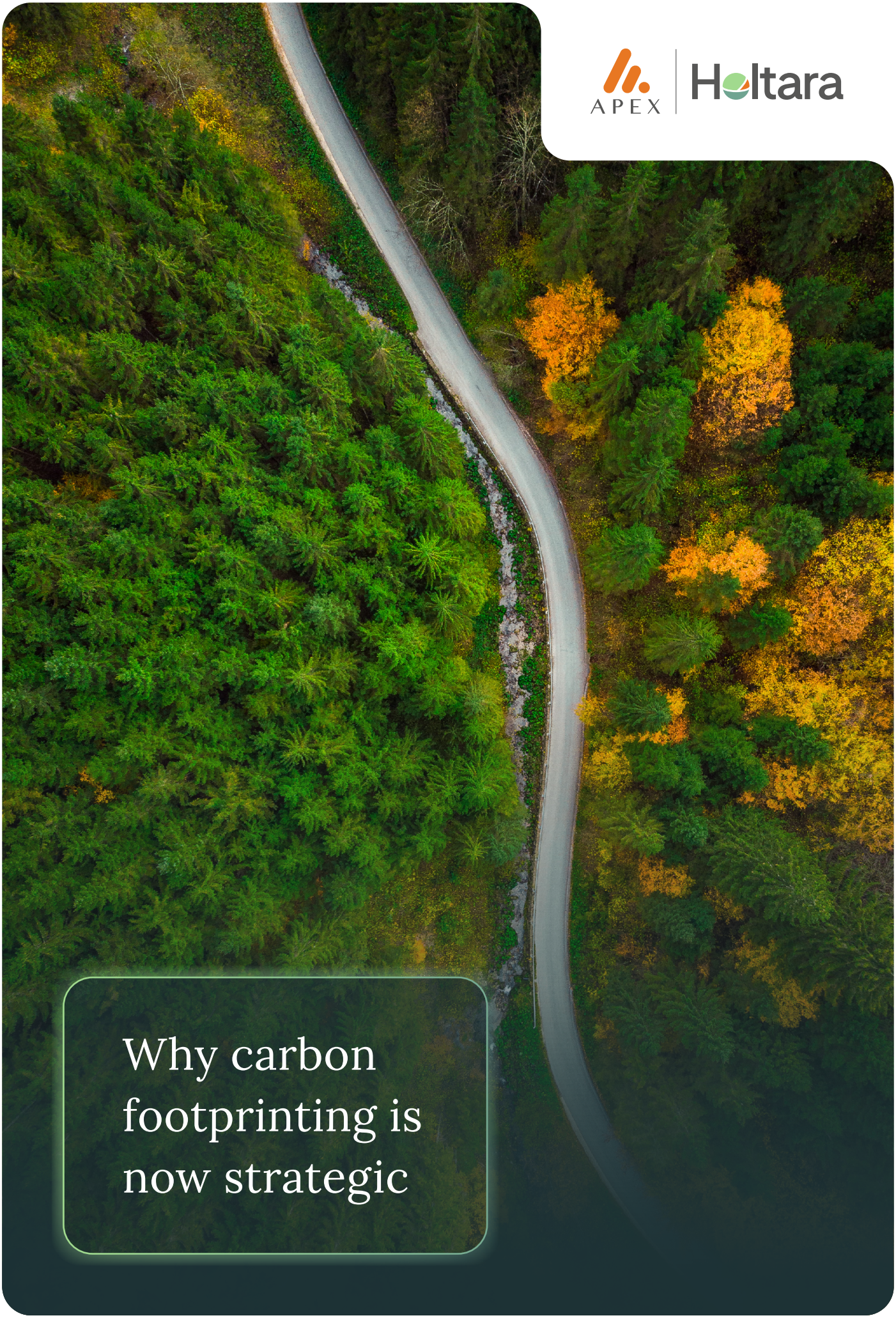


Why carbon footprinting is now strategic

Contents

Introduction

In a world increasingly shaped by climate imperatives, carbon footprinting has moved from a niche sustainability exercise into a strategic necessity. Whether you're a multinational corporation, a growing SME, or a public sector business, understanding and managing your carbon emissions is no longer optional. It's foundational to futureproofing your operations, meeting stakeholder expectations, and aligning with global climate goals (GHG Protocol, 2024; UNFCCC, 2015).

This guide is designed to help you navigate the complexities of carbon footprinting with clarity and confidence. It outlines the frameworks that define credible climate action, including Science Based Targets ("SBTi"), net zero commitments, and the importance of setting meaningful, achievable targets.

It also explores common pitfalls and challenges that companies face, from Scope 3 data gaps to methodological choices like bottom-up vs. top-down approaches, and the emerging risks of relying too heavily on AI-driven tools without proper oversight (BMJ, 2024; Arxiv, 2024).

Finally, we offer our perspective on the changing role of carbon in a shifting geopolitical landscape, where climate policy, trade, and energy security are increasingly intertwined (Wiley, 2024).

Whether you're just starting your carbon journey or refining an existing strategy, this guide will equip you with insights to make informed decisions and avoid costly missteps.

Chapter 1: Fundamentals of carbon accounting

Carbon accounting is the process of measuring and reporting a company's greenhouse gas ("GHG") emissions to understand its climate impact and identify opportunities for reduction. It follows the GHG Protocol, the most widely used standard, which classifies emissions into three scopes:

- **Scope 1:** Direct emissions from sources owned or controlled by the company, such as fuel combustion in company vehicles or on-site boilers.
- **Scope 2:** Indirect emissions from purchased energy, primarily electricity, heating, or cooling consumed by the business.
- **Scope 3:** All other indirect emissions across the value chain, including those from suppliers, business travel, product use, and waste. Scope 3 often represents the largest share of a company's footprint.

Carbon accounting typically involves collecting activity data (e.g., fuel use, electricity consumption) and applying emission factors to calculate emissions in CO_2-equivalent ("CO_2e") terms.

This consistent approach enables companies to set reduction targets, track progress, and report transparently to stakeholders.

Chapter 2: Reduction target-setting and SBTi

Setting meaningful climate targets is the cornerstone of any serious carbon reduction strategy. Yet with a growing number of frameworks, acronyms, and shifting expectations, it's easy to get lost in the detail. Understanding how credible climate frameworks define ambition and accountability provides a useful starting point.

The SBTi has emerged as the gold standard for corporate climate ambition. It provides a clear methodology for aligning emission reductions with the goals of the Paris Agreement, limiting global warming to well below 2°C, and ideally to 1.5°C (SBTi, 2024; UNFCCC, 2015). SBTi targets are grounded in climate science, externally validated, and increasingly expected by investors, customers, and regulators.

But setting a target is only the beginning. The concept of net zero, achieving a balance between emissions produced and removed, adds another layer of complexity. True net zero requires deep decarbonisation across your value chain, not just offsetting residual emissions (SBTi, 2024). The SBTi's Net Zero Standard outlines what this looks like in practice, including long-term targets and the role of carbon removals.

A credible climate strategy must also be time bound, transparent, and tailored to your sector and footprint. Targets should be ambitious but achievable, with interim milestones that drive accountability. They must be backed by strong data and governance structures to ensure progress is measurable and reportable.

A typical roadmap towards SBTi alignment looks like the following:

Measure baseline carbon footprint

The first step in creating a roadmap towards SBTi alignment is to establish a comprehensive overview of current emissions.

Together, Scopes 1, 2, and 3 will form the foundation for the rest of the process.

Assess target setting options

The second step is to assess target-setting options. Start by defining a baseline year and timeline to ensure progress can be measured and tracked. Then choose the most suitable target type - absolute or intensity-based - depending on your business model, noting that absolute targets show stronger ambition but can be challenging for growing companies.

Consider whether to exclude categories such as Scope 3, Category 15 (Investments), which mainly applies to financial institutions, but justify any exclusions to maintain transparency.

Finally, align with sector-specific requirements and select a sound methodological approach, as this will determine how targets are calculated, validated, and communicated. Poor choices at this stage can lead to credibility issues or rejection during SBTi validation.

Develop reduction roadmap

The third step is to identify key opportunities to reduce scope-based emissions, focusing on major emission sources. It involves evaluating the reduction potential of each opportunity to develop a roadmap, assessing the feasibility of achieving the SBTi-aligned targets.

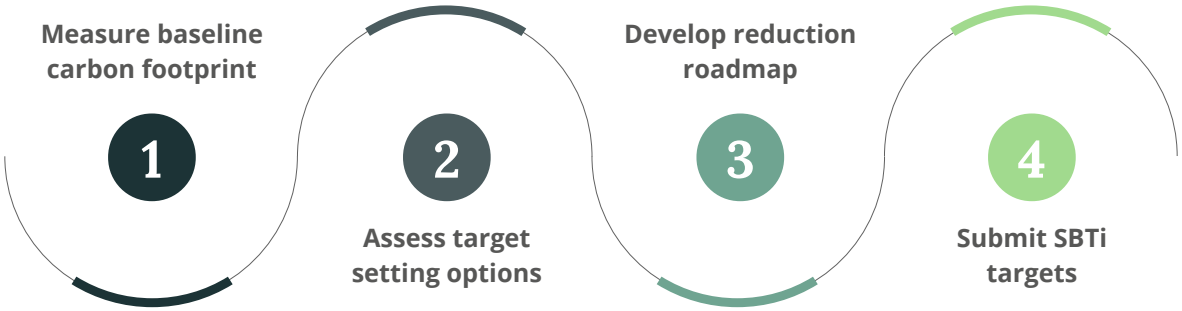
The reduction potential is calculated through a clear assessment of the current state, which is then compared to the low-carbon options available (including an assessment of the feasibility of implementation of these measures).

Submit SBTi targets

The final step is submitting your targets to the SBTi, ensuring they are accurate and fully compliant with SBTi guidelines. After submission, the SBTi conducts a validation process to confirm alignment with its criteria. Once validation is complete, companies can publicly announce their official targets.

Following this roadmap ensures that companies move from measurement to meaningful action, building credibility, and driving real progress towards science-based climate goals.

Typical roadmap towards SBTi alignment



Chapter 3: Challenges and pitfalls

As climate action accelerates, Scope 3 emissions, those arising across the value chain, have become a central focus for companies. These emissions often represent the majority of a company's footprint yet remain the hardest to measure and manage. According to the SBTi, nearly half of companies are currently off track in meeting their Scope 3 goals, highlighting the need for more effective strategies (SBTi, 2023).

For corporates, poor Scope 3 data complicates operational decisions such as supplier selection, logistics planning, and focusing on emissions-reduction initiatives - choices that directly impact compliance and cost efficiency. For private equity actors, data gaps undermine due diligence, making it harder to assess ESG risks and opportunities during acquisitions, and weaken value creation by limiting the ability to identify efficiency gains or enhance exit valuations. Inconsistent methodologies also hinder comparability across assets, increasing reputational and regulatory exposure.

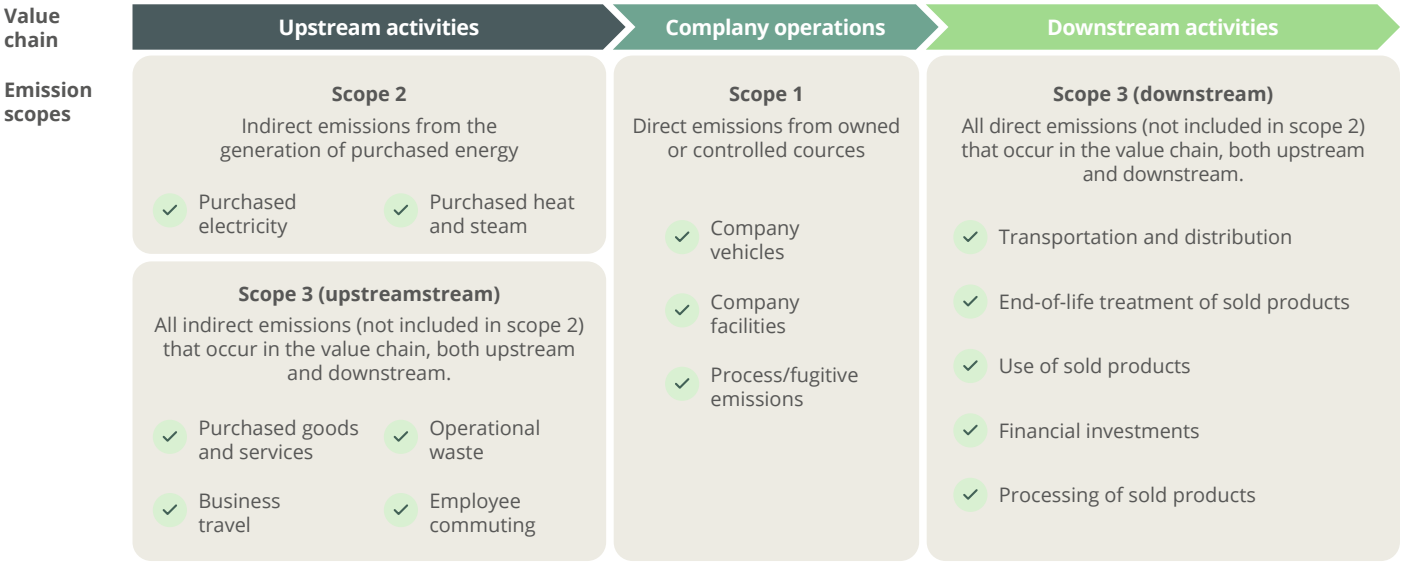
These challenges are becoming more material as regulatory frameworks tighten, and investor scrutiny intensifies. At the same time, new tools, particularly AI-driven systems, are being introduced to streamline carbon accounting.

While promising, these technologies also introduce new risks related to data reliability, energy use, and governance.

A risk-aware approach to Scope 3 management, grounded in robust data governance, methodological transparency, and responsible technology use, is increasingly essential for both corporates and investors.

Three critical pitfalls continue to undermine Scope 3 accounting: data coverage and quality, methodological trade-offs, and the growing risks introduced by AI-driven tools.

Pitfall 1: The Scope 3 data dilemma: coverage and quality



Scope 3 emissions encompass a wide range of activities, from upstream supplier operations to downstream product use and disposal. This breadth creates two major challenges: coverage gaps and data quality issues. Global supply chains are fragmented, and many suppliers lack the systems or incentives to provide accurate emissions data. Downstream, estimating emissions from product use and end-of-life treatment requires assumptions about consumer behaviour, energy mixes, and product lifecycles - factors largely outside a company's control.

To address these gaps, companies often rely on secondary data or industry averages. While this makes assessments more practical and scalable, it compromises both coverage (by oversimplifying complex value chains) and quality (by reducing accuracy and comparability) - especially in sectors like automotive, apparel, and technology (Buchenau, Oetzel and Hechelmann, 2024; UNFCCC, 2023; World Economic Forum, 2023).

Methodologies vary widely, from spend-based models to supplier-specific data, complicating benchmarking and assurance. Regulatory frameworks such as the EU's CSRD and ISSB standards are advancing rapidly, requiring companies to continuously adapt their approaches (European Commission, 2025; IFRS Foundation, 2025).

For investors, poor Scope 3 data quality - particularly in Category 15 (Investments) - creates significant challenges in aggregating financed emissions across portfolios, identifying hotspots, and benchmarking performance.

While portfolio-level methodologies like PCAF are emerging, data availability remains uneven across asset classes and buy-and-build strategies often exacerbate inconsistencies when subsidiaries use different factor sets.

PE firms can mitigate this risk by issuing portfolio-wide data quality policies and scoring systems - defining acceptable methods per category, factor sources, and timelines for upgrading to supplier-specific or product-level data, e.g., via PACT/Pathfinder exchanges (PCAF, 2022; WBCSD, 2023).

Pitfall 2: Methodological trade-offs: bottom-up vs. top-down

Carbon accounting methodologies fall broadly into two categories: bottom-up and top-down. While both have their place, this guide strongly favors bottom-up approaches as the foundation for credible, actionable carbon strategies.

- **Bottom-up methods** use supplier-specific or process-level data to deliver high-resolution insights at the site or product level. This granularity enables targeted interventions - such as input substitutions, SKU redesigns, and supplier switching - and supports robust reporting, auditability, and sustainability-linked financing. Though resource-intensive, bottom-up accounting is consistently viewed as more precise and defensible (GHG Protocol, 2024; ISO/IEC 42001, 2023).
- **Top-down methods,** including environmentally extended input-output models, offer speed and coverage by relying on sector averages and financial performance data (e.g., revenue). These are useful for initial screening or estimating exposure but lack the fidelity needed for performance management or contractual KPIs. They can misplace emissions hotspots and are sensitive to price fluctuations, making them risky as a primary tool (WBCSD, 2023; IPCC, 2023).

While portfolio-level methodologies like PCAF are emerging, data availability remains uneven across asset classes and buy-and-build strategies often exacerbate inconsistencies when subsidiaries use different factor sets.

PE firms can mitigate this risk by issuing portfolio-wide data quality policies and scoring systems - defining acceptable methods per category, factor sources, and timelines for upgrading to supplier-specific or product-level data, e.g., via PACT/Pathfinder exchanges (PCAF, 2022; WBCSD, 2023).

Pitfall 3: Risks of using AI-related tools

Artificial intelligence is increasingly applied to streamline carbon accounting processes, from data aggregation to predictive modeling. While AI offers efficiency gains, it introduces risks that companies must manage carefully.

- **First,** AI models are only as reliable as the data they process. In the context of Scope 3 emissions, where data is often incomplete, inconsistent, or based on estimates, AI-driven outputs can amplify inaccuracies rather than resolve them (NIST, 2023).
- **Second,** the energy intensity of AI systems themselves cannot be overlooked. Training and operating large models consume substantial electricity, increasing Scope 2 and Scope 3 emissions and, in some cases, offsetting reductions achieved elsewhere (ISO, 2023). However, recent research suggests that AI energy consumption with normal use also should not be overstated. Google estimated that GHG emissions associated with a median Gemini prompt are around 0.03 grams; for comparison, chicken produces 4.2g CO_2e per kg, around seven times lower than beef (Crownhart, 2025; Oviedo et al., 2025).
- **Third,** AI lacks the nuanced judgement required to navigate changing regulatory frameworks. Without human oversight, companies risk non-compliance as standards such as CSRD and ISSB continue to advance (EU, 2024).

- **Finally,** an over-reliance on AI for emissions management can create blind spots in broader ESG performance. For example, an AI-driven procurement tool might recommend switching to a lower-emission supplier without considering whether that supplier adheres to fair labour practices or human rights obligations. This narrow focus on carbon metrics can expose companies to reputational and legal risks, particularly under emerging due diligence regulations like the EU CSDDD.

These risks are not limited to corporate operations; they also extend to the investment landscape as well. For GPs, AI adoption across portfolio companies raises governance and liability questions. The EU AI Act and frameworks like the NIST AI RMF or ISO/IEC 42001, set out expectations for inventorying, documenting, and monitoring AI systems. Investors should ensure that portfolio companies deploying AI in carbon accounting maintain audit trails, freeze factor libraries per reporting cycle, and involve human reviewers. Without such controls, portfolio-wide GHG inventories risk being challenged during verification or by LPs.

- **In conclusion,** Scope 3 carbon accounting remains a complex and developing challenge at both corporate and portfolio levels. Companies must address data gaps, navigate methodological trade-offs, and manage emerging AI risks while ensuring compliance and credibility. For investors, these same pitfalls translate into portfolio-wide comparability issues, diligence risks, and exposure to LP scrutiny. A balanced approach - combining rigorous data governance, hybrid methodologies, and responsible AI integration - will be essential for building robust, future-proof carbon accounting systems that create both climate impact and financial value.

Chapter 4: Carbon in the geopolitical environment

In today's challenging macroeconomic environment, decarbonisation efforts often find themselves secondary to more immediate geopolitical and economic priorities. Yet below this tension, powerful technological and market dynamics are reshaping the global energy landscape in ways that may ultimately transcend short-term political considerations.

For one, the renewable technology sector continues its rapid scaling, with solar panel costs decreasing by 30% over the last two years and prospective solar and wind capacity growing by over 20% globally in 2024 (IEA, 2024; Global Energy Monitor, 2024). AI-powered innovations spring up across battery technology, advanced geothermal systems, small modular reactors, and upgrades to grid infrastructure. These technological developments represent fundamental shifts in the economics of clean energy that are increasingly independent of policy support.

Moreover, climate change presents both escalating costs and emerging opportunities that are reshaping investment calculations. The economics are stark: climate change costs the global economy $16 million per hour (World Economic Forum, 2024) and the cost is surely expected to increase over time as the impacts of climate change worsen. As climate risks translate into tangible business impacts, from supply chain disruptions to regulatory compliance and physical asset damage, companies are discovering that climate resilience has become a core business imperative, not just an ESG consideration.

Traditional financial metrics now incorporate climate risk premiums, affecting everything from capital access to long-term planning.

As the international community prepares for COP 30, set in Belém, Brazil in November 2025, expectations for additional large-scale financing commitments appear modest, particularly given current geopolitical tensions and economic pressures.

However, this may paradoxically accelerate the transition toward market-driven solutions rather than policy-dependent approaches. If there is a silver lining, it's that China has just announced a 7%-10% reduction in its peak GHG emissions by 2035, the first absolute target the country has committed to.

While admittedly underwhelming and insufficient to stave off a 1.5 °C warming, the commitment nevertheless signals potentially significant turning point for the world's largest emitter.

We anticipate that while short-term political pressures may slow coordinated global action, the fundamental economics of the energy transition suggest that market dynamics will increasingly take precedence. Driven by cost competitiveness, risk management, and technological capabilities, market forces may ultimately prove more decisive than political agreements in driving the pace and scale of decarbonisation.

Final reflections

Carbon footprinting has moved from a compliance exercise to a strategic imperative that underpins business resilience, investor confidence, and long-term value creation. Businesses that align with science-based targets, adopt robust methodologies, and integrate carbon considerations into governance will be best positioned to navigate regulatory shifts and stakeholder expectations. While challenges such as Scope 3 data gaps, methodological trade-offs, and emerging AI risks persist, these can be mitigated through rigorous data governance, hybrid approaches, and human oversight.

At the same time, geopolitical uncertainty and market dynamics underscore that decarbonisation is no longer solely policy-driven; it is increasingly shaped by technology, economics, and risk management. Companies that act decisively today will not only reduce climate risk but also gain a competitive advantage in a rapidly evolving global economy.

How can we support you?

Carbon assessment

We can conduct a comprehensive Greenhouse Gas Protocol-aligned carbon footprint assessment (Scope 1, 2, and 3) for any portfolio or company and perform benchmarking studies.

We also support product-level Life Cycle Assessments, financed emissions, and avoided emission calculations.

Decarbonisation pathways

We determine effective reduction pathways by identifying carbon hotspots and aligning with a 1.5°C trajectory through a decarbonisation and net-zero strategy.

Climate risk assessments

We provide insights on key physical and transition climate risks, leveraging our proprietary database built on advanced climate modelling.

Industry alignment

We are aligned with leading industry and regulatory frameworks, including:

- Task Force on Climate-related Financial Disclosures
- Science Based Targets initiative
- Carbon Disclosure Project
- EU Taxonomy
- Sustainable Finance Disclosure Regulation
- Corporate Sustainability Reporting Directive
- Carbon Border Adjustment Mechanism
- Taskforce on Nature-related Financial Disclosures

Advisory insights and strategies

We offer tailored advisory insights from subject-matter experts through workshops and strategic projects designed to accelerate sustainable transformation.

Our reach and expertise

400+

GPs and LPs trust our independently verified data to ensure accuracy and credibility

150+

ESG, climate, regulatory, data, and impact specialists who deliver superb client service

15+

Years experience as a market leader in ESG and Sustainability

50+

Countries where we deliver our services

15+

Languages spoken by our global team

10+

Awards received for our ESG and sustainability services

To find out more, **contact our team of experts.**

References

Arxiv. (2024) Integrating AI's carbon footprint into risk management frameworks: strategies and tools for sustainable compliance in the banking sector. Available at: https://arxiv.org/html/2410.01818v1

Buchenau, N., Oetzel, J. and Hechelmann, R.-H. (2024) Category-specific benchmarking of Scope 3 emissions for corporate clusters. Available at: https://kobra.uni-kassel.de/items/48ed6f9f-7f76-47a1-a3ea-b9f5e3ba9c9d

BMJ. (2024) Artificial intelligence risks becoming an environmental disaster. Available at: https://www.bmj.com/content/bmj/388/bmj.r505.full.pdf

Crownhart, C. (2025) In a first, Google has released data on how much energy an AI prompt uses. Available at: https://www.technologyreview.com/2025/08/21/1122288/google-gemini-ai-energy/

European Commission. (2024) EU Artificial Intelligence Act. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1689

GHG Protocol. (2024) Scope 3 calculation guidance. Available at: https://ghgprotocol.org/scope-3-calculation-guidance-2

GHG Protocol. (2024) Greenhouse Gas Protocol Scope 3 Technical Working Group (TWG) discussion paper. Available at: https://ghgprotocol.org/sites/default/files/2024-11/Scope%203-Subgroup%20B-Meeting1-Discussion%20paper-%20final.pdf

GHG Protocol. (2024) Corporate value chain (Scope 3) standard. Available at: https://ghgprotocol.org/corporate-value-chain-scope-3-standard

Global Energy Monitor. (2024) Wind and solar year in review 2024. Available at: https://globalenergymonitor.org/report/wind-and-solar-year-in-review-2024/

IFRS Foundation. (2025) International Sustainability Standards Board. Available at: https://www.ifrs.org/groups/international-sustainability-standards-board/

International Energy Agency (IEA). (2024) World energy investment 2024: overview and key findings. Available at: https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings

IPCC. (2023) AR6 synthesis report: climate change 2023. Available at: https://www.ipcc.ch/report/sixth-assessment-report-cycle/

ISO. (2023) ISO/IEC 42001: artificial intelligence – management system. Available at: https://www.iso.org/standard/42001

NIST. (2023) AI risk management framework. Available at: https://www.nist.gov/itl/ai-risk-management-framework

Oviedo, F., Kazhamiaka, F., Choukse, E., Kim, A., Luers, A., Nakagawa, M., Bianchini, R. and Lavista Ferres, J.M. (2025) Energy use of AI inference: efficiency pathways and test-time compute. Available at: https://arxiv.org/pdf/2509.20241

PCAF. (2022) Global GHG accounting and reporting standard for the financial industry. Available at: https://carbonaccountingfinancials.com/standard

Science Based Targets Initiative. (2024) Ambitious corporate climate action. Available at: https://sciencebasedtargets.org

Science Based Targets Initiative. (2024) Corporate net-zero standard. Available at: https://sciencebasedtargets.org/net-zero

Science Based Targets Initiative. (2024) Standards and guidance. Available at: https://sciencebasedtargets.org/standards-and-guidance

UNFCCC. (2015) The Paris Agreement. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement

UNFCCC. (2023) Guidance for measuring greenhouse gas emissions for purchased goods and services for the apparel and footwear industry. Available at: https://unfccc.int/sites/default/files/resource/Guidance%20for%20Measuring%20Greenhouse%20Gas%20Emissions%20Scope%203%20PG%26S.pdf

References

WBCSD. (2023) Pathfinder framework version 2.0. Available at: https://www.wbcsd.org/resources/pathfinder-framework-version-2-0/

Wiley. (2024) Corporate Scope 3 carbon emission reporting as an enabler of supply chain decarbonisation: a systematic review and comprehensive research agenda. Available at: https://onlinelibrary.wiley.com/doi/full/10.1002/bse.3486

World Economic Forum. (2023) The "No-Excuse" opportunities to tackle Scope 3 emissions in manufacturing and value chains. Available at: https://www3.weforum.org/docs/WEF_No-Excuse%E2%80%9D_Opportunities_to_Tackle_Scope_3_Emissions_in_Manufacturing_and_Value_Chains_2023.pdf

World Economic Forum. (2024) Climate change is costing the world $16 million per hour. Available at: https://www.weforum.org/stories/2023/10/climate-loss-and-damage-cost-16-million-per-hour/

holtara.com