Purpose and context. The 2020s have shattered temperature records across land and sea, a signal of the accelerating consequences of anthropogenic climate change. Major policy reversals driven by politics and markets are also rapidly reshaping annual public budgets and priorities. This affects timing and rate at which countries and regions transition towards sustainable energy systems and resilience. The decisions made in the context of these trends in the next few years by governments, finance institutions, businesses, and communities will also shape the trajectory of global temperature change and associated impacts.

The *2026 Global Climate Trends Report* addresses the question "In the coming 12 to 60 months, what decisions and strategies enable the transition to sustainable energy systems and societal and ecological resilience?". Drawing on best-available science and analysis of trends, the answers to this question enable practical, foresight-driven actions for governments, markets, and society.

Outlook for 2026: Seven trends shaping sustainable energy systems and resilience

2026 will likely be a year of **hybrid transitions** with cooperation in some regions, fragmentation and competition in others. Watch for climate shocks and financial impacts like localised insurance and home mortgage retreat, debt and interest rate dynamics, trade and industrial policy shifts, and AI-driven energy demand and innovation**.** Mid-decade, 7 trends are shaping the risks and potential for success of transition to sustainable energy systems and resilient societies and ecosystems.

Trend No.	Theme	Core Concept
1	Climate Limit & CO_2 Emissions	Exceeding 1.5C likely; remaining carbon budget exhausted around 2026; high CO_2 emissions despite electrification.
2	Climate Volatility & Damage	2026 is likely another year of temperature records and volatility; increased frequency of compound events like floods and fires, straining fiscal systems.
3	Food & Ecological Stress	Food price inflation linked to soil/forest degradation, La Niña-driven drought, and global crop yield declines; weakening natural carbon sinks.
4	Energy Transition & Market Shift	Rapid rise in renewables deployment (585 GW added in 2024); global energy investment in clean energy (e.g., Solar PV @$500b) nearly double fossil fuel investment; market shifting from monopolistic to competitive.
5	Geopolitics & Supply Chains	Security, trade tensions, and industrial policy are reshaping supply chains; critical minerals/clean-tech components are being weaponized for strategic autonomy.
6	Demography & Debt	Public debt exceeds 100 percent of GDP in over 80 countries; high interest rates create trade-offs between servicing debt and investing in climate resilience; ageing populations strain public finance.
7	Tech Energy Demand & Investment	Capital-intensive data centers and AI are driving up electricity demand; significant investment in digital infrastructure is crowding out other productive investments.

1. Exceeding **1.5°C is likely** as the remaining carbon budget is exhausted around 2026.

- Measurements confirmed **2024 as the hottest year in recorded history**, with global CO_2 emissions reaching **41.6 Gt** and atmospheric concentrations at **422.45 ppm**.
- Despite signs of emissions plateauing, **fossil fuels still supply over 80% of primary energy**.
- Renewables are scaling fast, adding **585 GW to the energy mix in 2024** and avoiding **9.8 $GtCO_2$**.

2. Unusually warm oceans will likely bring warmer-than-usual conditions in 2026.

- Early in 2026, persistent weak La Niña conditions and unusually warm oceans will likely bring warmer-than-usual conditions especially in the northern hemisphere. Some tropical regions may see more rain than usual, especially parts of Southeast Asia and northern South America.
- Compound events like heatwaves, floods, drought, and wildfires are more frequent and destructive. Extreme weather is reshaping financial risk, straining insurers and governments. Economic losses reached about $318 billion last year and insurance premiums are rising while coverage is receding in some areas. These dynamics in turn could lower property values, reduce tax revenues, and affect bond markets. Instruments like catastrophe bonds and climate-linked debt clauses provide partial relief.

3. Food price inflation is linked to forest and soil degradation, tariffs, and crop yield declines.

- Soil and forest degradation, combined with La Niña-driven drought, may affect grain yields.
- Groundwater depletion and glacier melt are major contributors to global water stress.
- Crop yields for staples (wheat, maize, rice) have declined globally; estimated **4–13% lower** than without recent climate trends.
- Heat and drought impacts on crops may distort food prices and worsen effects of tariffs, export controls on staples and further disrupt food supply chains. However, crop production for corn and soybeans in 2026 may exert downward pressure on commodity prices.
- Soil and forest carbon sinks are weakening; tropical forests and boreal regions shifting from sinks to sources. Over a few years, these stressors may accelerate, making investments in soil restoration urgent.

4. Rise in renewable energy deployment will affect energy, transport, and AI market structures.

- Electrification and substitution effects (e.g., EVs) is expected to reduce fossil fuel demand as more sectors transition to electric power. In 2026, projections suggest substitution effects towards renewable energy in transportation and heating. 2026 projected average prices of fuels like gasoline are projected to fall for a fourth consecutive year.
- Industrial reshoring and AI infrastructure is outpacing grid capacity. Industrial expansion and the spread of electric vehicles are driving higher electricity demand, possibly substituting legacy fuels and shifting the structure of energy markets.
- By 2026, renewable energy will become the largest source of electricity worldwide. Output from solar and wind is projected to exceed 6,000 TWh in 2026.
- Renewables are now the cheapest source of new electricity generation, often costing **one-quarter per kilowatt-hour compared to coal**, and that renewables investment (US$2.2

trillion in 2025) is outpacing fossil fuels two-to-one. Solar PV attracted **$500 billion**, more than any other generation technology.
- In 2026, nuclear power is expected to hit records through reactor restarts and new plants.
- Battery storage and distributed energy scaling fast in advanced economies, but grid bottlenecks and capital constraints persist elsewhere.

5. National interests more than collective ambitions will shape supply chains, energy security, industrial policy, and efforts to secure strategic autonomy.

- Security, trade tensions, and industrial policy will reshape supply chains and regional strategic autonomy.
- Conflicts and attacks on energy infrastructure incentivize diversification and energy autonomy.
- Some governments will prioritize energy sovereignty, defense, and activate trade policy around critical minerals and clean-tech components.
- Policies facilitating low-cost renewables are reshaping trade as well as domestic grids.

6. Demography and debt.

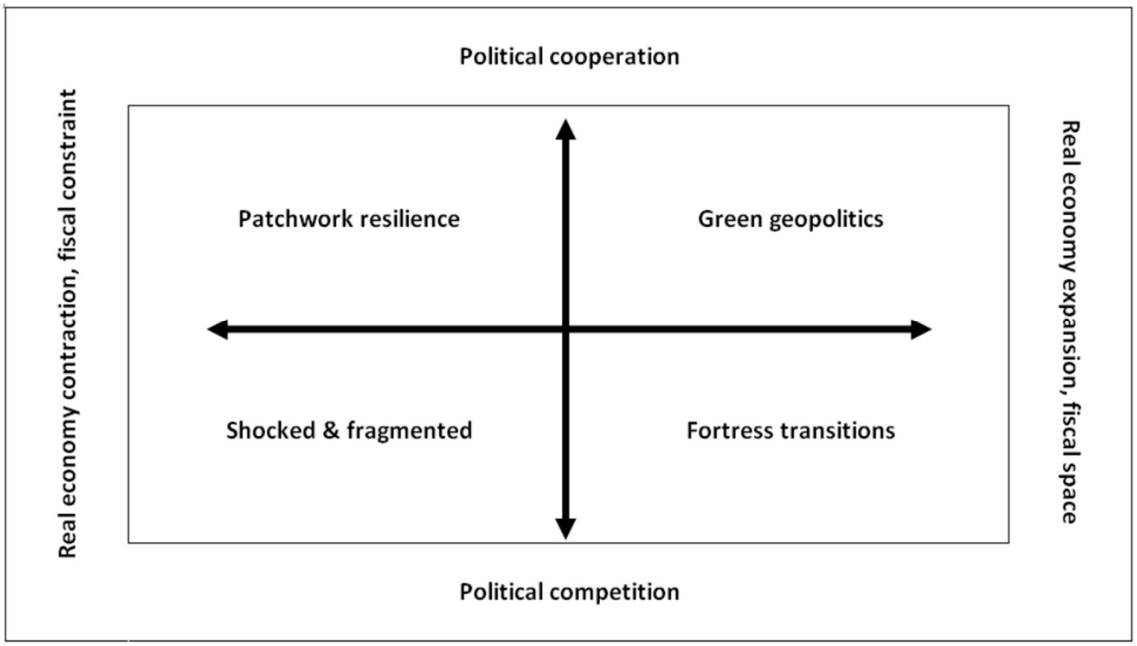
- In many countries, public pension payments for ageing populations make trimming (public) expenditures difficult. Raising taxes stirs public debate even as the working-age taxpayer base shrinks. Inflation can harm the poor and fixed-income pensioners, particularly sensitive to food and energy prices.
- Governments face trade-offs in allocating public resources. Debt burdens have reached historic highs for non-war periods. In 2026 public debt will exceed 100% of GDP in more than 80 countries, making servicing that debt costly. Governments may struggle to finance strategic investments such as making farms and towns resilient to climate-related disruptions and building a sustainable energy system yielding abundant affordable energy.
- In 2026, an important trend to watch is how major central banks like the Federal Reserve manage interest rates. Because global debt is so high, small changes in interest-rate policy could influence how easily many countries can refinance what they owe, which in turn is a major factor shaping global financial stability with implications for energy and resilience.

7. Technology is absorbing large scale finance and driving up energy demand.

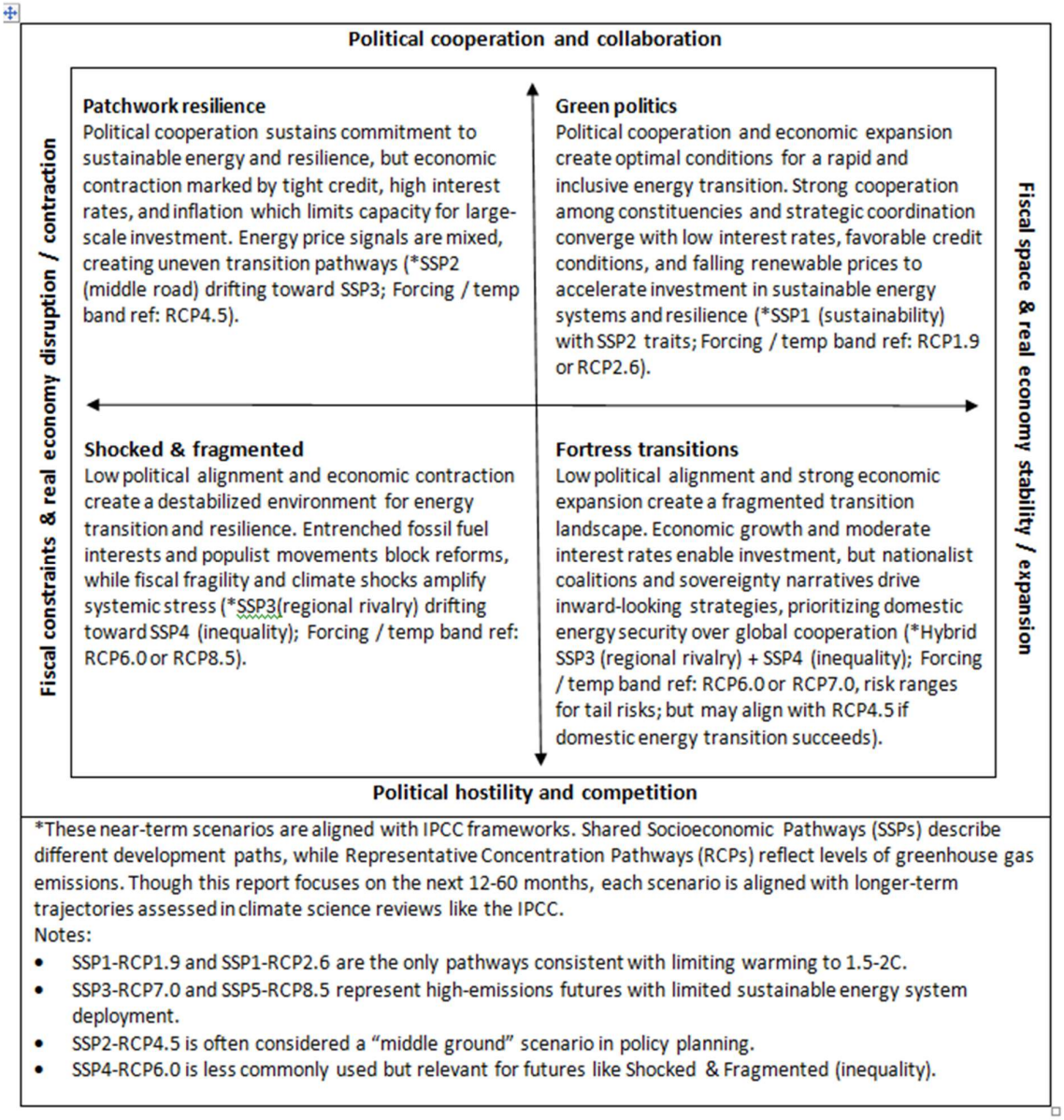
- Electricity consumption from data centers is expected to **double by 2030**.
- Capital-intensive data centers will drive up electricity demand, surpassing power used by all energy-intensive manufacturing sectors combined.
- In 2025 tech stocks accounted for **up to 40% of S&P500**. Gargantuan investments in digital infrastructure and AI are under pressure to deliver returns. If AI raises total factor productivity this may increase interest rates, crowding out other productive investments.
- AI could optimize grids and accelerate innovation in battery and solar PV, but benefits require rapid investment in electricity infrastructure and collaboration between governments and the tech sector.

Four scenarios for strategic planning

Politics, finance, and societal constraints will affect the degree of stability in the face of accelerating climate change in coming years. To navigate this volatile landscape, the report introduces four plausible scenarios for planning purposes. These scenarios are structured along two primary axes: political alignment (cooperation vs. competition) and economic momentum (expansion vs. contraction).



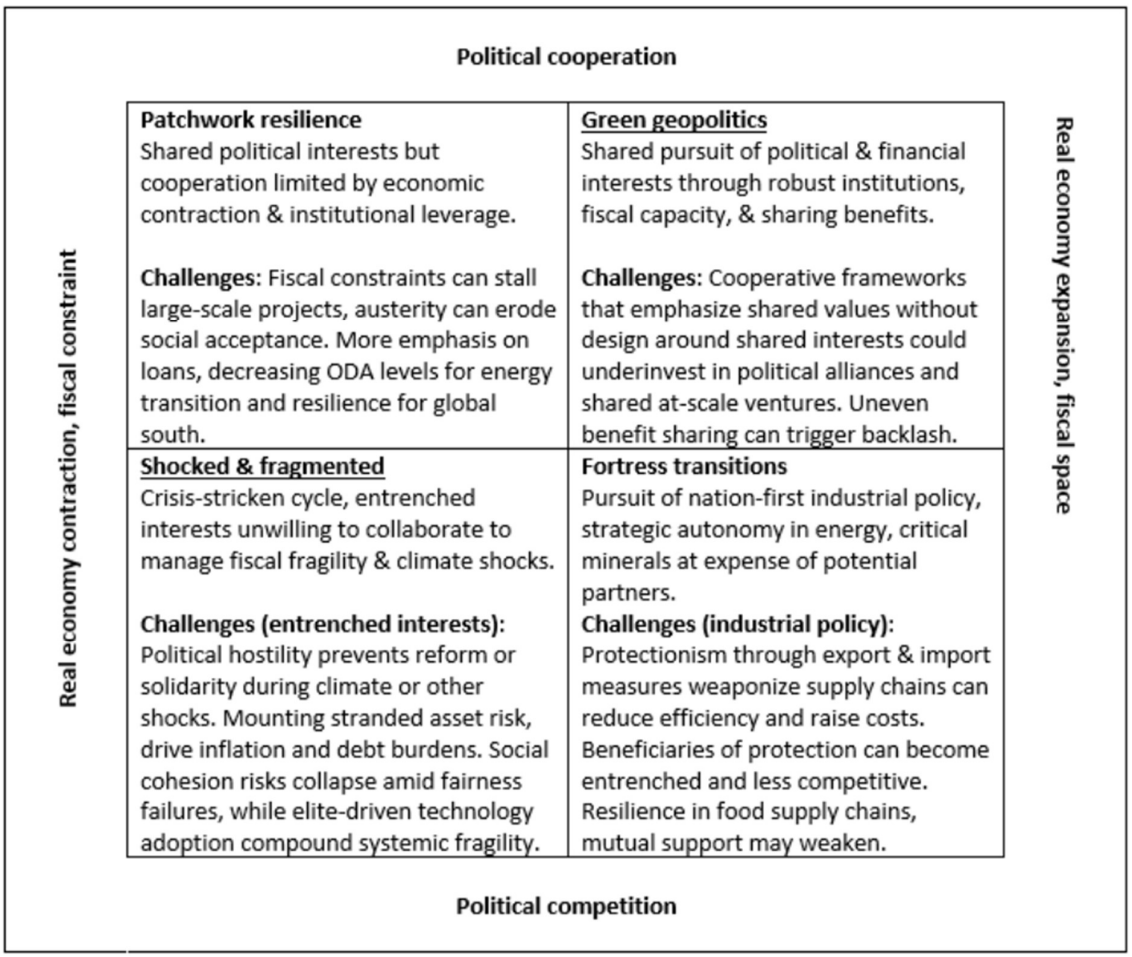
These dynamics vary by region and are similarly shaped by the relationships between countries and their domestic political, economic, and social contexts. Policy ambition related to sustainable energy systems and resilience are also shaped by the degree to how the interaction of countries on the global stage plays out, the state of the global economy, and factors shaping society like demographic trends, technology, and fairness.



The scenarios are structured foresight tools intended to help decision-makers anticipate risks, stress-test strategies, and identify leverage points for action.

Decision-making context 2026

While global temperatures may be relatively fixed in the near term, the crucial aspect that determines outcomes from now on is the way that decision makers navigate the challenges and opportunities embedded in the political and economic, as well as social, fairness, demographic and technological realities in which they find themselves at present. Each scenario contains threats and opportunities that help frame strategy and near-term decisions. By understanding the context, strategists can help decision makers advance sustainable energy systems and resilience relative to political alignment and economic momentum.



Scenario-Specific Opportunities

The crucial aspect that determines outcomes from now on is the way that decision makers navigate the challenges and opportunities embedded in the political and economic, as well as social, fairness, demographic and technological realities at present. Politics, finance, and societal constraints will affect the degree of stability in the face of accelerating climate change in coming years. Each scenario contains situations decision makers can use to advance sustainable energy systems and resilience relative to political alignment and economic momentum.

Scenario 1: Green Geopolitics *(Political cooperation and economic expansion)*

- Reduce dependency on single suppliers (e.g. rare earths, solar PV). Increase productivity and reduce system-wide costs by investing in long-term cooperative infrastructure like cross-border grids, regional hydrogen corridors, and shared flexibility markets. Strengthen mechanisms for transparent benefit- and cost-sharing to maintain political cooperation such as formulas for revenue allocation, job distribution, and fairness provisions for communities exposed to industrial restructuring. Increase system efficiency and reduce peak-load costs by deploying AI-enabled grid optimization and resilience analytics. Encourage diversified renewable portfolios and electrification of industry.

Scenario 2: Patchwork resilience *(Political alignment and economic contraction)*

- Strengthen regional trade arrangements to pool bargaining power. Prioritize initiatives with demonstrable savings and co-benefits: grid harmonization, regional renewable power

pools, joint procurement of batteries or green hydrogen equipment, and shared standards for interconnection and storage. Combine modular, low-capital technologies rooftop solar, community energy, district cooling with targeted social incentives to preserve legitimacy. Structure cooperation to reduce the cost of capital through risk-sharing mechanisms, blended finance, or coordinated regulatory reforms. Include climate resilience metrics and avoid opaque deals that compromise sovereignty in debt sustainability frameworks.

Scenario 3: Fortress Transitions *(Political competition and economic expansion)*

- Include sunset clauses, independent review mechanisms, and performance-based milestones (e.g., productivity gains, emissions intensity reductions, innovation outputs) to ensure strategic sectors evolve into competitive, export-ready industries.Complement on-shoring with diversification, regional compacts, or trusted-partner supply chains to avoid chokepoints. Treat resources like critical minerals as a cooperative challenge, not just a control strategy. Pair resource security strategies with joint ventures, transparent pricing, and sustainability standards that accelerate reliable access and reduce competitor backlash. Stress-test industrial policy against debt sustainability, interest-rate scenarios, and potential external shocks to ensure strategy remains viable.

Scenario 4: Shocked & Fragmented *(Political competition and economic contraction)*

- Prioritize low-cost, modular, and rapidly deployable solutions (off-grid and mini-grid renewables) for immediate affordability gains. Build community-based resilience (local solar cooperatives, decentralized water–energy solutions) that build trust and bypass dysfunction. Prepare for supply chain shocks by de-risking essential imports (food, fuel, critical components). Prevent grievance cycles through transparent, fairness-oriented targeting. Build minimal institutional resilience through disaster preparedness units, protocols for critical infrastructure, and diversified supply routes. Structure investments so that broad coalitions benefit.

While climate outcomes may be path-insensitive in the near term, the direction of energy and resilience will depend not only on climate impacts but on political and economic choices made in the near-term.

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About Penn International Climate Observatory. Global climate policy was shaped decades ago, but today's world looks very different. Uneven energy transitions, strategic competition, and cascading risks demand a recalibration in approach. To inform decision makers, in 2025 the University of Pennsylvania's International Climate Observatory (PICO) launched a new initiative anchored at Perry World House that connects cutting-edge academic research with global policy and practice. The Observatory convenes scholars, practitioners, and decisionmakers to generate near-term foresight on challenges and opportunities, translate emerging evidence into actionable insights, and stress-test strategies for resilience and the sustainable energy transition. The Penn International Climate Observatory brings geopolitical and security, finance and real economy, and social analysis to global climate diplomacy and action. This consultation document, created with inputs from experts with the Penn International Climate Observatory (PICO), analyses these critical trends and conveys recommendations for the coming period to inform decision making on energy and resilience in the context of shifting geopolitics, finance and the real economy, and societal pressures.

Trend analysis cycle. This executive summary of the *Global Climate Trends Report* is intended for consultation with leaders. The framing is intended to help navigate in the near-term, in the context of political dynamics, the real economy and finance, and societal and demographic forces that enable or constrain decisions. The report's biannual foresight cycle aligns with key global convenings throughout the year when foresight can inform decision makers, such as the World Economic Forum, Munich Security Conference, Spring and Autumn Meetings of the IMF and World Bank, Jackson Hole Economic Symposium, UN General Assembly, and the UNFCCC COP. The trend analysis cycle releases one annual set of trends for the coming year, and updates trends midyear to inform specific decision making moments in the third and fourth quarters of the year to enable decision-makers to anticipate transition risks and climate impacts, stress-test strategies, and shape informed responses.