of the Amazon rainforest shifted irreversibly toward a savannah-type landscape—leading to significant climate swings. Regional monsoon patterns evolved, causing severe droughts and crop failures across South America and further consequences for global food and commodities markets. Food prices reached historic highs, sparking a new humanitarian crisis.

Amazon Rainforest Tipping Point Sparks Global Food Security Crisis

2048

The climate continued to worsen, with warming surpassing 2.5°C. Following a series of back-to-back heat waves, a coalition of technologists secretly funded a small-scale program releasing sulfate aerosol into the stratosphere from high-altitude balloons. While the program led to measurable cooling of the atmosphere, the scientific community raised the alarm over potential unintended consequences.

Trillionaires and Scientists at Odds Over Climate Change Fixes

Digital Darwinism: This Scenario in Numbers

Macroeconomics and technology

		Current level	2050 – Digital Darwinism
1	**World GDP growth** (25-year backward rolling CAGR, real)	3.4%	4.0%
2	**Labor productivity growth** (high-income countries)	2.0%	3.8%
3	**Global ICT spending** (% of GDP)*	4.0%	8.0%
4	**Digital services trade restrictiveness** (index range 0–1)*	0.13	0.06

Geopolitics and society

		Current level	2050 – Digital Darwinism
5	**Global trade-to-GDP ratio**	57%	61%
6	**Regional share of world GDP**		
	North America	27%	29%
	European Union	21%	14%
	China	19%	24%
	India	4%	6%
	Rest of world	29%	27%
7	**Global defense spending** (% of GDP)	2.4%	4.0%
8	**Democracies** (% of countries)*	49%	30%
9	**Share of wealth held by richest 1% of population**		
	EU	25%	40%
	US	35%	50%
	China	30%	45%
	India	40%	50%
10	**Share of global population living in extreme poverty***	8%	12%

People and work

		Current level	2050 – Digital Darwinism
11	**Labor force participation rate**	80%	81%
12	**Annual hours worked per worker**	2,100	1,900
13	**Fertility rate** (births per woman)	2.24	2.00
14	**Global health spending** (% of GDP)	10%	15%
15	**Healthy life expectancy** (years)	63	62
16	**Human happiness** (index range 0–10)*	5.4	4.5

Planet and resources

		Current level	2050 – Digital Darwinism
17	**Share of unabated fossil fuels in primary energy supply***	81%	70%
18	**Low-carbon share of electricity generation***	41%	60%
19	**Global temperature increase vs. pre-industrial levels**	+1.3°C	+2.5°C
20	**Biodiversity health** (index range 0–1)*	0.73	0.60

Source: BCG Henderson Institute analysis.
Note: See Appendix 2 for metrics methodology, definitions, and sources. ICT = information and communications technology.
*Select explanations: **3.** As defined by IDC Worldwide black book and including hardware, software, and IT services. **4.** Digital services trade restrictiveness based on OECD Index measuring how restrictive a country's regulations are for digitally delivered services (0 = no restriction; 1 = maximum restriction). **8.** Defined as countries rated a Liberal or Electoral Democracy in V-Dem's "Varieties of Democracies" Report. **10.** Extreme poverty as defined by SDG 1 poverty line: below $2.15/day (2017 PPP). **16.** Life Evaluation Score from the World Happiness Report, where adults rate current life (0 = worst possible; 10 = best possible). **17.** The proportion of total primary energy supply derived from fossil fuels (coal, oil, and natural gas) for which emissions are not captured at source through carbon capture and storage (CCS). **18.** Electricity generated from renewables, biomass, and nuclear sources as a percentage of total electricity generated. **20.** Based on the International Union for Conservation of Nature "Red List Index" aggregating the extinction risk of species (1 = least concern for all species; 0 = all species extinct).

Implications for Business Leaders

If 2050 were to resemble Digital Darwinism, what steps would leaders want to take now and in the coming years to prepare?

Strengthen in-house signal intelligence. Amid fragile institutions, shared information aggregators—for competitive insight, macroeconomic data, and so on—would likely become more scarce, so in-house capabilities would need to expand. Near-real-time insights would be able to deliver outsize advantage when AI-only rivals emerge and tech-sector players encroach on new industries. Advanced sensing capabilities would also enable companies to anticipate and secure scarce resources early—as scarcities will accelerate in a lightly regulated world—and to track developments in disruptive technologies such as biotech and quantum computing. (See the sidebar "Securing the Quantum Edge.")

Securing the Quantum Edge

It's well within the realm of possibility that some players in Digital Darwinism's unbound tech sector could achieve a revolutionary breakthrough: a fully operational quantum computing stack.

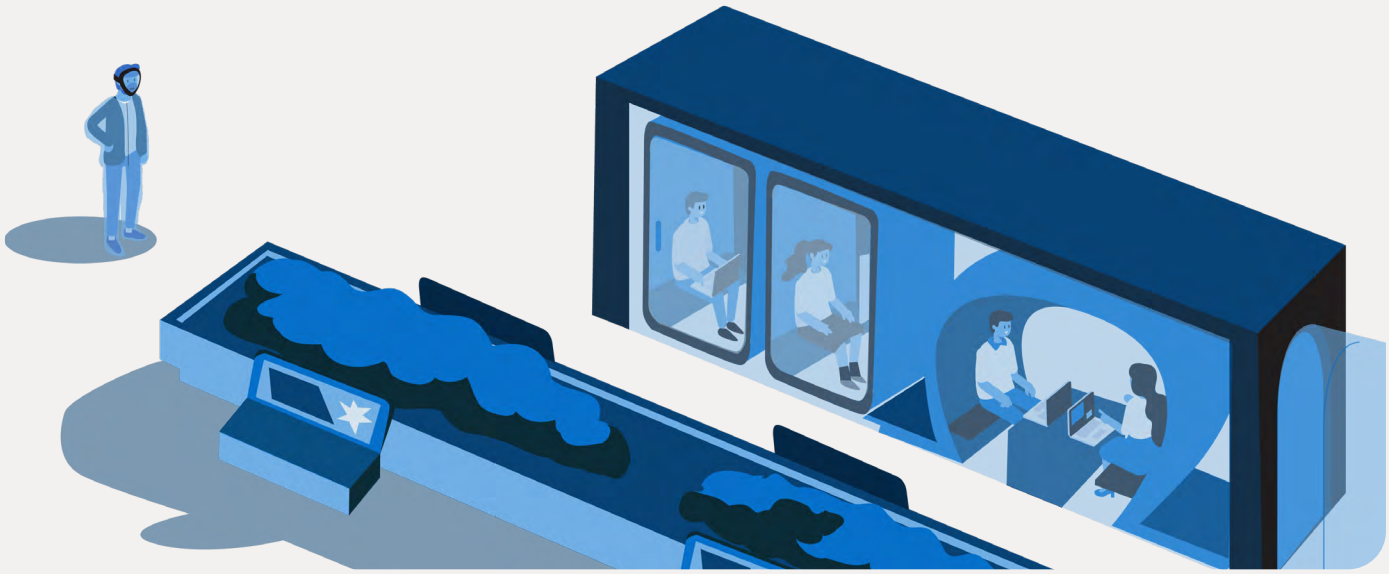
The rise of quantum would radically redefine competitive advantage by compressing innovation cycles and lowering energy and materials use. R&D would shift from a lab-first discovery approach to a simulation-first one. For example, in biotech and pharmaceuticals, quantum-driven molecular simulations could cut years off drug discovery and testing. In the energy sector, quantum could contribute to accelerating advances in renewables such as new battery designs—and help optimize grids and energy storage.

The availability of quantum computing at scale also has the potential to destabilize. It has the power to break today's most robust encryption mechanisms, threatening privacy—and enabling new vectors for espionage and warfare. Moreover, since quantum algorithms are hard to verify and debug, their output could lead to incorrect decisions.

Given the technology's huge promise and risks, it makes sense for organizations to start building quantum literacy (for both offense and defense) across functions and identifying their most promising quantum applications—and once quantum is a reality, to quickly test those priority business cases. It will be important to manage the initial rollout of quantum applications with a rigorous stage gate process incorporating defined hardware milestones and clear threshold metrics to scale or exit. And until the technology scales, companies should take a dual-track approach: running classical approaches and quantum in parallel.

Dig deeper:

The Long-Term Forecast for Quantum Computing Still Looks Bright



Master climate change risk in strategic planning. Weak global coordination on emissions reduction in this scenario would increase the frequency and severity of climate-related disruption—both acute disruptions from extreme weather events and chronic impacts on agriculture yields, health, and labor productivity.

Those companies that integrate a sharp understanding of their vulnerabilities to physical and financial risks into strategic planning would be better positioned to protect assets, secure scarce resources, shift supply chains, and evolve their offerings. While many organizations already include a climate lens in their planning, the imperative here is to go even deeper in risk quantification and develop concrete plans to mitigate and hedge against risks. (See the sidebar "Preparing for Climate-Driven Financial Crises.")

Alongside this imperative, strengthening in-house crisis management capabilities would also become more important, given that the capabilities of public systems are likely to diminish.

Explore multitier customer offerings—and invest in trust. As inequality grows to greater extremes, more companies would explore multitier offerings, with premium features for elites and affordable options for the mass market. And in a low-regulation, cutthroat world, being a trusted organization would be a powerful differentiator. Investing in the infrastructure of trust building—watermarking, provenance, and cyber resilience, as well as strong and auditable corporate governance procedures—could offer a real competitive edge.

Embrace partnerships as a hedge for volatility. Partnerships and ecosystems would be particularly essential in the turbulence of Digital Darwinism. Whether focused on data, infrastructure, or compute and production capacity, collaborations with suppliers, startups, and customers could significantly boost adaptability and resilience in the face of rapid technology cycles and weakening societal and regulatory structures.

Preparing for Climate-Driven Financial Crises

Unrestrained extraction and weak climate policies led to unchecked emissions and rising temperatures in Digital Darwinism. A continually warming world would be expected to mean more extreme weather events and other climate-related disasters, causing ever greater financial losses.

The systems that absorb those losses, like insurance and capital markets, would come under increasing pressure. Eventually, much like physical systems such as the Amazon rainforest or polar icecaps, a tipping point would be reached, causing a widespread and irrevocable change in how they operate. For example, an unexpected surge in claims for climate-related property damage could force insurers out of the market, leaving households without coverage, with consequences for mortgage-backed securities and bank balance sheets and requiring governments to step in as a backstop, adding to the strain on the public purse.

In a warming climate, these kinds of financial crises are much more likely. While leaders should aim to spot and mitigate these dangers early, they can also tap opportunities by acting strategically. Mapping of at-risk areas should include not just physical indicators but also financial warning signs. New products and services would be developed with climate risk exposure in mind. And collaboration could bring innovation as well as risk mitigation, whether through new partnerships and licensing agreements to scale new offerings or via public-private alliances to contain crises or minimize their impact.

Dig deeper:

Climate Change May Trigger Financial Tipping Points. Here's How Leaders Can Prepare.

CHAPTER 6

How Potential Shocks May Affect the Future

The preceding scenarios are four possible futures, representative of the likely range in which leaders will need to operate. But you may be asking yourself, Where are the shocks? Where are the low-probability yet high-impact black swan events? These developments could come from any direction and entirely change the course of society. For example:

- The AI Singularity, challenging humans with an intelligence far beyond their own.
- A war in space, affecting navigation and communication on Earth.
- Nuclear fusion, rewriting industrial economics.
- Brain-computer interfaces, linking humans and machines.
- A cure for aging, extending lifespans by decades.
- Geoengineering experiments, risking unforeseen natural disasters.
- AI agents and robots, replacing most human labor.
- A degrowth compact between nations, limiting resource extraction or energy generation.
- A dangerous pathogen, infecting 90% of humans worldwide.
- Desalination breakthroughs, ending water scarcity.

These are just some of the game-changing technological breakthroughs, physical catastrophes, and other discontinuities that could take place, leading to consequences in ways beyond today's imagination. We don't suggest that leaders plan for them. Instead, building an awareness that they or others may happen is helpful in understanding the boundaries of the plausible range that our four scenarios are designed to map.

In this chapter, we explore how four of these shocks could cause profound shifts, and the consequences they would likely bring.

AI Abundance: The Singularity Emerges

In this scenario, AI has driven huge progress. But what if the emergence of artificial general intelligence (AGI) brought on the Singularity—the point at which the capabilities of AI systems exceed those of human reasoning and begin rapid cycles of self-improvement with humans out of the loop?

With one or more algorithms learning to build on its own insights and to link with networked sensors and robots, this new intelligence could start rethinking and reshaping the world without human consultation.

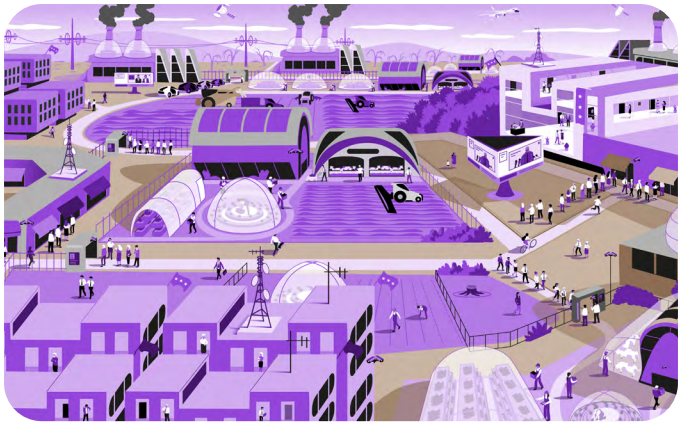
Changes could come faster than society could adapt.

Even if the machines didn't go rogue, they could be very difficult to turn off.

Competing systems with conflicting optimization goals might overhaul or upend markets and institutions.

The Singularity may see humanity as a threat, or it could unlock explosive productivity, compressing centuries of progress into decades.

No matter the outcome, by some definitions a new form of intelligent life may have been created on Earth, with humans having to learn to share the planet.



Battling Blocs: War in Space Breaks Out

In this scenario, regional blocs exist in uneasy peace, despite tension and division. But what if that changed? Advances in defense and communication technology make space a vital and vulnerable strategic arena.

Conflict in space could begin below the threshold of open warfare, for example, with jamming or spoofing of satellite systems or covert interference with satellite orbits. Such impacts, whether confirmed as deliberate or not, could escalate quickly, especially when affected parties fear the loss of critical capabilities such as early-warning systems or intercontinental ballistic missile defenses.

The destruction of satellites in Earth's orbit would create a debris field endangering other satellites. In the most severe case, it could trigger a cascading chain reaction of debris-creating collisions that would render entire orbital regions unusable for extended periods.

Were that to happen, global trade would shrink further as GPS failures paralyze logistics networks. Weather prediction would falter, leaving farmers and cities, among others, blind to storms and droughts. Disruptions to satellite-based communications and timing services would ripple through financial markets, energy grids, and emergency response systems.

Businesses would have to reimagine operations around slower, regional, and lower-precision systems. Navigation would need to rely on older technologies like terrestrial radio, inertial systems, and even printed maps. Supply chains and logistics would have to leave behind the long, continuous routes afforded by satellite navigation and revert to hub-and-spoke architectures following known regional pathways. A war in orbit would become a humanitarian and business crisis on Earth, affecting countries far beyond those directly involved in the conflict.

Climate Coalition: Nuclear Fusion Arrives

At the heart of this scenario: managing a tradeoff between climate resilience and economic growth in an energy-bounded world. But what if nuclear fusion became commercially viable and broke the need for that compromise?

Fusion is what powers the sun. It would transform industrial economics with near-limitless cheap, clean, and safe energy. Fusion has already been achieved in the lab, but scaling it into a viable alternate energy source requires engineering breakthroughs. These could be achieved if advances in vital materials such as high-temperature superconducting magnets continue—perhaps accelerated by AI technologies that could also optimize new reactor designs or manage plasma stabilization in real time.

With commercial fusion, nations could reprioritize economic growth. Long-standing geopolitical tensions over resources would shift and maybe even ease. Human-made emissions would plummet, carbon capture could clean up the atmosphere and stabilize temperatures, and fusion-powered desalination plants could ease water scarcity across the globe.

Bottlenecks would shift from energy scarcity to the key materials and physical inputs supporting the rise of fusion (for example, rare earths and superconductors). Firms benefiting from the old energy dynamics would lose leverage; new winners would emerge in fusion-enabled ecosystems such as carbon removal, desalination, and critical materials.

Digital Darwinism: Brain-Computer Interfaces Spread

This scenario already has soaring inequality, a hotter planet, and a high-stress gig economy. But what if a breakthrough in brain-computer interface (BCI) technology gave an entirely new meaning to the phrase *hybrid work*?

BCIs enable people to control computers or machines with thought alone. Today, BCIs are experimental and focused on medical applications. But given enough technological progress and societal permission, their application could expand. The result: a human-machine hybrid with extraordinary situational awareness, exceptional analytical skills, enhanced reaction time, and remarkable endurance. Significant investment would be required to build multimodal electrochemical brain datasets that could be used to train models, but in this scenario, tech leaders may be prepared to take that step.

Companies would compete for access to neurotechnology and the new class of "hybrid" workers it creates—resulting in a two-tier labor market. For many positions, a worker's level of enhancement technology would become a more important hiring criterion than skills and experience. The possibilities for industry, research, and entertainment are endless—but with brain data the next asset class, concerns would arise over cognitive privacy and mind control, perhaps forcing the need to enumerate new personal rights, adapt employment laws, and rethink employment contracts.

CHAPTER 7

Five Low-Regret Moves

Our four scenarios for 2050 present leaders with a breadth of possibilities and distinct challenges. While many of the strategic and operational implications are scenario-specific, common threads and trends across the scenarios provide a starting point for practical planning. When looking 25 years into the future, it may not be possible to identify actions that guarantee success, but five low-regret moves can help position organizations to prosper.

Some moves relate to unavoidable trends—like aging and global warming—and others focus on building agility and optionality to navigate the future as it comes into focus.

Leaders who pursue these five actions will give their organizations a head start in navigating the decades ahead. Alongside continued scenario thinking and strategic monitoring of the future path the world is taking, it's possible to develop a stronger plan for the next 25 years, and beyond. This long-term view will become all the more critical for leaders, as decisions made in the next five years set the stage for success or struggle in 2050.

Enhance Structural Resilience

In a world of harmonious free trade and low climate impacts, it has made sense to focus on efficiency over resilience and redundancy. Now, it's time to rebalance the tradeoff in favor of resilience to ensure the continuity of operations. Practically, that means diversifying sourcing and redesigning operating networks to build regional optionality. It also means securing access to vital inputs such as critical minerals, semiconductors, water, and low-carbon materials. Identifying—and minimizing—emerging climate risks to infrastructure, supply chains, and labor productivity will also be key. Businesses should also sharpen competencies in liquidity management and cross-border financial risk management, including learning to operate in new forms of value storage, transaction banking, and blockchain-based finance.

Reimagine Talent for Aging Populations and AI

Demographic changes are reshaping talent pools, so it's vital to build strategies and models today for intergenerational work, more flexible roles, and talent mobility—as well as to extend an organization's talent footprint into emerging labor markets. At the same time, it's key to identify and scale new collaborative human-machine operating models that bring together agentic AI workflows and human oversight, judgment, and creativity.

Build Digital Flexibility and Trust

Given the rapid development of AI and other emerging technologies, it's sensible to take a modular approach to tech and data stacks. This allows an organization to remain adaptable as trajectories evolve—to focus on architectures that can be swapped, isolated, or localized as the emerging situation demands. Tracking where systems are developed, and where they can be sourced, will be an increasingly essential part of any technology strategy. Additionally, organizations should focus on trust and cybersecurity: as AI permeates everything from supply chains to decision making, it's more important than ever that systems are responsibly managed and verifiable.

Sharpen Sensing and Influencing Capabilities

While the trends that drive the three preceding recommendations are clear, the outcomes of many other trends or policy decisions can vary significantly. Organizations that build a foresight advantage and secure a seat at the policy table now will have an advantage. They should ensure that they are developing sensing capacities along multiple dimensions—for example, regulation, geopolitics, resources, and technology—and complementing these insights by building the capability to act on them via shorter decision loops and rapid experimentation.

Embrace a Broader Societal Role

With aging populations, climate stress, and increasing institutional fragility, companies will likely need to shoulder more responsibility for workers' well-being, local resilience, crisis management, and meeting community needs. Organizations that do this well will earn the trust of customers and secure a premium in talent markets.

APPENDIX 1

How to Use the Scenarios

Unlike traditional strategic planning that focuses on the probable, working with scenarios offers the opportunity to prepare for the possible. The goal isn't simply to shape a plan and a budget but to understand how competitive advantage would shift in an imagined world and which broad moves would be needed to succeed.

We suggest a three-step process to get the most value from the scenarios. However you approach it—whether in response to breaking news, as a one-day exercise, or longer term, when considering a significant strategic decision—the experience will strengthen your foresight muscles, lend focus to your organization's sensing capabilities, and give you an edge in recognizing emerging patterns amid uncertainty. Our scenarios, although representative of the range of likely futures, are not the only possibilities, and you may consider it helpful to use them as inspiration in developing your own scenarios that are tailored to the particular concerns of your organization.

1. Inventory Today's Strategic Assumptions and Advantages

Every organization has a set of assumptions, whether explicit or tacit, about the world—and its place in it—that shape its strategy. Often, these assumptions are broadly shared across the leadership team, but disagreements, or at least differences of perceived degree or priority, are not uncommon. So, it's important, before diving into the scenarios, to articulate and build consensus around these beliefs.

The process involves asking questions. Among them:

- What are our customers' most important priorities—and how are they changing?
- What are the key sources of our competitive advantage?
- What are the key value drivers of our business model?
- What assumptions drive our operating model?
- Which factors give us an edge in recruiting and retaining talent?

2. Explore How to Win in Each Scenario

Exploring each scenario in depth, and one at a time, will provide greater clarity of insights. We recommend taking a structured approach, asking, for each scenario, questions such as the following:

- Would any of our strategic assumptions need revisiting?
- How would our underlying economics shift?
- Which businesses or offerings would face tailwinds—and which headwinds?
- What new opportunities and risks would arise—and what would it take to address them?
- What geographies, industry sectors, customer segments, and offerings should be exited?

3. Categorize Moves and Identify Triggers Across Scenarios

Compile the answers generated into action agendas for the four scenarios. Then separate the recommended actions into categories.

Are there no-regret, or low-regret, moves that make sense across all four scenarios or that make sense across several but have minimal opportunity costs in the others? Do any have the potential for a material improvement in performance? Would they have a low impact on management time and capital? If the answer to any of these questions is yes, consider pursuing those now.

Next, consider the moves that are either specific to an individual scenario or relevant in a couple of scenarios. What are the best early-warning indicators to track? And for each, is there a particular level at which specific actions would be triggered? Are there things we should explore further? Are there big bets we might want to make?

APPENDIX 2

Methodology and Sources

Methodology for Scenarios

Our scenario-building process began with an extensive analysis of more than a hundred megatrends, of which we prioritized a list of 20—across dimensions of macroeconomics, technology, geopolitics, society, work, and the environment—that we believe will have the greatest potential to shape the world of 2050.

Certain trends, like demographics, are fairly inevitable for 2050. Others—such as the development of technology, geopolitical shifts, actions to address climate change impacts, and social inequality—are less straightforward. In those cases, we developed, in collaboration with BCG experts, a variety of possible endpoints and assessed the factors that would influence the most likely outcomes for 2050.

We then built our scenarios by clustering internally consistent combinations of these endpoints. The four scenarios are designed to push the envelope yet to remain plausible and to represent a variety of possible futures. Although they are reasonably representative of the range of futures we believe are likely, they are neither comprehensive nor exhaustive, and they were not individually selected on the basis of likelihood. However, they do exclude extreme, low-likelihood events that are incompatible with business planning.

The work was spearheaded by the BCG Henderson Institute's Strategy Lab and BCG's Corporate Finance and Strategy practice, in close collaboration with BHI's other research labs—the Climate & Energy Transition Lab, the Center for Macroeconomics, the Human Futures Lab, the Geopolitics & Society Lab, and the Technology & Business Lab—and enriched by inputs from practice areas and experts across BCG and beyond.

Methodology for Scenario Indicators

We have selected 20 indicators spanning four domains—macroeconomics and technology, geopolitics and society, people and work, and planet and resources—to quantify the ways that futures may diverge.

These indicators are not precise projections for 2050. Rather, they are meant to be plausible and to facilitate comparisons across scenarios.

Our selection process followed four design principles:

- The indicators are scenario-divergent.
- They are useful for business, favoring intuitive and transparent metrics over complex composite indices.
- They are distinct.
- They are updatable given that each is anchored in credible data sources.

We set future ranges for each indicator using one of three approaches:

- Where multiple reliable external pathways exist, we adopted them directly and cite sources, shown in the following material.
- Where multiple pathways are not available or comparable, we used a mainstream forecast as the baseline and adjusted it for drivers and assumptions to construct upper- and lower-range bounds.
- In data-sparse areas, we triangulated historical extrapolation, stated commitments, and expert judgment to bound a plausible range.

The following tables describe the rationales, definitions, and data sources for the 20 indicators we highlight.

Indicator Definitions and Rationale for Selection

Macroeconomics and Technology

METRIC	RATIONALE AND DEFINITION	
1.	**World GDP growth—25-year backward rolling CAGR, real** (size of global economy vs. 2025)	Indicates whether a scenario has led to sustained global growth and prosperity. Definition: 25-year compound annual growth of global GDP in 2050, measured as purchasing power parity (PPP) and expressed in constant 2021 international dollars.
2.	**Labor productivity growth—high-income countries** (absolute productivity vs. 2025)	Reflects productivity increases driven by technological and AI progress in each scenario. Definition: 25-year compound annual growth in 2050 of output produced per hour worked in high-income economic areas, based on historical trends for 22 markets: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, South Korea, Spain, Sweden, Switzerland, Taiwan, UK, and US.
3.	**Global ICT spending** (% of GDP)	Indicates the scale of investment in information and communications technology in the scenario. Definition: Information and Communications Technology (ICT) spending as a percentage of GDP, as defined by IDC Worldwide Black Book; includes hardware, software, and IT services.
4.	**Digital services trade restrictiveness** (index range 0–1)	Indicates how open and cooperative regulatory environments are for digital trade in each scenario. Definition: OECD Digital Services Trade Restrictiveness Index, which measures how restrictive a country's regulations are for digitally delivered services. Ranges from 0 (least restrictive) to 1 (most restrictive).

Data sources for macroeconomics and technology indicators

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Geopolitics and Society

METRIC	RATIONALE AND DEFINITION	
5.	**Global trade-to-GDP ratio**	Indicates degree of economic openness and global integration for each scenario. Definition: Total of exports and imports of goods and services as a percentage of GDP.
6.	**Regional share of world GDP**	Reflects how economic power shifts across regions in each scenario. Definition: Total GDP (PPP-adjusted, constant 2021 international dollars) of countries in each region as a percentage of global GDP. Regions are North America, Europe, India, China, and rest of world.
7.	**Global defense spending** (% of GDP)	Indicates militarization level and global conflict risk in each scenario. Definition: Military expenditure as a percentage of GDP.
8.	**Democracies** (% of countries)	Indicates democratic stability around the globe. Definition: Share of countries by regime type, based on V-Dem Institute's classification and expressed as a percentage of all countries. Democratic regimes include liberal democracies and electoral democracies, while autocratic regimes include electoral autocracies and closed autocracies.
9.	**Share of wealth held by richest 1% of population**	Indicates degree of economic inequality—and power of economic elites—by region in each scenario. Definition: Personal wealth owned by the top 1% of adults ranked by net personal wealth as a percentage of total personal wealth. Personal wealth defined as market value of financial plus nonfinancial assets minus liabilities (pre-tax). Regions are Western Europe (comprising Germany, France, and UK), India, China, and US.
10.	**Share of global population living in extreme poverty**	Reflects inclusiveness of growth and impact of redistribution in each scenario. Definition: Population living in extreme poverty as a percentage of total population. Extreme poverty defined using the UN Sustainable Development Goal (SDG-1) definition of $2.15/day (2017 PPP).

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People and Work

METRIC	RATIONALE AND DEFINITION	
11.	**Labor force participation rate**	Indicates workforce engagement and impact of aging, automation, and reskilling in each scenario. Definition: People aged 25 to 54 in the labor force as a percentage of the total population aged 25 to 54. The labor force includes both those employed (including members of the armed forces) and unemployed but available to start within a short time and actively seeking work.
12.	**Annual hours worked per worker**	Indicates work intensity, capturing part-time work and labor regulation. Definition: Average number of hours worked in a year by a person engaged in full- or part-time economic activity.
13.	**Fertility rate**	Indicates demographic renewal and long-run population stability. Definition: Total fertility rate as average births per woman globally.
14.	**Global health spending** (% of GDP)	Indicates health system burden and efficiency in each scenario. Definition: Total health spending (government, prepaid private, out-of-pocket, and international development assistance for health) on health consumption and capital investments, as a percentage of GDP.
15.	**Healthy life expectancy** (years)	Indicates the health of the population in each scenario, reflecting factors such as health care quality, access, and progress on therapies and medtech. Definition: Number of years a newborn is expected to live in full health, combining current age-specific mortality with morbidity.
16.	**Human happiness** (index range 1–10)	Reflects overall well-being and social cohesion in each scenario. Definition: Life Evaluation Score from the World Happiness Report (2011–2024), where adults rate current life from 0 (worst possible) to 10 (best possible). Global average constructed using population-weighted average of country indices.

Data sources for people and work indicators

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Planet and Resources

METRIC	RATIONALE AND DEFINITION	
17.	**Share of unabated fossil fuels in primary energy supply**	Indicates dependence on fossil fuel energy and extent of decarbonization in each scenario. Definition: The proportion of total primary energy supply derived from fossil fuels (coal, oil, and natural gas) for which emissions are not reduced through carbon capture and storage (CCS). Primary energy defined by the IPCC's Direct Equivalent Method for primary energy accounting.
18.	**Low-carbon share of electricity generation**	Reflects decarbonization of power generation in each scenario. Definition: Electricity generated from renewables, biomass, and nuclear sources as a percentage of total electricity generated.
19.	**Global temperature increase vs. pre-industrial levels**	Indicates trajectory of climate change and proximity to tipping points in each scenario. Definition: Change in global surface temperature relative to the 1850–1900 average (IPCC's pre-industrial baseline).
20.	**Biodiversity health** (index range 0–1)	Indicates degradation of ecosystems and natural capital that could affect resilience, food security, and climate stability in each scenario. Definition: "Red List Index," International Union for Conservation of Nature—an indicator tracking change in the aggregate extinction risk of species over time based on movements among International Union for Conservation of Nature categories with a range from 1 (least concern for all species) to 0 (all species extinct).

Data sources for planet and resources indicators

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