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Quarterly highlight: Navigating mega-forces


Michael Lewis
Head of Research
ESG


Steffen Kutscher
Head of
Stewardship
Standards &
Processes

IN A NUTSHELL

- Three structural mega-forces - geopolitical fragmentation, the energy transition and rapid technological disruption - are increasingly interconnected and now shaping long-term investment outcomes.
- Their convergence is creating structural bottlenecks in critical minerals, grid capacity and supply chains, widening the gap between climate ambition and implementation, elevating nature-related risks, and accelerating physical climate hazards.
- European policymakers are reinforcing these dynamics through a growing regulatory framework designed to strengthen supply-chain accountability, accelerate decarbonization and ensure responsible technology deployment.
- Against this backdrop, we identify **four structural investment themes** that offer long-term opportunities while requiring careful management of emerging risks:
  - the energy transition value chain,
  - corporate transition readiness,
  - nature-related risks and impacts, and
  - climate adaptation and resilience.

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Introduction

In this issue of the Energy and Nature Investor Quarterly we analyse how three structural mega-forces - geopolitical fragmentation, the energy transition and accelerating technological disruption - are reshaping the economic and investment landscape. These forces are increasingly interdependent, influencing supply-chain strategies, resource availability, regulatory expectations and operating conditions across sectors. These mega-forces are also embedded in DWS's Top 10 themes for 2026.[1]

Recent discussions at the World Economic Forum reinforced this shift. The energy transition is now being shaped as much by statecraft as by carbon pricing, with industrial policy, critical-mineral security and infrastructure protection increasingly influencing investment performance.

At the same time, nature and climate risks are being reframed as national security and financial stability issues,[2] while rapid advances in artificial intelligence are altering competitive dynamics, governance expectations and electricity-demand trajectories around the world. This convergence requires investors to move beyond siloed assessments of sustainability, technology and geopolitics. Instead, these forces should be understood as interconnected drivers of long-term value, influencing corporate transition pathways, operational resilience and the durability of business models.

[1] DWS CIO View Special (September 22, 2025). 10 themes for the year ahead
[2] UK Department for Environment, Food & Rural Affairs (January 2026). Nature security assessment on global biodiversity loss, ecosystem collapse and national security

1 / The big picture

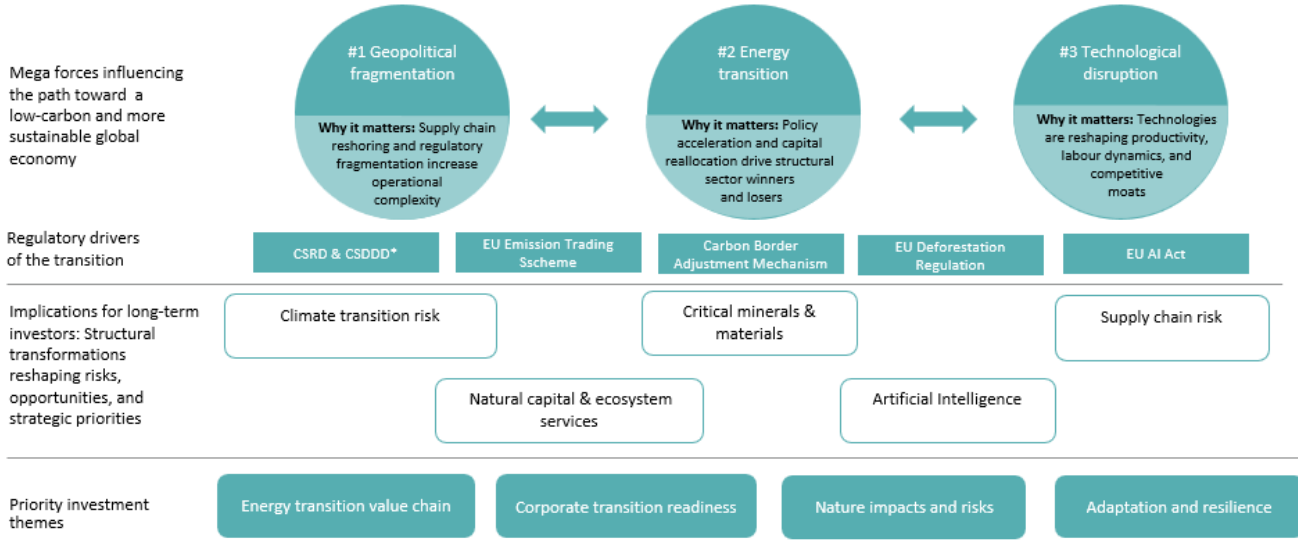
1.1 Navigating mega-forces

Financial markets and investment returns are increasingly being shaped by three mega-forces: geopolitical fragmentation, energy transition and technological disruption, Figure 1. When it comes to geopolitical fragmentation, governments and corporations are increasingly prioritizing national security, reassessing cross-border dependencies, supply chain resilience and strategic autonomy over cost-minimization and global integration. This more security conscious industrial policy has naturally led to a more interventionist policy environment whether its trade-policy action in the U.S. or European policymakers loosening state-aid rules partly to prevent capital and industrial flight.

Geopolitical fragmentation is happening at a time when global greenhouse gas emissions are remaining at record highs,[3] and the energy transition is progressing unevenly and at different speeds between regions and across sectors. Part of the problem is the incessant rise in energy demand over the past decade with only half of this increase being met by renewables.[4] Another challenge is the increasing electricity needs for our digital world. According to the IEA, power demand from data centres as well as electric vehicles and heat pumps will be important drivers of power demand. For example, data centres are projected to account for half of the projected increase in U.S. power demand by the end of the decade.[5]

AI also introduces the potential to lift productivity across sectors ranging from manufacturing and healthcare to finance and logistics. AI is therefore likely to reshape earnings power for companies and consequently alter the dynamics of competition within industries. In addition, the rapid adoption of AI and greater reliance on data heightens concerns around privacy while more connected and automated systems expand the risk of cyber threats. Governments therefore need to balance the desire to foster innovation and national competitiveness against the need to protect critical infrastructure.

Figure 1: Mega-forces, implications and investment themes



* CSRD: Corporate Sustainability Reporting Directive (CSRD); Corporate Sustainability Due Diligence Directive (CSDDD),
Source: DWS Research Institute (February 2026); DWS CIO View Special (22 September 2025). 10 themes for the year ahead

1.2 Convergence and macro-level implications

The three mega-forces outlined in Figure 1 do not operate in isolation. Instead, they are reinforcing one another and creating a set of interconnected risks and opportunities that are increasingly shaping long-term investment outcomes. Geopolitical fragmentation is reconfiguring trade, industrial policy and access to strategic resources. This is leading to a rewiring of supply

[3] Copernicus (January 2026). Copernicus: 2025 was the third hottest year on record
[4] For more details refer to the DWS report "The great energy race: challenge and transformation" DWS Investment GmbH (September 2025)
[5] IEA (November 2025). World energy outlook 2025

chains to improve resilience and secure access to critical minerals which are essential for the energy transition. At the same time the energy transition is driving an unprecedented reallocation of capital toward low-carbon power, electrification and efficiency. This transition is both commodity and technology intensive. As a result, the energy transition relies not only on the ability of companies to execute, finance and govern a credible decarbonization pathway but is also highly dependent on natural resources that are themselves under pressure from climate impacts. AI and related technologies play a significant role in the energy transition by increasing electricity demand, optimizing energy systems and transforming industrial production but are also creating dependencies such as on semiconductors and data infrastructure. In addition, the inability of renewables to meet the rise in global energy demand is being aggravated by the increasing power requirements of data centres.[6] All of which imply global greenhouse gas emissions remaining close to record high levels until the end of this decade.

European policymakers are responding through a growing regulatory framework designed to strengthen supply-chain accountability, accelerate decarbonization and ensure responsible technology deployment. This includes reforms to the Corporate Sustainability Reporting Directive (CSRD) and Corporate Sustainability Due Diligence Directive (CSDDD), widening the scope of the European Emission Trading Scheme, and regulations to ensure the safe and ethical use of AI systems. Against this backdrop, we identify four structural investment themes that sit at the centre of this convergence.

1.3 From mega-forces to investment themes

- **The energy transition value chain**
  The shift to a low carbon economy is increasingly shaped by structural bottlenecks. Securing critical minerals, reducing exposure to geopolitical shocks and accelerating clean energy deployment have become essential for global competitiveness. In addition, investment opportunities are appearing in the areas of extraction, processing and refining, manufacturing, grid expansion and digital infrastructure.

- **Corporate transition readiness**
  A widening gap between climate ambition and real-world implementation is making portfolio decarbonization more challenging. Investors should encourage and/or select companies that have capital-allocation discipline, governance strength and financial resilience needed to execute credible transition pathways. Forward-looking indicators now matter more than backward-looking emission profiles.

- **Nature-related risks and impacts**
  Nature-related dependencies and impacts are becoming binding constraints on economic activity and on the energy transition itself. Rising water stress, land-use pressures and resource exploitation are creating material financial risks, while regulations such as the CSDDD and EU Deforestation Regulation (EUDR) are making supply-chain transparency mandatory. Investors should integrate nature considerations more directly into analysis and stewardship to understand related risks and identify resilient business models.

- **Climate adaptation and resilience**
  Physical climate risks are no longer distant concerns. Extreme weather events are already affecting asset valuations, operations and financing costs. Companies' ability to withstand acute hazards and adapt to chronic ones is becoming a determinant of long-term value. This is increasing the focus of companies and policymakers on adaptation and resilience, opening opportunities across resilient infrastructure, water systems, agriculture, and climate-risk analytics.

Together, these four investment themes illustrate how the convergence of geopolitical, environmental and technological forces are reshaping the foundations of long-term value creation. Each theme highlights a different pressure point within the global economy, but all are linked by structural constraints in resources, infrastructure, corporate transition capability and public policies. The logical starting point is the energy transition value chain, where bottlenecks in critical inputs and enabling infrastructure are already defining the pace and trajectory of the transition itself. The next section explores this energy transition value chain end-to-end and examines where the most persistent constraints and the most durable investment opportunities are emerging.

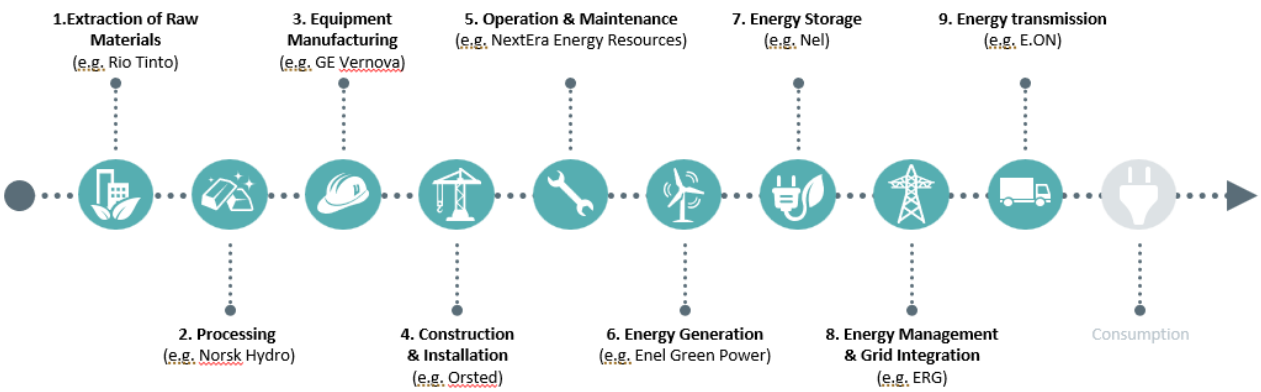
[6] DWS Research Institute

2 / Energy transition value chain

2.1 From minerals to megawatts

The transition to a low carbon economy begins long before clean technologies reach consumers. It depends on a value chain that extends from the extraction of critical minerals to processing, manufacturing and ultimately the deployment of energy and digital infrastructure, Figure 2. As the three megatrends converge, this value chain has become a focal point of both geopolitical competition and structural investment demand. Access to minerals, refining capacity and grid infrastructure now influence not only the pace of decarbonization but also the competitiveness of entire industries.

Figure 2: The energy transition value chain



Source: DWS International GmbH (February 2026)
This information is intended for informational purposes only and does not constitute investment advice, a recommendation, an offer or solicitation

Critical minerals such as lithium, cobalt, nickel, copper and rare earth elements form the starting point of this chain. Their production is concentrated in a small number of countries, underscoring the strategic nature of supply security. Once extracted, these materials flow into a refining system dominated by China, which controls more than 70% of global processing capacity for key minerals. The processed outputs then feed into the manufacturing of batteries, turbines, solar technologies and other components essential to electrification and digitalization. The value chain ultimately culminates in the buildout of renewable energy systems and electrified infrastructure.

Understanding how these stages connect - extraction, refining, manufacturing, and deployment - helps clarify both the opportunities and the bottlenecks shaping the pace and trajectory of the global energy transition. In this section, we examine the energy transition value chain end-to-end, highlighting where constraints are emerging, where new investment opportunities are forming, and how long-term policy frameworks are reshaping incentives for companies and investors.

2.2 The role of critical minerals

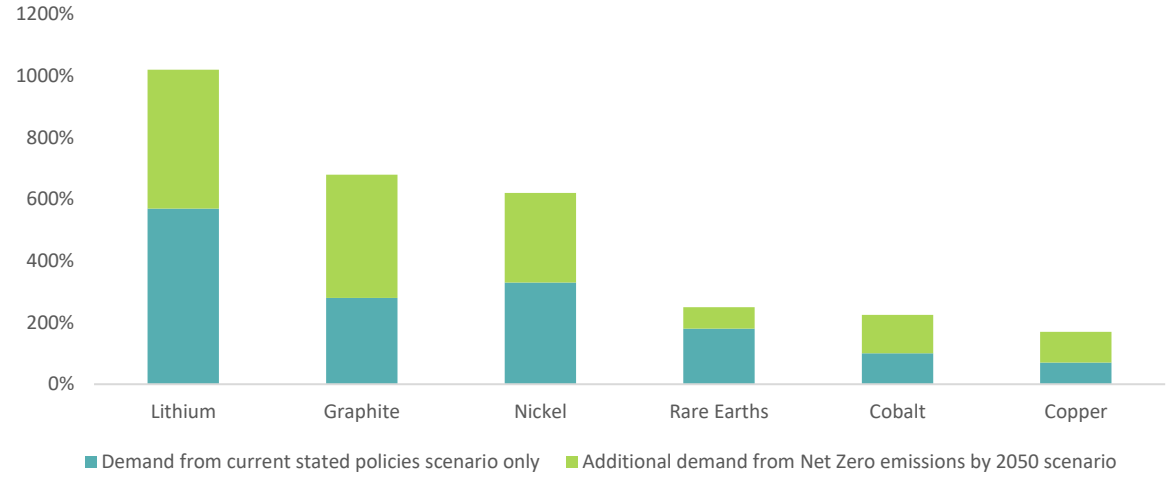
For more than a century, oil has been the bedrock of the global economy, fueling industries, shaping geopolitics, and defining entire eras of growth. Today, however, the foundation is shifting. As the world accelerates toward a low carbon and digitalized future, “shovels and picks” are replacing oil rigs as the essential tools of economic power.

Both the energy transition and the ongoing digital transformation draw heavily on many of the same suite of critical minerals. Lithium, cobalt, nickel, copper, and rare earth elements, have become indispensable for manufacturing electric vehicles, solar panels, wind turbines, battery storage systems and the rapid expansion of data centre infrastructure.

Demand for these minerals is projected to grow significantly over the coming decade, Figure 3. The IEA[7] projects that across a range of commodities, such as cobalt and rare earths, expected supplies can meet projected demand through the 2030s, if all announced projects are delivered on time. However, there are two major exceptions. First copper, where the IEA is estimating that the existing development pipeline, combined with declining ore grades, could lead to as much as a 30% shortfall by 2035, unless new extraction projects are announced. The second is lithium, where ample near-term supplies may begin to tighten rapidly during the 2030s as EVs and storage demand increases. This would suggest likely pressure points may relate to copper for grids and electrification, and lithium for batteries and machinery.

As a result, critical minerals have been propelled from niche industrial inputs to the center of global energy security and economic competitiveness.

Figure 3: Expected increase in critical materials demand between 2024 and 2040 under curent policies and net zero scenario



Source: "Global Critical Minerals Outlook 2025", International Energy Agency (IEA), May 2025. Rare earth elements refer only to four magnet rare earths, neodymium, praseodymium, dysprosium and terbium. The Stated Policies Scenario indicates where the energy system is heading based on a sector-by-sector analysis of today's government policies and policy announcements; the Net Zero Emissions by 2050 Scenario indicates what would be required in a trajectory consistent with meeting the Paris Agreement goals.

In addition to mining, which represents one important opportunity along the value chain, another emerges in the processing and refining segment of the value chain. China currently controls over 70% of global refining capacity for many of these critical minerals, creating a strategic bottleneck. This dominance helps explain why recent industrial-policy efforts – most notably the U.S. Inflation Reduction Act and the EU Critical Raw Materials Act - are creating strong incentives for companies to develop local processing capabilities. These policies are therefore reshaping supply chains and creating multi-decade investment themes supported by strong market fundamentals.

2.2 The energy and digital infrastructure build out

Further along the value chain, as the focus shifts from materials to infrastructure, the build-out of grid capacity is emerging as one of the most critical bottlenecks. E-mobility and electrification in the industrial sector both depend on a resilient grid, making grid infrastructure investments the central enabler of the transition. The scale of required investment is substantial, with global grid spending projected to reach nearly USD 600 billion per year through 2030. In the United States, the interconnection queue has surpassed 2,600 GW, over twice the nation's installed generation capacity, with wait times extending to between four and five years in many regions.

[7] IEA (May 2025). Global critical minerals outlook 2025

This backlog underscores the urgency of accelerating grid expansion and in generating opportunities beyond traditional transmission and distribution companies. Grid-enhancing technologies capable of unlocking 40-100% more capacity from existing infrastructure are particularly compelling since they avoid the decade-long wait times often associated with new build-outs. Meanwhile, utilities in regions experiencing data-center growth face substantial capital-deployment needs. These facilities are already accounting for 10% or more of power demand growth in some areas, and that percentage is only going up.

The infrastructure build out also includes renewable energy opportunities such as solar and wind developers as well as energy storage and electric vehicle charging infrastructure. For digital infrastructure, this also includes submarine cable developers and fiber optic network operators which form the literal backbone of the AI revolution.

This brings us to the second investment theme: **corporate transition readiness.** Just as the energy transition value chain shows how the low-carbon economy is being constructed, the next question is how and how quickly the companies operating within this system can transform. Understanding the credibility of corporate decarbonization pathways, and differentiating transition leaders from laggards, is therefore central to translating value-chain opportunity into portfolio outcomes, which we explore in the next section.

3 / Corporate transition readiness

3.1 Why identifying transition-capable companies matters

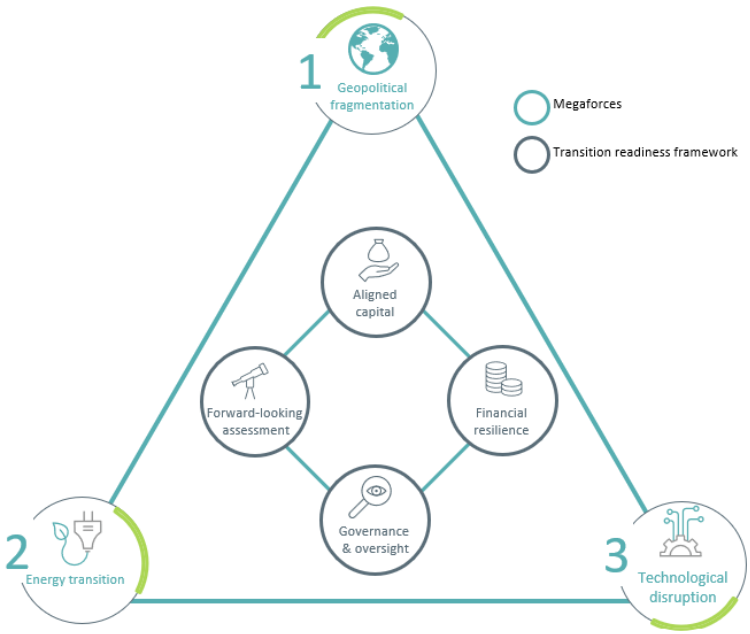
The global transition is unfolding unevenly. Energy demand continues to rise faster than clean-energy deployment, climate policies are diverging across regions, and companies face growing constraints related to grid capacity, water availability, and critical minerals. These structural pressures, combined with diverging regulatory pathways, variable technology readiness, and economic headwinds, are contributing to inconsistent progress across markets. Recent studies show that many listed companies remain misaligned with global climate goals, underscoring the widening gap between ambition and real-world decarbonization outcomes.

While corporate target-setting has accelerated, with 10,000 companies now holding SBTi-validated targets, representing over 40% of global market capitalization, alignment with a 1.5°C pathway remains limited. Only around 12% of MSCI ACWI IMI companies are aligned with this trajectory,[8] while the majority are on pathways implying warming above 2°C, including 26% whose strategies correspond to temperature increases above 3.2°C. In this context, it has become essential to distinguish companies that can realistically transition from those that merely signal intent.

The real differentiator today is a company's ability to execute, finance, and govern a credible decarbonization pathway despite mounting systemic friction. Rising policy uncertainty, intensifying competition for resources, and growing infrastructure bottlenecks are exposing the limits of backward-looking metrics. These pressures highlight the need for a more rigorous, forward-looking assessment of which firms can deliver real-world decarbonization progress. While historical footprint metrics remain useful, they are no longer sufficient to evaluate transition readiness.

A deeper understanding of companies' operational, strategic, and financial capacity is therefore essential. Approaches that rely heavily on past emissions trends risk overlooking whether businesses are meaningfully reshaping their operations, supply chains, and long-term business models in response to a rapidly evolving climate, technological, and policy landscape.

Figure 4: Corporate transition readiness framework



Source: DWS Research Institute (February 2026)

[8] MSCI Institute (January 2026) Transition Finance Tracker

3.2 Corporate transition readiness

Navigating an uneven and increasingly complex transition landscape requires a structured way to assess which companies are genuinely positioned to transition and decarbonize. A thorough assessment of the transition readiness of companies provides this foundation by evaluating companies' strategic, operational, financial, and governance capacity to transition in a world shaped by geopolitical fragmentation, resource constraints, and technological disruption. Building on this assessment, an integrated investment and stewardship approach enables investors to remain invested across all sectors, including high-emitting and hard-to-abate industries, while actively supporting credible, long-term transition pathways. Together, these two components offer a coherent framework for identifying transition-capable companies and reinforcing their progress over time.
Companies that are well positioned for the transition typically exhibit a combination of reinforcing capabilities. Together, these form the essential building blocks of credible, durable transition pathways which are illustrated in Figure 4 and outlined below:

- **Credible transition plans backed by aligned capital allocation**
  Companies that are well positioned for the transition typically exhibit credible, science-based plans backed by tangible and aligned capital expenditure rather than distant pledges. Firms that systematically invest in efficiency gains, electrification, renewable power procurement, storage solutions or, where feasible, carbon capture, usage, and storage (CCUS) demonstrate that decarbonization is embedded in operational and strategic decision-making. This capex alignment is one of the strongest indicators of a credible transition.

- **Financial strength as a foundation for execution**
  Well-prepared companies also demonstrate financial resilience, supported by solid balance sheets, healthy liquidity and robust cash flows. These financial foundations are critical because transition investments are typically frontloaded and vulnerable to delays in permitting, technology deployment or grid connection. Firms with strong financial profiles are more likely to sustain momentum even when confronted with volatility, supply chain constraints or shifting regulatory incentives. This capacity to maintain progress under pressure is increasingly a differentiating factor.

- **Governance structures that enable real transition**
  Leading companies complement transition plans and capital allocation with strong governance frameworks that ensure transition execution rather than simply outlining intentions. Boards with relevant technical literacy, oversight processes that fully integrate transition risks, and remuneration structures linked to measurable milestones help ensure the transition remains a strategic priority, even when short-term pressures arise. Such governance often separates firms that convert plans into action from those that continue to rely on aspirational or symbolic commitments.

- **Forward-looking assessment to gauge decarbonization potential**
  Historical emissions reductions can signal early progress, but they are not a strong indicator of how much further a company can transition and decarbonize. In many sectors, the most straightforward decarbonization opportunities, such as energy-efficiency gains, process optimization, or partial electrification have often already been captured. Additional emission reductions increasingly depend on emerging technologies, supply-chain redesign, additional grid capacity, and significant capital commitments. As a result, past achievements may obscure structural constraints that will intensify as the transition evolves.

This makes a forward-looking, scenario-based assessment essential. Such an approach evaluates how business models respond to rising carbon prices, region-specific policy shifts, changing technology economics, and physical climate risks. It offers a clearer view of how companies may perform under different transition pathways.

Importantly, forward-looking analysis also reveals strategic flexibility, a critical differentiator in an environment defined by uncertainty and regional divergence. Companies capable of adjusting investment plans, shifting technology strategies, or reconfiguring supply chains are better positioned to sustain progress. Those relying on optimistic assumptions, supportive policies, or perfect technology timing may find their transition pathways constrained.

Ultimately, this perspective highlights which companies are equipped to advance in a more competitive, resource-constrained world and which are likely to struggle. A context-aware, forward-looking approach is essential for identifying businesses with durable transition potential and long-term resilience.

3.3 Integrated investment and stewardship approach

A comprehensive transition-readiness analysis provides a structured way to identify companies across all sectors, including today's high-emitting industries, that demonstrate the capability to transition in a world shaped by mega-forces. Rather than excluding high-emitting sectors, which would overlook areas where the most meaningful decarbonization progress and value creation can occur, this approach focuses on understanding which companies are capable of transitioning and why.

Stewardship can then serve as a complementary lever to encourage and monitor that transition-capable companies remain on a credible path. The emphasis is on maintaining an ongoing dialogue, monitoring the alignment between stated plans and implementation, and encouraging transparency on climate- and nature-related risks. This includes clarity on capital allocation, operational resilience, and progress against transition priorities, particularly in high-impact and hard-to-abate sectors where change is complex and long-dated.

Through this integrated investment and stewardship approach, investors can reinforce accountability, improve information quality, and reduce uncertainty. In doing so, the approach enables investors to participate in the full breadth of the economy, including those sectors most central to achieving a successful transition.

This brings us to the third investment theme: **nature-related risks and impacts**. Having assessed how companies are positioning themselves for the low-carbon transition, it becomes clear that corporate readiness alone is not a sufficient indicator of long-term resilience. The next area of exploration for investors lies in understanding how business models depend on and impact natural capital, from water and soil systems to biodiversity and ecosystem services. We explore this in the next section.

4 / Nature-related risks and impacts

4.1 How mega-forces are reshaping nature-related risks and impacts

The combined effects of geopolitical fragmentation, the energy transition, and technological disruption are increasingly shaping nature-related risks and impacts. As governments and companies prioritise energy security, supply-chain resilience, and strategic autonomy, environmental pressures embedded in global value chains are becoming more material. These dynamics are reinforced by the resource intensity of the energy transition, which is driving heightened demand for land, water, and critical minerals, thereby increasing pressures on ecosystems and exposing new dependencies across sectors. AI and the rapid expansion of digital infrastructure add further strain, as rising electricity and water needs accelerate local environmental impacts and amplify competition for limited resources.

Together, these forces are transforming nature loss, water stress, and ecosystem degradation into core strategic issues for investors. Understanding how these pressures interact with regulatory developments and corporate practices is essential for assessing financial risks, supply-chain vulnerabilities, and the long-term resilience of business models.

4.2 Assessing supply chain risks

One of the challenges for investors is that often many nature-related impacts lie upstream in complex supply chains yet the reporting requirements on supply chain related indicators remain optional for companies to disclose. CDP reports that about 8,500 companies disclosed water-related data in 2024, and while 70% are mapping water use across their value chains, only 25% extend this beyond direct suppliers, and just 20% directly engage suppliers on water issues.[9] Notably, 27% of disclosing companies have already withdrawn from water-stressed regions, showing how scarcity is reshaping corporate strategy. Companies also report USD 339 billion in potential financial impacts from water-related risks, underscoring the need for stronger preparedness and long-term water security.

However, things are changing. One of the most significant policy developments affecting supply chain risk and impact management is the introduction of regulations such as the CSDDD and the EUDR. The CSDDD requires companies to identify and address human rights and environmental risks within their operations and supply chain. Sectors such as textiles, agriculture, mineral extraction, and construction are likely to be affected the most by these requirements.[10] The EUDR mandates companies to demonstrate that key commodities and derived products, including cattle, wood, cocoa, coffee, palm oil, soy and rubber placed on or exported to the EU market are free from deforestation,[11] legally produced, and fully traceable. Non-compliance with the EUDR could lead to fines, product seizure and reputational damage.

4.3 Tools for screening nature risks and impacts at a portfolio level

Despite the poor level of nature-related disclosures, including at a supply chain level, tools are still available to investors and corporates to help perform nature-related materiality assessments. One of the most popular screening approaches has been developed by Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE). This adopts a top-down approach focusing on sectors and industry types to create a materiality matrix. The aim is to identify priority sectors in terms of their dependency and impact on nature. In terms of impact, it examines the main threats to biodiversity loss such as land use change and resource exploitation and links these threats to economic activities by scoring production processes on a scale from Very Low to Very High.

From a top-down materiality perspective, the heatmap in Figure 5 highlights sector-level exposure to nature-related dependencies and impacts. Utilities & Electricity Generators have high dependencies and high impact drivers as it relates to water/soil dependence, land & water use and pollutants. For Agricultural Products & Tobacco, it reveals high dependency on soil, water and land alongside agro-chemical run-off. In Extractives & Minerals Processing nature impacts are ranked high particularly when it comes to land & water use and tailings & effluents. Meanwhile other sectors exhibit targeted hotspots—Health Care (high water use/effluents), Food & Beverage (processing water use/solid waste), and digital infrastructure within

[9] CDP (September 2025). Internal water pricing unlocks resilience and long-term growth, reveals new CDP insights
[10] European Commission (February 2022). Directive of the European Parliament and of the Council on CSDDD (EU) 2019/1937
[11] European Commission (June 2023). Regulation on Deforestation-free Products

Technology & Communications, where data centre siting in water-stressed basins elevates location-specific risk despite lower generic scores.

Complementing this top-down view, a bottom-up analysis[12] of MSCI ACWI constituents shows that biodiversity impact is heavily concentrated in a small subset of companies. Two-thirds (67%) of total estimated biodiversity impact sits within the top 250 companies, with nearly half in the top 100, 38% in the top 50, and over 15% driven by the top 10. Almost 50% of total impact originates in Scope 3 value chains, reflecting pressures from climate change, pollution, land use, and water use as key drivers of nature loss.

Figure 5: An illustrative heatmap of nature-related dependencies and impacts by driver and sector

	Dependencies		Impacts					
			Land use	Water use	Pollution			
SASB Sectors	Soil Quality	Water	Land use	Water use	Air pollution	Solid waste pollution	Soil pollution	Water pollution
1 Agricultural Products & Tobacco	High	High	High	High	Low	Low	High	High
2 Consumer Goods	Low	Low	Low	High	Moderate	Low	Moderate	Moderate
3 Extractives & Minerals Processing	Low	Moderate	High	High	High	High	Moderate	High
4 Financials	Low	Low	Low	Low	Low	Low	Low	Low
5 Food & Beverage (ex. Agriculture & Tobacco)	Low	Moderate	Low	High	Low	Moderate	Low	Low
6 Health Care	Low	High	Low	High	Low	Moderate	High	High
7 Infrastructure (ex. Utilities & Generators)	Low	High	High	Low	Low	High	Low	Low
8 Renewable Resources & Alternative Energy	Low	High	Low	High	Low	Low	High	High
9 Resource Transformation	Low	Low	Low	High	Moderate	High	High	High
10 Services	Low	Low	Low	Moderate	Low	Low	Moderate	High
11 Technology & Communications	Low	Low	Low	Low	Low	Low	High	High
12 Transportation	Low	Low	Moderate	High	Moderate	Moderate	High	High
13 Utilities & Electricity Generators	High	High	High	High	High	High	High	High

Source: TNFD (March 2023). Recommendations of the Task Force on Nature-related Financial Disclosures

4.4 Assessing nature-related dependencies and impacts of companies

While there has been a significant increase in corporate climate disclosures, there remains a notable disparity when it comes to company reporting in the broader realm of nature. CDP company filings reveal how far behind the reporting of broader nature-related metrics, such as the water recycling rate, hazardous waste generated or operations near areas of endangered species, are compared to climate and specifically carbon emissions. For example, nearly 100% of the MSCI ACWI report on carbon emissions but less than 30% report on their water recycling rate and operations near areas of endangered species.

Although data coverage on nature is still incomplete, the information that *is* available, covering key business activities, targets, and risk management practices, can be actively used by investors to evaluate companies' current nature-related dependencies and impacts, as well as their forward-looking performance. Current best practices are moving away from one-size-fits-all approaches such as the early biodiversity foot-printing methods[13] mainly pushed forward by French legislation[14] as they fail to provide actionable insights by convoluting information across topics and locations.

[12] Finance for Biodiversity Foundation (October 2024). Assessment of the biodiversity impacts and dependents of globally listed companies
[13] For an overview, see for example the Finance for Biodiversity's 4th edition of Biodiversity Measurement Approaches – A Practitioner's Guide for Financial Institutions
[14] LOI n° 2019-1147 du 8 novembre 2019 relative à l'énergie et au climat

One aspect of the new approach is narrowing down the scope to sectors where such topics are likely to be an issue using heatmaps. The other is breaking down complexity by focusing on what is likely to be relevant in the short-term through regulations such as on deforestation, litigation often fueled by human-rights related damages, or impacts as in the case of water scarcity, and on where actual company-reported data is already available (mainly controversial behavior, deforestation, and water-related topics). In combination with information from nature-related disclosures such as TNFD or CSRD on strategy, governance, metrics, and targets, investors can evaluate where investees currently stand with regards to topics material to their business model and location and estimate future developments to deduce actions.

4.4 Closing the nature-disclosure gap through active engagement

Effective engagement can serve as a valuable way to encourage companies to address nature-related concerns and enhance transparency in their reporting. This might involve requesting responses to CDP questionnaires on water and forests, as well as biodiversity disclosures in line with TNFD and CSRD standards. Engagement can also cover topics like board oversight, regulatory compliance, and human rights. Through such efforts, companies may strengthen both the transparency and effectiveness of their nature strategies and risk management, including setting Science Based Targets Network SBTN-validated nature-related targets for their operations and supply chains. This then gives investors a consistent framework for comparing issuers, setting engagement targets, and linking results to voting and capital allocation.

Nature-related pressures, rising regulatory expectations and the challenges of the transition all converge with another structural reality: the physical impacts of climate change which are becoming increasingly evident. Extreme weather events and gradual climate stressors are already influencing asset values, operational reliability, insurance availability and financing conditions across sectors. As these risks intensify, adaptation is shifting from a long-term consideration to an immediate business requirement and an emerging area of investment opportunity.

This brings us to the fourth investment theme: **climate adaptation and resilience**. Here, the ability of companies and systems to withstand and adjust to climate hazards is becoming a core driver of long-term value.

5 / Climate adaptation and resilience

5.1 Rising physical climate risk: Why adaptation must accompany mitigation

Just as the combined effects of geopolitical fragmentation, the energy transition, and technological disruption are shaping nature-related risks and impacts, they are also escalating physical climate risks. This reflects the still important role fossil fuels play in the energy mix given the slow and uneven pace of the energy transition. Along with the growing power needs of the digital revolution, these imply global greenhouse gas emissions, which are projected to hit a record high in 2025,[15] should remain at elevated levels for the remainder of this decade. This suggests the increasing frequency and intensity of extreme weather events will likely continue with the knock-on effects on companies through asset impairment, operational downtime, supply-chain disruption, workforce impacts, and rising insurance and financing costs.

Recent catastrophe data illustrates the scale and urgency of the challenge: global natural disasters caused an estimated USD 224 billion in economic losses in 2025, of which only USD 108 billion was insured.[16] This widening protection gap has direct implications for investors, including increased earnings volatility, potential asset impairments, rising operating costs, and the need for unplanned capital expenditures, particularly in regions where insurance availability is tightening, exclusions are expanding, or premiums are rising.

Mitigation remains essential, but it is not a substitute for adaptation. The challenge from an investment perspective is that adaptation typically creates value by avoiding losses rather than generating new cash flows. According to some estimates,[17] if urgent adaptation and resilience measures are not implemented, physical risks could result in an annual financial impact exceeding USD 1 trillion by 2050 or three to four times current levels. One example of adaptation investment includes early warning systems which can save lives and protect assets worth at least 10 times their cost.[18] Yet adaptation investment gap for developing countries is estimated to be as much as USD 365 billion annually.[19]

Not surprisingly, government action is gaining momentum. As of September 2025, 144 countries had formal adaptation plans,[20] up from 85 five years earlier.[21] However, only a minority identify clear priorities which included costed measures. Given rising risks and evolving policy expectations, investors should examine how to integrate physical climate risk and adaptation capability as core inputs to valuation and stewardship rather than simply optional sustainability disclosures. This would then facilitate the ability to identify companies that can withstand acute hazards and systematically adapt to chronic hazards.

5.2 Physical climate risk and sector exposure

Physical climate risks stem from both acute hazards, such as storms, floods, heatwaves, and wildfires, and chronic hazards including rising temperatures, water stress, and sea-level rise. Acute hazards create event-driven shocks, while chronic hazards steadily erode productivity and increase operating costs over time. The five sectors most exposed to physical climate risk in the 2°C REMIND scenario[22] are Energy, Utilities, Consumer Staples, Industrials, and Materials. Energy and utilities face the greatest risks due to their vulnerability to coastal hazards, heatwaves, water stress, and cyclones affecting large, fixed infrastructure.

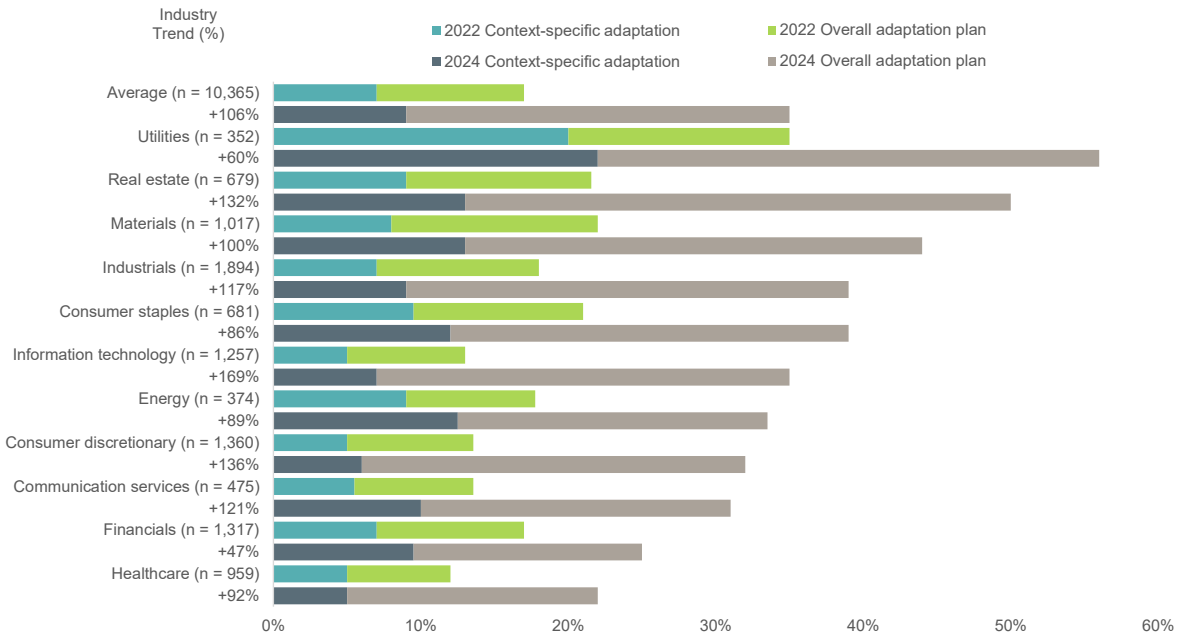
Consumer staples are also at high risk because heatwaves, rainfall variability, and water stress can directly impact agricultural inputs and production. Industrials and materials are next, with their main risks stemming from coastal hazards, flooding, heatwaves, and other hazards that can disrupt manufacturing and supply chains. These sectors are particularly exposed because their operations are capital-intensive, geographically concentrated, and sensitive to climate conditions.

[15] Nature (November 2025). Global greenhouse gas emissions are still rising: when will they peak?
[16] MunichRe (13 January 2026). Climate change presses on
[17] CDP (January 2026). Corporate health check 2026
[18] WRI (June 2025). WRI Study Finds Climate Adaptation Investments Yield Massive Returns — Over $10 for Every $1 Spent
[19] UNEP (October 2025). Adaptation gap report 2025. Running on empty
[20] UNFCC (October 2025), National Adaptation Plans 2025. Progress in the process to formulate and implement national adaptation plans.
[21] UNFCC (November 2020), Climate Dialogues 2020. Progress in the process to formulate and implement national adaptation plans.
[22] MSCI (May 2023). Which sectors are most affected by climate risks?

5.3 Limited corporate preparedness: Few companies have a credible adaptation plan

Despite its growing importance, climate adaptation remains significantly underreported by companies. Figure 6 highlights a persistent gap in corporate climate disclosures,[23] even as adaptation planning shows a clear upward trend between 2022 and 2024. Context-specific adaptation plans, those tailored to physical climate risks such as water stress or wildfires, rose only modestly, from 7% in 2022 to 9% in 2024 across all sectors. In contrast, overall adaptation plans increased more substantially, from 10% in 2022 to 26% in 2024. In addition, organizations reporting through CDP[24] have identified USD 1.47 trillion in environmental physical risks, with 26% of this risk expected in the short term.

Figure 6: Only one in four companies have an adaptation plan to address physical climate risks



Source: S&P Global. Data as of 2 July 2025

5.4 What robust physical climate risk disclosure should provide

Physical climate risks have become a structural feature of the operating environment for companies across sectors and geographies. Because these risks vary significantly by location and industry, a "one-size-fits-all" approach is inadequate. To evaluate resilience and future capital allocation needs, investors require context-specific, site-level data rather than broad, generic disclosures. As a result, investors increasingly expect disclosures that are comprehensive, clear, comparable, and actionable. Established frameworks such as the Taskforce on Climate-related Financial Disclosures (TCFD) and the International Sustainability Standards Board (ISSB) provide a strong foundation for such reporting. The challenge now lies in ensuring that companies apply these frameworks with discipline, transparency, and consistency. Against this backdrop, the following metrics outline the key elements that may encourage robust disclosure:

(i) Governance: Demonstrating clear oversight and accountability
Companies should explain how physical climate risks are governed, identifying the Board-level owner, frequency of review, and how insights influence strategy and capital allocation.

(ii) Materiality assessment: Providing a transparent, consistent view of exposure to hazards
Investors need clarity into the scope and quality of climate risk assessments such as what share of assets, and value chain is covered, and whether both short-term and long-term climate horizons are included.

(iii) Strategy and resilience: Showing how the company plans to adapt

[23] S&P Global (July 2025). Physical climate risk adaptation: Are businesses doing enough to adapt to physical hazards?
[24] CDP (January 2026). Corporate health check 2026

Companies should outline how physical risks assessment shape strategic decisions, supply chains, and long-term financial planning.

(iv) Financial implications: Clarifying effects on performance and capital structure
Investors need a balanced assessment of how physical climate risks translate into financial risk and opportunities. Companies should outline effects on revenue, operating costs, capital requirements, asset valuations, and financing conditions, including knock-on implications for insurance arrangements.

(v) **Metrics and targets: Focusing on indicators that matter**
Useful indicators include the proportion of critical assets assessed, the share located in high-risk zones, share of revenue at risk, measures of operational disruption or downtime, and capex spending on adaptation and resilience activities.

For asset managers and investors, adaptation measures open a growing pipeline of investable themes, ranging from resilient infrastructure and water-efficient technologies to climate-smart agriculture and advanced risk-analytics services. As physical risks intensify, capital is likely to reprice towards companies and projects that demonstrably enhance resilience, creating both risk-adjusted return opportunities and avenues for long-term value creation across sectors.

6 / Conclusion

Summary of key findings

- Geopolitical fragmentation, the energy transition and technological disruption are increasingly driving investment returns: European policymakers are reinforcing these dynamics with policy action and regulations that are focused on driving decarbonization, protecting the environment and ensuring AI is safe, trustworthy and respects human rights.
- The energy transition is increasingly being shaped by statecraft: Tariffs, industrial policy, critical mineral security and infrastructure protection sit alongside carbon pricing as drivers of economic performance and investment returns.
- Decarbonizing portfolios has become more challenging: This reflects a world where energy demand outpaces clean energy deployment, climate policies are diverging between regions, and critical inputs such as grid capacity, water and minerals face mounting constraints. Many listed companies remain misaligned with global climate goals, underscoring the widening gap between ambition and real-world decarbonization outcomes.
- Rising nature risks and tightening regulations require greater supply chain transparency: Nature-related risks are accelerating as megatrends such as the energy transition and AI increase pressures on ecosystems, water resources, and supply chain resilience. To address this, regulations such as CSDDD and EUDR are making nature disclosure and supply chain traceability mandatory.
- Physical climate risks are no longer a distant concern: Global natural disasters caused an estimated USD 224 billion in economic losses in 2025, of which only USD 108 billion was insured.[25] This protection gap has direct implications, including increased earnings volatility, potential asset impairments, increased operating costs, and the need for unplanned capital expenditures.

Investor implications

- Capturing the energy transition and digital transformation: Both depend heavily on the same raw materials, such as lithium, copper, nickel, and rare earth elements. Under various scenarios, demand for these minerals is expected to grow anywhere from two to ten times by 2040. This presents clear opportunities such as mining companies focused on battery metals and copper producers serving both electrification and data center buildouts.
- Focus on companies with credible transition capabilities: Investors should consider systematically identifying companies with credible, actionable transition plans, as assessing genuine transition capability has become a strategic necessity rather than a sustainability preference.
- Nature and climate risks are being reframed as national security and financial stability issues:[26] Effective engagement can serve as a valuable way to encourage companies to address nature-related concerns and enhance transparency in their reporting. This might involve requesting responses to CDP questionnaires on water and forests, as well as biodiversity disclosures in line with TNFD and CSRD standards.
- Deploy tools to assess nature-related risks at a portfolio level: With limited reporting, active engagement and tools such as ENCORE are useful to assess nature dependencies and impacts and steer capital toward credible nature positive companies.
- Investment in climate adaptation presents an opportunity: Investable themes range from water efficient technologies to climate-smart agriculture and advanced risk analytics services. As physical risks intensify, capital is likely to reprice companies and projects that demonstrably enhance resilience, creating both risk-adjusted return opportunities and avenues for long-term value creation across sectors.

[25] MunichRe (13 January 2026). Climate change presses on
[26] UK Department for Environment, Food & Rural Affairs (January 2026). Nature security assessment on global biodiversity loss, ecosystem collapse and national security

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