MONTHLY RESEARCH DIGEST

An Executive Briefing on New & Notable Sustainability Research

In This Issue – **May 2026**

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CORPORATE SUSTAINABILITY TRENDS

State of Decarbonization Report

By PwC

View the full report here

Notable Highlights

- **23% of companies increased their climate ambitions** from 2024 to 2025, while 18% decreased their ambitions.
- **69% are on track to hit Scope 1 and 2 targets** (up from 67% in 2024), and **56% are on track to hit Scope 3** targets (up from 54%).
- **60% report using AI to achieve operational decarbonization,** but only about 14% report using AI to improve sustainability or emissions reporting.
- Companies in hard-to-abate sectors that **allocate a larger share of CapEx to climate-transition-aligned activities receive valuation premiums** of 15-59%.
- **63% have supplier decarbonization requirements at scale with monitoring and oversight** (up from 50% in 2023), yet **only 13% consistently verify and enforce** requirements at scale.
- **Products with sustainability attributes are realizing 6-25% revenue uplift** and are correlated with companies being on track for Scope 3 targets.
- The following Report Findings include **insights on how leading companies are enhancing energy resilience; decarbonizing products and supply chains;** and **leveraging AI** for sustainability, **as well as recommendations** to drive revenue growth, improve margins, and reduce risk.

Objective

- To assess changes in corporate climate ambitions and progress, including energy resilience, supplier engagement, product sustainability, and the use of AI.

Background

- This third annual report draws on data from 3,547 companies' disclosures to CDP in 2025; companies' sustainability, CSRD, and 10-K reports; S&P Capital IQ; the SBTi; and public information sources, such as press coverage (methodology on pg. 2, 35-36).

- The authors also compared companies' CDP submissions from 2023, 2024, and 2025. Companies targeting greater emissions reductions (e.g., earlier target years or additional Scopes) were deemed to be increasing climate ambition, and those targeting lesser reductions were deemed to be decreasing ambition.

Report Findings

Corporate climate ambition and progress (pg. 6-11):

- **82% held or accelerated the timeline** to achieve their climate commitments (compared to 2024).
- The number of new climate targets being set is declining (a 7% increase year-on-year, compared to a 29% increase in 2024). However, **new targets are increasingly rigorous**, with most companies setting science-aligned or externally validated science-based targets. Additionally, **companies are influencing suppliers to set targets**.
- 30% of companies have improved Scope 3 accounting.

▷ **Companies leading on Scope 3 performance have** deeper supplier engagement programs, better value chain data, and targeted procurement and product design levers. They are also evolving their products to consume less energy and natural resources, enable electrification, and reduce lifecycle impacts.

Companies are sharpening capital allocation to build energy resilience (pg. 13-16):

- **Energy is now a strategic vulnerability for companies:**
  - Outdated grid infrastructure, surging demand for AI data centers, and shifting regulations pushed **US electricity prices up by 7-25% in 2025**.
  - Amid energy supply and price volatility, global **investment in industrial energy efficiency increased by 45%** from 2020 to 2025 to approximately $30 billion.
  - US energy customers experienced an average of 11 hours of **electricity interruptions** in 2024, nearly double that of the prior decade, with storms accounting for most disruptions.
  - The One Big Beautiful Bill Act accelerated the phase-out of key clean-energy tax credits. As a result, total **US and European contracted power purchase agreement volumes fell by 19%** from 2024, and deal counts fell by 26%.
- In 2025, **companies allocated slightly less CapEx to climate-transition-aligned activities** but made more progress toward their climate targets.

- **Companies that make focused, disciplined investments in climate-transition-aligned activities will outperform** those that don't.
    - To date, companies have benefited from tailwinds that have kept capital expenditures light: renewable energy credits and contracts, low-effort efficiency gains (e.g., LED conversions), and supportive policy incentives.
    - These tailwinds are set to weaken or disappear under growing pressures tied to energy resilience, regulation, and shifts in customer demand.
    - Companies should (1) **invest in initiatives aligned with the core business strategy** and supported by a strong business case, and (2) show investors how these actions create competitive and operational advantages.

▷ **Page 16 includes insights on how leading companies are allocating capital to enhance energy resilience.**

Supplier engagement (pg. 18-21):

- Stronger supplier visibility, engagement, and requirements are **associated with accelerated Scope 3 reductions** and lower costs (details on pg. 20).
- **Supplier engagement has improved since 2023:**
    - Of 158 Fortune 500 companies, 25% have supplier visibility only at Tier 1 (down from 50% in 2023), 58% have partial Tier 2 visibility (up from 46%), and **18% have end-to-end supplier transparency** and traceability at scale (up from 4%).
    - **64% of companies have structured, scaled supplier decarbonization programs** (up from 35% in 2023); 23% have structured programs with narrow coverage (up from 53%); and 6% have limited or no engagement.
    - Only **7% incentivize action** across the supplier base (up from 0%).

▷ **Page 21 includes insights on how leading companies are decarbonizing their supply chains.**

How companies are decarbonizing products (pg. 23-26):

- **Product sustainability is emerging as a key mechanism for decarbonizing Scope 3, reducing costs and risks, and capturing new business opportunities.**
    - Design can account for up to 80% of a product's lifecycle environmental impact.
    - Companies that are on track with Scope 3 targets are more likely to have integrated sustainability practices across the product life cycle.

  - Consumer Goods companies and Retailers that effectively integrate sustainability into their product design are realizing **profitability that is 8-13% higher**.

- **Sustainability-marketed products now account for 24% of US consumer packaged goods sales.** 30% or more of revenue within the Power and Utilities, Metals and Mining, and Construction and Real Estate sectors is aligned with the climate transition.
- **Reliable product-impact data is becoming a critical enabler.** Companies are investing in product-level transparency, impact quantification, and external verification to support internal decision-making and external product messaging.

▷ **Page 26 includes insights on how leading companies are decarbonizing products.**

Companies utilizing AI for sustainability (pg. 28-31):

- Of the 60% of companies using AI to achieve operational decarbonization, only 1% have quantified emissions reductions from AI initiatives.
- **AI is delivering the greatest decarbonization value where companies have direct operational control and rich, real-time data streams.**
- Data quality is a significant constraint for sustainability progress, yet **only about 14% publicly report using AI to improve sustainability or emissions reporting.**
  - Sustainability data will shift from a compliance exercise to a performance signal as investors and regulators place greater weight on verifiable emissions data, and investors can triangulate reported numbers against independent datasets.
  - Companies that **build AI-enabled measurement systems now** can reduce reporting burdens, strengthen disclosure integrity, detect supply chain risks earlier, and make faster, better decisions.
- **Companies that embed sustainability as a native input in the AI design stage can** avoid sourcing choices that become too costly under carbon pricing and manage energy costs alongside emissions. Those that don't will face the cost of retrofitting AI systems.

▷ **Page 31 includes insights on how leading companies are leveraging AI for sustainability.**

Recommendations for companies (pg. 34):

- **Recommendations to drive revenue growth:**
  - **Redesign products** to use fewer, lighter, or alternative materials.
  - Embrace a **circular business model** that focuses on recyclability and modularity.
  - Governments are tightening rules on environmental marketing and product disclosures (examples on pg. 25). **Back product sustainability claims** with credible lifecycle data and transparent supply chains to avoid reputational and regulatory risks.
- **Recommendations to improve margins:**
  - Invest in high-impact **energy-efficiency innovations**, such as smart buildings and process optimization.
  - Enhance **energy management** and load shifting to reduce peak demand charges.
  - **Use AI** to detect inefficiencies, optimize equipment, anticipate maintenance requirements, and enhance material sourcing and resource efficiency.
- **Recommendations to reduce risk:**
  - **Increase transparency** across the value chain to avoid regulatory exposure, hidden costs, and inefficiencies.
  - **Engage suppliers** to set clear expectations on emissions, data, and performance.
  - **Use AI** and analytics to identify concentration risk, geopolitical exposure, climate risk, and compliance gaps early.
  - **Monitor external signals**, such as energy constraints, raw material volatility, disruptions, and evolving regulations.

The State of the Sustainability Profession in 2026

By Trellis

View the full report here

Notable Highlights

- **57% of companies with announced sustainability targets have maintained them,** 24% have strengthened their targets, and 16% have weakened or abandoned them.
- **63% have scaled back or changed sustainability communications.** 80% of companies with over $10B in revenue have downplayed or changed public sustainability-related statements.
- **33% cut sustainability budgets** (compared to 9% in 2024), the highest percentage reduction in the past decade, and 44% increased budgets.
- **50% increased their sustainability team headcount** (down from 74% in 2024), 26% decreased it (up from 4%).
- **80% have employees outside the core sustainability team** who work full-time on sustainability.
- **44% of sustainability professionals are less fulfilled** by their work, while 33% are more fulfilled. Only **47% of professionals want to stay** in a corporate sustainability role over the next 5 to 10 years.

Objective

- To assess the state of the sustainability profession, including drivers of corporate sustainability strategy, staffing and budgets, the role of the CEO, and employee fulfillment.

Background

- The data in this ninth biennial report is based on a survey of 548 sustainability professionals at companies with at least $1 billion in annual revenue, including 86% from North America and 14% from Europe and Asia (methodology on pg. 2, 50-53).

Report Findings

Drivers of corporate sustainability strategy (pg. 15-20):

- **57% of companies with announced sustainability targets have maintained them,** 24% have strengthened their targets, and 16% have weakened or abandoned them.
- **63% have scaled back or changed sustainability communications.**
    - 80% of companies with over $10 billion in revenue are downplaying or changing public sustainability-related statements.
    - Companies are changing the language they use (examples on pg. 19).
    - Several companies have removed sustainability reports from their websites.

The critical role of the CEO (pg. 6-14):

- **CEOs are less engaged with sustainability:** 32% of CEOs own sustainability and are very engaged (down from 48% in 2024), 35% are interested, but it's not a priority (up from 30%), 14% are neutral (up from 9%), 12% have a gap between their words and actions (up from 9%), and 8% are openly dismissive of sustainability (up from 4%).
- **Companies with engaged CEOs are more likely to** strengthen public sustainability commitments, prioritize emission reductions, and increase team budgets and headcount than companies whose CEOs are dismissive of it.

Sustainability staffing and budgets (pg. 21-31):

- **Many companies pared back headcount and budgets due to** concerns about losing government contracts or prompting unwanted regulatory attention, the need to divert funds for climate initiatives to more pressing investments, and management scaling back initiatives they never fully supported.
- **Fewer sustainability teams report to the CEO** (from 30% in 2024 to 18%), and **the number reporting to Finance doubled** (to 14%).
    - It is most common for teams to report to Legal (20%) and Corporate Affairs/Comms/Government Relations (19%).
    - Only 21% of companies in which the sustainability team reports to the CEO cut budgets, compared with 36% of those in which it reports to Finance.
- Companies with 1,000-10,000 employees **typically have a core sustainability team of 5 or fewer people.**

  - About half of the companies with over 10,000 employees had **at least 11 embedded sustainability experts** outside the core sustainability team, and 23% had more than 50.
  - More companies are increasing the headcount of core sustainability teams than embedded experts.
- Pages 26-28 feature examples of **common patterns** in how companies are making sustainability headcount and budget decisions.

Sustainability professionals' frustration with shifting resources (pg. 32-37):

- 38% of sustainability professionals report that **changes to their company's sustainability resources have made it harder to achieve sustainability goals**.
- **52% of companies are devoting more resources to sustainability reporting**. 33% of professionals said the investment has helped their companies make better sustainability decisions, 37% said it has had no clear impact on their sustainability efforts, and **30% said it has diverted resources from higher-impact work.**
- **Sustainability professionals are adapting** to shifts in public sentiment and management priorities with a range of strategies, from winning over skeptics to leveraging technology to learning new skills. Pages 35-37 provide examples.
- Over the past two years, **salaries and total pay grew at the slowest rate of the decade,** and compensation for senior sustainability executives decreased slightly. See pages 38-41 for details.

How employees see the sustainability profession (pg. 42-47):

- Sustainability professionals at companies whose CEOs are dismissive of sustainability are more likely to feel less fulfilled and insecure, and to be pessimistic about their work.
- **People in companies where the sustainability team reports to the CEO or Corporate Affairs are significantly more fulfilled** than those where the team reports to Legal, Finance, or Marketing.
- 26% want to continue working in sustainability over the next 5 to 10 years, but outside of corporate.

MATERIALS

Battery Circularity

By International Energy Agency (IEA), European Patent Office (EPO)

View the full report here

Notable Highlights

- **The lithium-ion battery market grew fivefold from 2020 to 2024** (from around 180 GWh to 1,100 GWh) **and is projected to triple by 2030** (to 3,500 GWh).
- **Around 1.2 million EV batteries could reach end-of-life in 2030,** 14 million by 2040, and 50 million by 2050. **Systems for battery collection, logistics, and treatment must be scaled.**
- Battery circularity innovation is growing faster than other battery technology fields. **International patent families (IPFs) related to battery circularity recorded a compound annual growth rate of 42%** from 2017 to 2023, compared with 16% for battery-metal refining technologies and 2% for all technical fields.
- **Battery disposal poses risks** from residual energy, reactive electrolyte salts, and fluorinated materials, which can contribute to fires, toxic emissions, and contamination of land and water systems. **Recycling materials can produce 80% fewer GHGs on average** than mining and processing primary materials.
- **Advances in process integration, automation, materials separation, and hydrometallurgical selectivity are needed** to ensure that recycling can deliver battery-grade secondary materials at competitive cost and quality.
- Pages 30-32 include **examples of battery circularity technologies.**

Objective

- To analyze innovation trends in battery circularity, including the emerging end-of-life wave of EV batteries, recycling, patenting trends, and battery circularity technologies.

Background

- The analysis is based on IEA expert insights and data from the European Patent Office's worldwide patent databases from 2000 to 2023 (methodology on pp. 33, 74, 81-82).

- The report focuses on international patent families (IPFs) (patent applications filed and published in at least two countries). It covers technologies for used-battery collection and sorting, mechanical processing, and metal recovery (details on pg. 33).

Report Findings

The battery circularity landscape (pg. 20-35):

▷ **Subchapters:** emerging end-of-life wave of EV batteries (pg. 20), environmental and safety risks of battery disposal (23), geopolitical landscape of critical battery minerals (23), global battery circularity policy (25), scaling and innovation (29), battery circularity technologies/recycling chain overview (30)

- **The battery value chain is highly geographically concentrated,** with China accounting for about 80% of cobalt refining and 70% of lithium refining in 2024.
- **Around 1.2 million EV batteries could reach end-of-life in 2030,** 14 million by 2040, and 50 million by 2050.
    - If government climate pledges are met, the resulting surge in battery deployment could generate enough end-of-life material to **reduce the need for newly mined copper and cobalt by 40%, and lithium and nickel by 25%, by 2050**.
    - **Recovering metals can diversify supply** by creating domestic or regional secondary material streams.
    - The growing complexity and diversity of modern products often limit the effectiveness of existing recycling technologies, resulting in low recovery rates.
    - Page 22 breaks down the **projected maximum available battery recycling feedstock** and recycling capacity by region.
    - **Emerging solutions** (e.g., novel chemical and physical separation processes) **are enhancing efficiency**, increasing recovery potential, and improving the reliability and traceability of secondary raw materials.

Battery circularity patenting trends (pg. 36-59):

▷ **Subchapters:** patenting trends (pg. 36), trends by stage of the battery circularity value chain (42), regional trends (44), the most active patent applicants (47)

- The **share of energy patenting represented by energy storage reached 40%** in 2023, with data indicating it is approaching 50%.

- **Five technologies accounted for an 83% share of battery circularity IPFs** from 2020 to 2023: hydrometallurgy, stabilization and discharge; comminution; pyrometallurgy; and pyrolytic pretreatment and hydrometallurgical extraction.
- **Asian companies lead innovation across the battery recycling value chain,** having accounted for 63% of IPF applications for battery circularity technologies in 2023.
    - **Chinese national patents accounted for around 70%** of all national and international patents globally on average from 2018 to 2023. Brunp has installed recycling capacity equivalent to around 5% of the global total.
    - Chinese applicants are increasingly shifting from national patents to IPFs as regulatory requirements take shape in more countries and technology competition intensifies.
- **European entities accounted for roughly 20% of all battery circularity IPFs** from 2015 to 2023. Innovation is concentrated around battery collection and pre-processing, giving the region the potential to manage growing volumes of used batteries.
- Pages 25-28 break down **global policy approaches** relevant to battery circularity.
- **Governments face policy challenges regarding scaling battery circularity and supporting domestic innovators (pg. 14):**
    - The gap between the number of innovators seeking to scale up this decade and the availability of end-of-life batteries must be addressed.
    - Long-term investment, government funding, and managed access to waste materials are likely needed to test promising approaches and adapt them to future changes in EV primary battery chemistries.
    - Continued innovation is needed to reduce battery recycling costs further and address the energy intensity and environmental impacts of processing.

Refining of critical metals for batteries (pg. 60-69):

- Under today's policy settings, **lithium demand is projected to grow several-fold by 2040,** graphite and nickel demand are set to roughly double, and cobalt and rare earth demand are projected to increase by around 50-60%.
- **The supply needed to meet demand**, particularly in refining and processing, **is highly geographically concentrated**. The average market share of the top three producers of key energy minerals reached around 86% in 2024.
- Pages 61-62 include **examples of technologies** for refining critical battery materials.

Rare Earth Elements: Pathways to Secure and Diversified Supply Chains

By International Energy Agency

View the full report here

Notable Highlights

- **The total global market value of rare earth elements** is estimated to be around **$6.4 billion today.**
- **Demand for magnet rare earth elements has doubled since 2015** and is set to increase by a further third from 2024 to 2030 and by over 90% by 2050 (under today's policy settings).
- **Meeting 2035 demand projections** for magnet rare earths outside China **would require doubling mining capacity**, quadrupling refining capacity, and increasing magnet production sixfold.
- Magnet rare earth **supply is highly geographically concentrated**, with **the top three mining producers** (China, the U.S., and Australia) **accounting for 86%** of global mined production.
- An estimated **$60 billion in investment is needed over the next decade to diversify** supply chains and meet demand. This is **compared with $6.5 trillion in costs** that could arise if China fully implements introduced and announced rare-earth export controls.
- **Recycling can strengthen supply security** by reducing the need for primary supply by up to 35% by 2050.
- The following Report Findings highlight **pathways for securing and diversifying rare earth supply chains.**

Objective

- To assess the state of the global rare earth elements market, including supply and demand, and supply chain diversification.

Background

- The analysis covers the full value chain, from mining to permanent magnet production. Unless otherwise specified, the analysis focuses on the four key magnet rare earth elements: neodymium, praseodymium, dysprosium, and terbium.
- The IEA Working Party on Critical Minerals, the IEA Critical Minerals Expert Advisory Group, the French G7 Presidency, and experts from companies, consultancies, industry associations, research institutions, and government agencies provided input and/or review (methodology on pg. 4-5, 16-17).
- Projections are derived from the IEA's Global Energy and Climate (GEC) Model.
    - Demand projections are based on the IEA Stated Policies Scenario (STEPS) (current energy-related policies that have been adopted, announced, or are in the advanced planning stages).
    - Supply projections are based on the pipeline of operating and announced mining and refining projects by country in the 2025 Global Critical Minerals Outlook.

Report Findings

Rare earth elements market overview (pg. 18-33):

▷ **Subchapters:** rare earth reserves (pg. 18), prices, market size, and applications (20), rare earth value chain (25), demand prospects for magnet rare earths (28), production and supply chain concentration (30)

- **Permanent magnets account for around 96% of global rare earth element consumption by value.**
- **Demand for magnet rare earth elements is projected to increase by over 90% by 2050** (under today's policy settings).
    - Electric vehicle motors are projected to double their current share of demand, reaching 18%, by 2030.
    - Growth in automation and robotics will increasingly drive demand after 2030.
- **Magnet rare earth supply is highly geographically concentrated.**
    - China accounted for 60% of global mined production, 91% of global refined output, and 94% of sintered permanent magnet production in 2024.
    - China holds roughly half of the world's rare-earth reserves, while the U.S. holds 2%.

The strategic importance of rare earths for economic security (pg. 34-41):

▷ **Subchapters:** recent export controls and market developments (pg. 34), potential economic impacts of supply disruptions (37)

- **In 2025, China introduced export controls on several rare earths** and announced additional controls, which were suspended for a year (details on pg. 8). **Full implementation** of these controls **would affect $6.5 trillion in economic activity annually** for other countries.
    - The **U.S. and Europe have the greatest exposure** to direct economic losses compared to other regions (each estimated at **over $1.5 trillion**).
    - The **Automotive sector has the greatest exposure** to direct losses **($3 trillion)**, followed by Portable Electronics and Other Transport (over $1 billion each), and Data Centers (over $350 billion).
    - Many services depend on industrial motors that contain rare earths (e.g., robotics, mining applications) or on products that rely on rare earths (e.g., data center servers, AI services, fintech). The inability to trade such products would lead to **significant indirect economic impacts**.
    - These controls may have a lower economic impact on some sectors (e.g., defense applications that rely on rare earths), but they can still pose major **strategic vulnerabilities**.
- In 2025, **China exported enough rare earth magnets** to manufacture the components used in over 61 million cars or 6,700 AI data centers. **Delays or denials in licensing approvals could threaten companies' revenue,** competitiveness, and employment within global value chains.

Challenges and opportunities for supply chain diversification (pg. 42-65):

▷ **Subchapters:** needs for diversified rare earth supplies (pg. 42), diversified supply project pipelines (44), supply and demand outside the top producer (47), recycling opportunities (50), investment (52), key challenges in advancing diversification (55)

- **The project pipeline outside China is growing but uneven.** Mining capacity is expanding significantly, led by Australia and the U.S., but the manufacturing infrastructure to convert that raw material into usable products isn't keeping pace.
- **Key challenges in advancing rare earth supply chain diversification:**
    - **Magnet production is the main bottleneck.** While resource development is advancing in several regions, the build-out of refining and magnet production is slower.

Without accelerated investment, regions are likely to remain dependent on the dominant producer.

- Projects outside China face **higher capital and operating costs** due to smaller scale, complex permitting, and stricter environmental requirements.
- Processing and magnet manufacturing are technically demanding and rely on specialized equipment. There is a **shortage of skilled workers** outside China.
- Customers often require **demonstrated technical feasibility** before committing to long-term offtake.
- Assets, technology, and skills are unevenly distributed across regions. **International collaboration is needed**.
- Magnet rare earths are typically co-produced with abundant, lower-value elements. Without sufficient end-use markets for these co-products, the **economics of magnet production** can be undermined.
- Rare earth supply chains **generate environmental impacts**, including emissions, radioactive waste, and water contamination (see pages 59-62 for details).

- **Recycling can strengthen rare earth supply security by reducing the need for primary supply by up to 35% by 2050.**
  - Manufacturing scrap currently accounts for nearly 75% of the secondary supply and is heavily concentrated in China.
  - Rapidly increasing **end-of-life volumes** from EV motors, wind turbines, and electronic waste **present a growing recycling opportunity**. Total available feedstock is expected to grow by 50% by 2035.

Pathways to secure and diversify rare earth supply chains (pg. 66-100):

▷ **Subchapters:** pathways to secure and diversify supply chains (pg. 66), strengthening international supply chain coordination (98)

- **Understand rare-earth needs and risk exposure:** Develop a clear picture of national demand to estimate investment needs and set realistic targets. Assess vulnerability to supply chain disruptions, including the economic consequences.
- **Increase disruption preparedness:** Effective emergency response includes market monitoring to identify disruptions, procedures that enable swift action, regular exercises to strengthen capacity, and measures that deliver meaningful impact during disruptions. Rare earth stockpiles can provide a supply buffer (details on pg. 71-74).

- **Adopt a whole-supply-chain approach to make projects competitive:** Rare earth value chains rely on complex technical processes. There are often few suppliers of specialized equipment and machinery outside China, creating bottlenecks of high costs and long lead times.
- **Promote supply-side technology innovation:** Pages 85-86 include examples of novel rare earth separation and refining technologies. Public support for shared testing facilities or loan guarantees is needed to accelerate technology commercialization.
- **Promote demand-side technology innovation to alleviate supply constraints and geopolitical risks:** Pages 90-91 summarize alternative technologies that reduce, substitute for, or avoid the use of rare earths. Collaboration among end users, magnet producers, and the government can help overcome technical barriers.
- **Enhance price transparency:** Limited price transparency makes it more difficult for participants to manage long-term contracts and hedge price risks. Take action to facilitate market development by enhancing transparency tools, promoting established platforms, and standardizing products to strengthen liquidity.
- **Strengthen collaboration:** Assets, technologies, and skills are unevenly distributed across countries. Cross-border investment, technology partnerships, and long-term offtake agreements can mobilize capital while addressing business and environmental risks.
- **Strengthen financial and policy support:** Increase targeted finance and policies that enable long-term offtake to reduce investment risk and support project viability. Public-private partnerships and supply chain traceability are key enablers. Page 82 breaks down various policy tools and their relative impacts on project profitability.
- **Develop targeted policies to unlock recycling:** Key measures include boosting collection and sorting, and introducing rare-earth recovery and labeling requirements. Industrial clustering that links recycling facilities with magnet manufacturers can help close the loop.

NATURE

Growing Momentum: Tackling Invasive Alien Species Together

By Fauna & Flora and the IUCN, with support from the Taskforce on Nature-related Disclosures (TNFD)

View the full report here

Notable Highlights

- **Global annual costs associated with invasive alien species (IAS) now exceed $423 billion.**
- IAS are **among the top five drivers of global biodiversity loss,** contributing to 60% of recorded extinctions.
- 81% of companies recognize IAS as a critical or moderate material business risk overall, but **only 57% consider IAS a material risk to their company,** and **only 31% regularly assess their exposure** to IAS-related risks, opportunities, or impacts.
- **Invasive alien species expose companies to** operational disruption, supply chain and asset challenges, reduced climate resilience, higher management and compliance costs, missed nature-related targets, and increased stakeholders pressure.
- **Earlier IAS prevention measures can enable companies to avoid recurring costs** needed to control IAS; **harness emerging opportunities,** including new detection technologies and IAS uses (e.g., for biomass); **and meet stakeholder needs** (investors increasingly require credible IAS management).
- The **most significant barriers to acting on IAS** are a lack of data (53%), a lack of awareness (50%), cost constraints (41%), and a lack of tools or guidance (38%).
- The Report Findings include **case studies** on companies managing and preventing IAS, as well as **measures for effective collaboration to address IAS.**

Objective

- To assess the business risks of invasive alien species (IAS) and how to address them.

Background

- The report data is based on Phase 1 of the IAS Collaborative Initiative, which has engaged 184 organizations across 52 countries (methodology on pg. 2, 24).
    - 90 companies and financial institutions participated in a global survey.
    - Representatives from companies, civil society, and government participated in sector workshops focused on Extractives, Tourism, Transport & Logistics, Food, Agriculture & Forestry, and Finance.
- Invasive alien species include animals, plants, and other organisms introduced by human activity to areas outside their natural range, where they spread and negatively impact native species and ecosystems.

Report Findings

The business case for addressing invasive alien species (pg. 6-8):

- **The global cost of biological invasions has increased fourfold each decade** since 1970.
- **Invasive alien species expose companies to a range of risks:**
    - **Operational disruption** due to crop failure and yield losses, fouled equipment, damaged infrastructure, or impaired ecosystem services.
    - **Supply chain and asset challenges** stemming from degraded land and water systems, disrupted production, and increased vulnerability across sourcing regions.
    - **Reduced climate resilience**: IAS intensifies wildfire risk, increases water stress, hinders ecosystem recovery, and alters carbon storage.
    - **Higher management and compliance costs** due to tighter regulations.
    - **Missed nature-related targets**, as IAS can undermine restoration efforts.
    - **Increased pressure** from stakeholders to act on nature-related risks.
- **The impact of invasive alien species is already visible across sectors:**
    - Invasive crop pests and pathogens cause **yield losses of 30-40%** for rice, maize, and wheat across regions.
    - Citrus greening, spread by the invasive Asian citrus psyllid, reduced orange grove production in Florida by around 90%, causing **tens of billions of dollars in losses**.

- **Flammable invasive grasses and shrubs in the Western U.S. have increased wildfire frequency and severity** and heightened climate-related physical risks for nearby infrastructure.

Company-level ownership and assessment of IAS are lagging (pg. 10-11):

- **Commercial activities can unintentionally introduce or spread IAS** through several pathways, including contaminated cargo or packaging, the transport of soil, timber, and other materials, and asset decommissioning activities.
- **Company-level assessment and ownership of IAS-related risks are lagging** because many pathways for IAS spread run through shared infrastructure.
- Page 11 includes **case studies** on companies' approaches to preventing the spread of IAS across operations.

Corporate action on IAS (pg. 12-16):

- **The top five motivators for companies to address IAS are** risk management (66%), meeting biodiversity commitments (60%), regulatory compliance and reputation (both 50%), and harnessing nature-related opportunities (48%).
- **Most corporate action is focused on managing their own IAS risks,** including removal or restoration (61%), risk assessment (54%), developing policies, strategies, or guidance (49%), and building internal capacity or raising awareness (45%).
- **Fewer companies focus on IAS prevention:** Only 35% use preventative measures (e.g., biosecurity protocols); 26% are involved in policy advocacy/partnerships or are setting targets, transition plans, or action plans; and only 21% engage suppliers or the value chain.
- Page 14 includes **case studies** on company actions to manage and prevent IAS. Page 16 includes a **case study** on a company's IAS prevention measures to meet regulatory requirements.

How companies can overcome the barriers to addressing IAS (pg. 17):

- **Companies need clear species lists, consistent information across geographies**, and simple identification tools to close data gaps and know where to focus their efforts.
- The issue of IAS only gains attention when the impacts are tangible. **Training and examples** tailored to specific sites or sectors are needed.

- Companies should develop **practical, sector-specific tools and materials**, including checklists, supplier requirements, and monitoring protocols that can be integrated into existing systems.
- When the pathways for IAS spread are shared across organizations, **the cost burden to address the spread should also be shared.**
- Page 17 includes a **case study** on how a mining company navigates barriers to addressing IAS across its global mining portfolio.

Collaboration to address IAS (pg. 18-20):

- **47% of companies already collaborate to address IAS risks,** most commonly through joint prevention and/or management actions (around 70%), data sharing or research (around 50%), and co-developing tools and guidance (43%).
- **For collaboration to work in practice, companies must:**
    - Prioritize landscape-level projects with long-term funding,
    - Have the capacity and funding to maintain local coordination, monitoring, and rapid response
    - Share information that is easy to use (e.g., simple species lists and identification tools tied to clear management actions)
    - Develop real-world projects that prove and scale practical tools
    - Conduct peer-to-peer learning to spread effective methods
- Page 20 includes **case studies** on company collaborations to address IAS.

Metrics for IAS detection and management (pg. 21):

- **IAS risks are context-dependent,** making it difficult for businesses to identify and manage exposures.
- **Companies can use the TNFD metrics, core global disclosure indicators, and sector-specific guidance that cover IAS** to improve comparability, plan prevention measures, track progress, and share performance with investors in a decision-useful manner.

CLIMATE & HEALTH

Adapting to Climate-Related Health Risks: The Economic Case for Climate Services for Health

By World Resources Institute, The Rockefeller Foundation

View the full report here

Notable Highlights

- **By 2050, climate-related health impacts in low- and middle-income countries are projected to cost $20.8 trillion, cause 4.1-5.2 billion cases of morbidity**, and result in 14.5-15.6 million deaths.
- **Climate services for health (CSfH) investments can help organizations** anticipate and manage climate-related health risks and vulnerabilities, control strategies for climate-sensitive diseases, allocate human and financial resources, prepare for emergencies, and design and maintain health infrastructure.
- **Average CSfH investment needs** for a median-sized developing country are estimated at **$12-$18 million per year** across all seven CSfH activities, and $1.4-$5.9 million per year per activity.
- **Investing in CSfH is estimated to yield $3.60 to $68.40 within five years for every dollar invested,** depending on a country's costs, capacity, and climate trends.
- The following Report Findings include **examples of CSfH investments and their returns.**

Objective

- To estimate the economic value of investing in climate services for health (CSfH) in developing countries.

Background

- "Climate services for health" (CSfH) refers to activities that produce and apply climate data to enhance health decisions and services.
- The report focuses on seven upstream CSfH activities: disease surveillance, public awareness campaigns, hydrometeorological services, climate-sensitive health planning, early warning systems, emergency preparedness, and climate-resilient health facilities.

- The report data is based on a cost-benefit analysis that models the effects of CSfH on reducing climate-related health impacts and costs (methodology on pg. 3).
    - It draws on a literature review of CSfH investments across 40 low- and middle-income countries and on projections of climate-related health impacts sourced from 24 studies.
    - Countries were selected based on the availability of public information. The findings are approximate due to data gaps.

Report Findings

Climate change poses significant global health threats (pg. 6-10):

- Floods, drought, extreme heat, and other **climate-related impacts threaten livelihoods and access to health care** (e.g., by damaging health infrastructure) and **exacerbate existing disease burdens**, such as dengue, malaria, and heat-related illnesses.
- Projected climate-related health impacts vary across countries, with **low- and middle-income countries more vulnerable.**
- Integrated risk monitoring, early warning systems, integrated climate/health research and assessments, health-informed workforces, and resilient infrastructure are needed to manage shifting disease burdens and **build climate-resilient health systems.**

The uptake of climate services for health (CSfH) (pg. 2, 12-13):

- Several countries are prioritizing investment in CSfH (examples on pg. 12), but **the uptake of CSfH activities remains limited.**
    - Only 23% of surveyed WMO Member States integrate meteorological information into health surveillance systems, yet such integration helps decision-makers understand health risks and address climate-related diseases.
    - All 59 national adaptation plans submitted to the UNFCCC from 2021 to 2024 identify the health sector as vulnerable to climate change, yet only **41% estimate the required financial resources to implement health adaptation measures**.
- **Barriers preventing the successful uptake of CSfH:**
    - **Complex implementation:** CSfH are interdisciplinary and require collaboration between national meteorological and hydrological agencies (NMHAs) and health agencies, which rarely work together.
    - **Insufficient funding** to support staff, equipment, and capacity-building
    - **Limited data** collection and management

- **Institutional barriers that prevent collaboration**: Health ministry staff are not equipped to conduct weather and climate modeling, and NMHAs lack the training to integrate health-sector modeling into their work.

The costs and benefits of investing in CSfH (pg. 13-16):

- **Average CSfH investment needs** for a median-sized developing country are estimated at **$12-$18 million per year across all seven CSfH activities**.
  - This estimate **does not account for other necessary CSfH-related investments**, including upstream climate services that collect and share climate and weather data across sectors and downstream on-the-ground health services.
- **CSfH investments have improved health services across countries.** Page 16 includes **examples of CSfH investments and their returns**.
  - Heat-health warning systems in Europe have a benefit-cost ratio of over 10:1.
  - Making health facilities in the Caribbean more climate-resilient has a 100:1 ratio.
  - Community behavior change and awareness campaigns in Pakistan have a 3:1 ratio.

Examples of CSfH investments and potential pathways to more effective health services (pg. 10-13):

CSfH ACTIVITIES THAT PRODUCE CLIMATE AND HEALTH DATA

Activities	Illustrative investments	Pathway to increased effectiveness
Hydrometeorological data generation and information services	▪ Strengthening meteorological information services[a] ▪ Modernizing national meteorological observation systems and forecasting[b] ▪ Improving hydrometeorological and EWS[c]	Hydromet data are required for modeling the epidemiological and ecological impacts of climate change.
Integrated early warning systems	▪ Establishing an EWS to monitor the impact of climate change on infectious diseases and enable their prediction[d] ▪ Developing an integrated EWS using data from diverse sources for real-time outbreak detection and visualization, including meteorological data[e] ▪ Training health ministry staff to deploy EWS[f]	EWS help avoid potential health impacts before they occur by initiating public health responses based on observed hazards.
Integrated disease surveillance systems	▪ Monitoring climate-sensitive diseases against meteorological data to better understand the relationship between climatic patterns and climate-sensitive diseases[g] ▪ Developing standards to manage climate-sensitive disease outbreaks and specific mechanisms for collecting and testing climate-sensitive disease samples[h] ▪ Strengthening national and regional capacities and promoting cross-border collaboration for surveillance[i]	Integrated disease surveillance supports iterative learning and analysis to improve understanding of the linkages between climate and health, to design appropriate facilities and staff training programs, and to monitor the effectiveness of targeting and treatments.

CSFH ACTIVITIES THAT APPLY CLIMATE AND HEALTH DATA		
Activities	**Illustrative investments**	**Pathway to improved effectiveness**
Climate-sensitive health planning	▪ Developing and costing a climate and health adaptation strategy[j] ▪ Leveraging climate risk information to improve the resilience of pharmaceutical supply chains and stockpiles[k] ▪ Developing action and contingency plans for health emergencies[j]	Integrating climate and health data into health sector planning helps to ensure that decisions related to services, infrastructure, and workforces are responsive to climate-related health risks.
Emergency preparedness and response training	▪ Training health facility staff to detect and respond to climate-related health emergencies[j] ▪ Mapping health workforce needs based on current and projected climate vulnerability[j] ▪ Developing health workforce training, regulatory, and management mechanisms to improve preparation for and response to climate-induced health emergencies[l]	Emergency preparedness and response training ensures that health workers are prepared to identify and respond to the health impacts of climate-related events, including droughts and floods.
Community behavior change and awareness campaigns	▪ Developing and disseminating climate and health promotion information to enhance the adaptive capacity of communities in the face of extreme climate-related events[m] ▪ Developing social behavior change communication materials that increase awareness about the impacts of climate change on health and nutrition and adaptation measures[n] ▪ Improving community awareness of the impacts of climate change on water- and vector-borne diseases[h]	Community awareness campaigns reduce behavioral vulnerabilities and support physical improvements in households and at the workplace.
Resilient health facilities and infrastructure	▪ Applying climate-resilient designs to construct health facilities[o] ▪ Developing a national plan for climate-resilient health care infrastructure[j] ▪ Rehabilitating health facilities selected based on their exposure to climate risks, including flooding and extreme heat[p]	Integrated analysis of climate and health risks enables the identification and adaptation of health infrastructure to ensure service continuity.

Images taken from pg. 11