MONTHLY RESEARCH DIGEST

An Executive Briefing on New & Notable Sustainability Research

In This Issue – **May 2025**

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SCOPE 3 DECARBONIZATION

Scope 3 Decarbonisation: Practitioner Challenges

By Ramboll (for the Voluntary Carbon Markets Integrity Initiative (VCMI))

View the full report here

Notable Highlights

- **Most companies are experiencing incremental changes in Scope 3 emissions,** ranging from 0% to 10% change, rather than a substantial transformation.
- Approximately **80% of Scope 3 emissions across sectors are found in two categories: Purchased Goods and Services and Fuel- and Energy-Related Activities**.
- Companies are facing **two main themes and five top cross-sector barriers to Scope 3 decarbonization:**
  - **A. Techno-economic barriers to upstream decarbonization:** (1) limited availability of technically suitable low-carbon options, (2) high cost of low-carbon alternatives, and (3) high costs of carbon-free energy and fuels
  - **B. Supply chain coordination and emissions reporting barriers:** (4) supplier emissions data unavailability and (5) lack of control or influence over indirect suppliers
- The following Report Findings break down **solutions for techno-economic barriers** to upstream decarbonization barriers **and supply chain coordination and emissions reporting barriers**, including cost and timeline estimates.

Objective

- To identify which Scope 3 categories are the most material to companies today, decarbonization barriers associated with those categories, and potential solutions (including potential costs and timelines).

Background

- The report data is based on a literature review, interviews with “decarbonization practitioners,” and a survey of 181 sustainability professionals across regions and 10 sectors (methodology on pg. 5, 19-20, 23).

- Survey respondents identified their two highest-emitting Scope 3 categories, their top three decarbonization barriers in both categories, and potential solutions.
- Five factors were evaluated to prioritize decarbonization barriers: (1) their frequency of selection, (2) severity, and (3) prevalence across sectors, as well as the (4) respondent's company's historical emissions change and (5) perceived ability to meet future targets (pg. 51).

Report Findings

The Scope 3 maturity of survey respondents' companies (pg. 23-24):

- Over 55% have set Scope 3 decarbonization targets between 2030 and 2040.
- Respondents said their **company's ability to meet targets is "somewhat limited" (39%),** "adequate" (30%), "good" (22%), "very good" (4%), or "very limited" (5%).
- Most respondents reported that their **company's past performance on Scope 3 emissions reductions was** "as expected" (46%) or **"below expectation" (36%),** compared to "above expectation" (13%) or "far above" (4%).
- Between the earliest and latest years for which companies have emissions calculations, **46% reported a decrease in their Scope 3 emissions, 38% reported an increase, and 16% reported no significant change.**
    - Over 35% of those who reported an increase in Scope 3 emissions identified company growth or calculation methodologies (e.g., spend base) as the primary reason.
    - Some companies' emissions have decreased due to a decrease in revenue.
- **65% said their company could implement Scope 3 decarbonization solutions within five years, and 20% said they could within 10 years.** This is contingent upon having the necessary resources, stakeholder support, and structural changes that are beyond individual companies' control.

Scope 3 categories (pg. 4-5):

- **Investments are the third-most material category** for responding companies (the most material for 11% of respondents), driven by financial companies.
- Emissions from Purchased Goods and Services are more prominent in North American (37%) and European (29%) companies, due to their reliance on upstream suppliers and advanced data tracking.

- Emissions from Fuel- and Energy-Related Activities are more prominent in companies in Asia (33%), Latin America (23%), and the Middle East (50%) due to greater reliance on fossil fuel-intensive energy production.

Sector and cross-sector barriers hinder Scope 3 decarbonization (pg. 22-49):

Cross-sector top 10 barriers	Sectors impacted
Limited availability of technically-suitable low-carbon options	
Lack of control or influence over indirect suppliers	
High cost of low-carbon alternatives	
Supplier granular emissions data unavailability	
High costs of carbon-free energy and fuels	
Cost of implementing recycling/circular technologies and methods in-house	
Dependency on fossil fuel suppliers	
Cost of switching to electric / alternative fuel fleets	
Difficulty shifting direct supplier relationships	
High dependency on air and sea freight that has limited decarbonisation options	

Biotech · Consumer packaged goods · Professional services · Financial services · Retail
Real estate · Utilities and energy · Information technology · Manufacturing · Transport

Image taken from pg. 7

Top barriers by sector		
Sector	**Priority barrier 1**	**Priority barrier 2**
Biotech	Cost of switching to electric / alternative fuel fleets	High dependency on air and sea freight that has limited decarbonisation options
Consumer packaged goods	Limited availability of technically-suitable low-carbon options ●	Cost of switching to electric / alternative fuel fleets
Finance	Lack of emissions disclosure by investees ●	Risk return concerns on green investments ●
Information technology	Cost of implementing recycling/circular technologies and methods in-house	Employee preference for air travel ●
Manufacturing	Limited availability of technically-suitable low-carbon options ●	Dependency on fossil fuel suppliers
Professional services	High costs of carbon-free energy and fuels ●	Lack of control or influence over indirect suppliers ●
Real estate	Difficulty monitoring tenant energy use	Tenant engagement challenges
Retail	Cost of implementing recycling/circular technologies and methods in-house	High cost of low-carbon alternatives ●
Transport	Lack of control or influence over indirect suppliers ●	Limited availability of carbon-free energy and fuels ●
Utilities and energy	High costs of carbon-free energy and fuels ●	Dependency on fossil fuel suppliers

Image taken from pg. 7

- **Pages 30-49 have detailed industry-specific insights for all 10 sectors,** including Scope 3 decarbonization barriers and the most material Scope 3 categories.

Solutions to the top five cross-sector Scope 3 decarbonization barriers (pg. 53-55):

- Across all sectors and solutions, the **estimated solution cost averaged between the $250,000-$1 million and $1 million-$5 million** categories. The **timelines ranged from under two years to over 15 years**, but most are **achievable within the next 10 years**.
- **Techno-economic solutions are likely to cost more** than supply chain coordination solutions (over $10 million vs. under $250,000) **and take longer to implement** (3-5 or 6-10 years vs. under 2 years), due to the development, testing, and scaling of technologies or infrastructure required.
- Additional research and pathway modeling are needed to refine barrier-specific solutions, establish clearer cost benchmarks, and further evaluate implementation timelines for effective decarbonization.

- Pages 66-72 break down **solutions for five barriers that ranked in the top two within an individual sector but did not appear in the top 10 cross-sector barriers.** The barriers (and their respective sectors) include:
    - Financial Services: lack of emissions disclosure by investees and risk-return concerns on green investments
    - ICT: employee preference for air travel
    - Real Estate: difficulty monitoring tenant energy use
    - Transport: limited availability of carbon-free energy and fuels

Solutions for techno-economic barriers to upstream decarbonization (pg. 56-61):

- **Create, test, and scale low-carbon technologies or transform existing systems.**
    - Costs range from low-cost initiatives, such as material testing (under $250,000), to high-cost ones, like fleet electrification (over $10 million).
    - Electrification is a significant aspect of this category, including investments in electric vehicles, charging infrastructure, and battery technologies.
- **Collaborate across supply chains to align resources, share expertise, and scale decarbonization efforts** (e.g., adjust procurement strategies to prioritize low-carbon materials, co-fund technologies, and advocate for clean energy incentives).
- **Optimize logistics** by improving route efficiency, upgrading vehicle fleets, or transitioning to low-carbon solutions.
- When low-carbon options are inaccessible or unaffordable**, use high-quality carbon credits as an interim strategy** to drive climate finance into emission-reduction activities.
- **Electrify and develop infrastructure** by integrating renewable energy into operations, constructing EV charging networks, and transitioning to low-carbon industrial processes.
- **Leverage tax credits and subsidies** for renewable energy production, carbon pricing, and incentives for infrastructure development.
- **Utilize branding efforts and education campaigns** to foster consumer willingness to pay for low-carbon products.
- **Adjust business models to capture the green premium**, including leveraging customer demand to justify investments in carbon-free energy or low-carbon alternatives.

Solutions for supply chain coordination and emissions reporting barriers (pg. 62-65):

- **Collaborate with and engage suppliers** through formal engagement programs, data-sharing mandates, targeted training to improve emissions reporting and accountability, and tiered incentive structures rewarding emissions reductions.
- Expand or **diversify the supplier base** to include suppliers already committed to decarbonization.
- Embed **sustainability into contracts** to drive compliance and accountability.
- Promote **supplier geographic proximity** to enable more direct engagement and oversight.
- Adopt **centralized, standardized digital tracking tools** to streamline the collection, verification, and reporting of emissions-related data.

CORPORATE CLIMATE RISKS, ADAPTATION, & INVESTMENT

Sizing the Inevitable Investment Opportunity: Climate Adaptation

By GIC, in partnership with Bain & Co.

View the full report here

Notable Highlights

- **Global annual revenues from a select set of 14 climate adaptation solution groups are projected to grow from $1 trillion today to $4 trillion by 2050** (under a 2.7°C warming scenario). An estimated $2 trillion will be incremental revenue growth driven by global warming.
- **The investment opportunity for these solutions is expected to grow from $2 trillion today to $9 trillion by 2050**, with an estimated $3 trillion of incremental growth driven by global warming.
- **The investment opportunity is significant regardless of the climate scenario.** The **estimated value only varies +/-4% across climate scenarios** ranging from 1.5°C to over 4°C, suggesting that **investors can build conviction in adaptation investments without needing to predict the precise scenario that will unfold**.
- Global warming will fuel the **adoption of mature solutions** and **technological innovation for emerging solutions**, creating **investment opportunities for traditional and emerging industries.**

Objective

- To identify which climate adaptation solutions are most relevant to private sector investors and develop estimates of the potential investment opportunity.

Background

- The report data is based on reviews of industry and scientific studies, interviews with industry practitioners, climate scientists, insurers, and weather modelers, and assessments of climate adaptation solutions (methodology on pg. 7-11, 20-21).

- To develop the select set of climate adaptation solutions, the report authors identified the most material physical climate hazards across climate scenarios and regions, narrowed down over 1,400 solutions to 14 solution categories based on commercial attractiveness, socio-political acceptance, and substitution risk, and modeled the total addressable market for 2024-2050 and the potential investment value under four climate scenarios.
- The climate scenarios are the Stable Temperature Reference (projected solution demand assuming no further global warming) and three scenarios aligned with UN IPCC scenarios: the Base Case (2.7°C of warming, based on current climate policies and actions), the Low Case (net zero by 2050), and the High Case (4°C, a failed transition).

Report Findings

The investment value and revenue growth by 2050 across the 14 adaptation solution categories (bubbles represent 2050 enterprise value) (pg. 15):

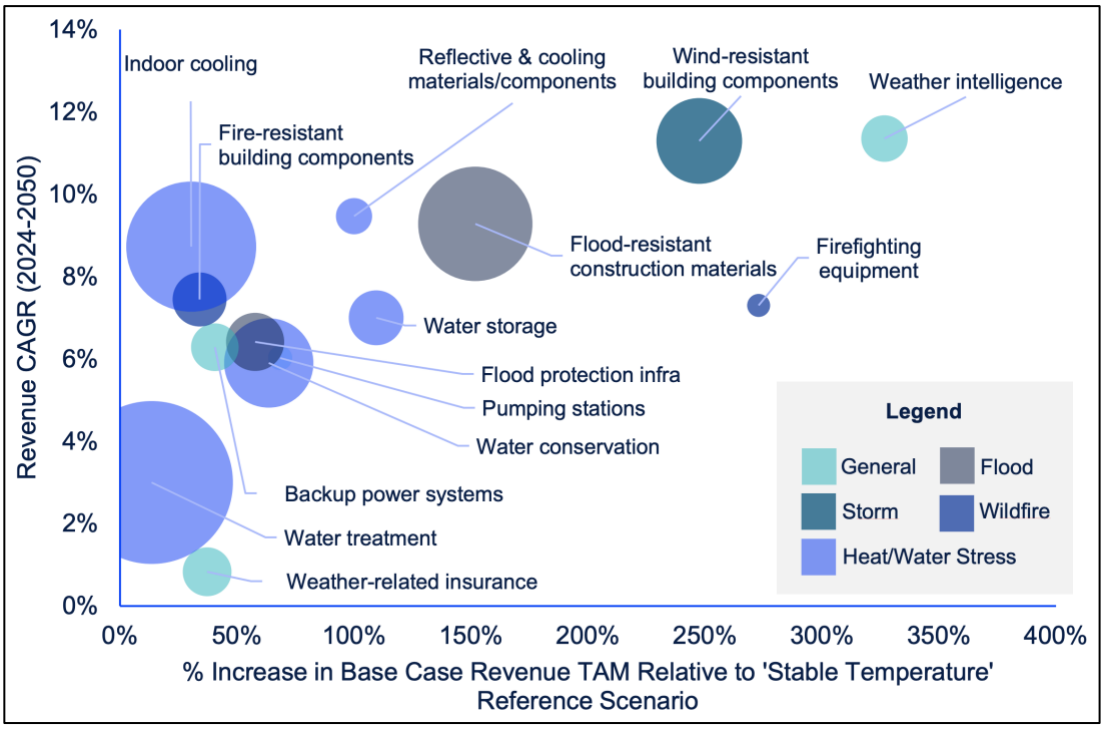


Image taken from pg. 15

Climate adaptation solution examples (pg. 16-17):

- **Weather intelligence solutions** turn weather data into actionable insights (e.g., to optimize flight routes, forecast renewable energy generation, and plan agricultural harvests). The **market is nascent** but expected to be one of the fastest-growing, **with annual revenues forecasted to grow 16-fold to over $40 billion by 2050**.

- **Wind-resistant building components** build resilience against storms and hurricanes, which accounted for over 55% of global economic damages from climate-related events from 2000 to 2024.
    - Global **adoption of these products has been inconsistent** due to a lack of comprehensive regulations.
    - **Demand is expected to grow from approximately $40 billion today to over $650 billion by 2050**, driven by insurers' increasing requirements, more stringent building codes, and a growing consumer willingness to build storm resilience.
- **Flood-resistant construction materials**: Floods have accounted for approximately 30% of economic losses from climate-related events and are expected to become more frequent and intense in the coming decades, particularly in Europe and Asia.
    - Regulations are expected to become more robust as flood events increase.
    - **The market for flood-resistant construction materials is expected to exceed $680 billion by 2050.**

Total addressable market (TAM) forecasts for adaptation solutions (pg. 13-14):

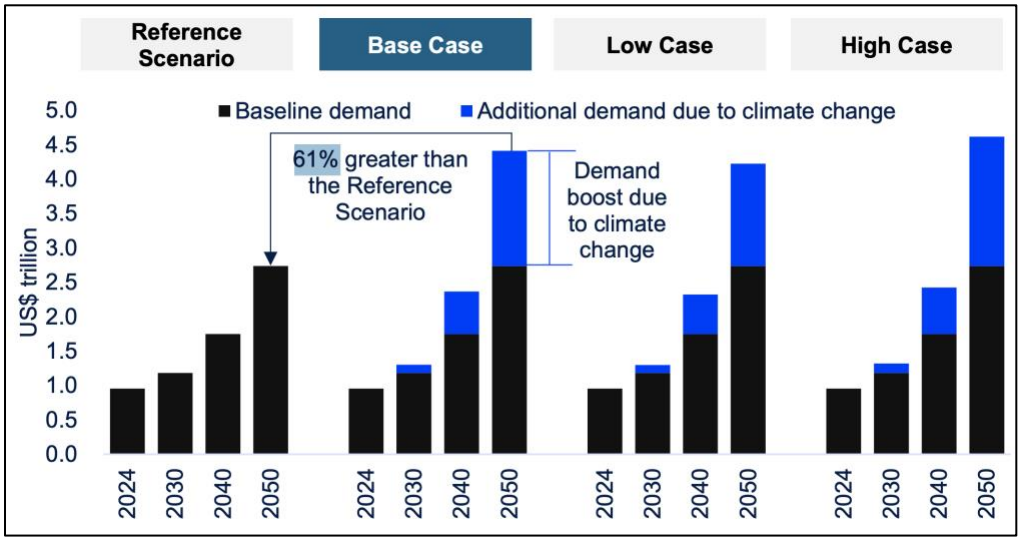


Image taken from pg. 14

- In the Base Case, **2050 revenues for adaptation solutions are expected to exceed projections based on historical trends by 61%.** This is because most financial planning teams rely on historical data for forecasting, which creates an information gap.
- Estimates assume demand will be reactionary and follow rising temperatures as they occur. **If demand becomes anticipatory due to growing awareness of physical climate risks, demand could accelerate significantly before 2050.**

Climate Risk & Adaptation in Global Food

By First Sentier MUFG Sustainable Investment Institute

View the full report here

Notable Highlights

- **Global food demand is expected to increase at a compound annual growth rate of 1.26%** over the next decade, driven by population, economic, and urbanization growth.
- **The global food system faces six extreme weather events with a projected cost of up to $38 trillion in damages across food value chains, infrastructure, and wider natural ecosystems by 2050** (in a 2.5°C warming scenario): temperature extremes, heavy precipitation, flooding, droughts, storms, and compound events.
- Given the globally integrated nature of food supply chains, **direct and indirect investors** will face significant climate risks in the coming decades, and therefore, a **higher likelihood of insecurity and commercial losses.**
- The following Report Findings include **deep dives on crop, livestock, and fishery value chains** (including climate and extreme weather **risks and examples of mitigation and adaptation levers)** and **actions for investors** to improve food security and resilience in portfolio food and agriculture companies while achieving commercial returns.

Objective

- To highlight the impacts of climate change and extreme weather on global food supply chains and outline actions for investors to improve food security and resilience in portfolio food and agriculture companies while achieving commercial returns.

Background

- The report data is based on Baringa analysis (pg. 3), US Energy Information Agency projections (pg. 3), and other sources, including the United Nations, the OECD-FAO Agricultural Outlook, the World Bank, and Reuters (see report footnotes for all sources).
- “Extreme weather” refers to a singular occurrence of rare weather for a particular place or time. “Climate risk” refers to a pattern of extreme weather over longer periods (pg. 6).

Report Findings

Examples of extreme weather impacts on the food system and investors (pg. 8):

Extreme Weather Hazards	Temperature extremes	Heavy precipitation	Flooding	Droughts	Extreme storms	Compound events
First Order Impacts	Soil degradation	Water scarcity	Labour shortage	Biodiversity loss	Energy price Inflation	Warming waters
			Nutrient cycling decline	Pollination service decline	Pest control disruption	Loss of genetic diversity
Production Impacts	Farmland damage	Inputs reduction	Feed shortage		Wild capture migration	Aquaculture facility damage
	Crop yield reduction		Livestock injury, stunting & mortality		Fishery stock decline	
Value Chain Impacts	Agricultural output fall	Low plant productivity	Transport disruption	Market shortages	Increased food loss (incl. from perishables lost in transport)	
Societal Impacts	Lower food resilience		Greater food insecurity		Social unrest	
Investor Impacts	Heightened risk profiles and insurance premiums	Increased capital and operational expenditures	Increased price volatility	Market turbulence	Long-term decline in yields	Increased stranded asset risks

Deep dives on crop (pg. 15-23), livestock (pg. 24-33), and fishery (pg. 34-42) value chains:

*These deep dives outline **climate and extreme weather risks in each value chain**, **how risks impact assets and investors**, **mitigation and adaptation levers**, and **questions companies and investors should ask** to identify the optimal mix of mitigation and adaptation measures.*

Investment risks and opportunities across the food value chain (pg. 43-46):

- Pg. 43 includes an **overview of investment risks and opportunities** across the food value chain.
- **Climate risks and extreme weather events are shifting the players in global agricultural supply chains that will capture the most value from increasing food demand** ("the new winners")**. Five key market shifts:**
    1. Changing climate patterns are making geographic regions that were previously too cold more viable as agricultural hubs, such as Northern Europe. The new

winners will capitalize on shifting climate patterns, infrastructure enhancements, and opportunities to shorten supply chains, particularly in **servicing large, ready demand markets** and driving a premium for locally sourced products.

2. Temperature spikes and droughts are **shifting crop and livestock farming** toward species that are more heat- or cold-resilient (e.g., from cattle to goats). The new winners will **make these shifts faster**, and in consumer markets already being repositioned for them.
3. **Technological innovation** is accelerating data analytics and AI use to enhance farming yields. The new winners will **understand technological risks and opportunities** and prepare consumer markets to do the same.
4. **Dietary choices are evolving.** Higher-income countries are emphasizing the connections between health and sustainability, while emerging markets are consuming more calories, particularly those from meat and dairy. The new winners will **understand and meet shifting consumer preferences**.
5. **Agricultural trade may decline** in the coming decade, particularly in countries that limit exports when faced with domestic food insecurity resulting from lower agricultural yields due to climate change. The new winners will seek to **influence trade policy and diversify import and export markets**.

Actions for investors to improve food security and resilience in portfolio food and agriculture companies while achieving returns (pg. 47-50):

- **Understand the key risks within your portfolio companies by identifying** upstream supply chains and partners, economic structures and flows of core businesses, forward demand and price trends, extreme weather hazards and adaptation/mitigation measures, trade policy, subsidy schemes, ESG regulations, diversification options to reduce supply/demand dependencies; and innovative agricultural practices/solutions.
- **Incorporate physical climate risk into investment decision-making.** Update due diligence processes to consider cross-value chain climate impacts (e.g., impacts on upstream commodity input prices).
- **Encourage portfolio companies to disclose (to the board and/or publicly) the following information:**
    1. **Value chain maps** outlining core partners and regions that account for over 20% of supply or offtake.
    2. **Climate risk scenarios** over at least 10 years across all key extreme weather hazards for themselves and their core supply chains.
    3. **Input price scenarios** over five years across all key inputs, including key drivers for volatility.

4. **Trends in nutrient density** across key products (e.g., a reduction in wheat protein density due to drought).
5. Operational **emissions trajectories** across Scopes 1-3.
6. **Natural resource consumption** across direct and indirect operations (e.g., the spatial footprint of controlled land, land use change, and water consumption) and opportunities to reduce resource usage.
7. **Material ESG factors** impacting direct and dependent (relying on other operations to function effectively) operations (e.g., water, biodiversity loss).
8. Current and projected **carbon taxes'** impact on operations, including economics and product mix.
9. **Market trends** at the end of agricultural value chains that may alter customer and consumer demand, such as a shift toward health or sustainability.
10. **Operational, product, and investment plans** to decarbonize operations, improve material impacts, and hedge against future consumer demand.

- **Accelerate sustainable business models and mitigate climate risk through active engagement with key stakeholder groups:**

Stakeholder	Example objectives
Corporate	• Encourage disclosures on the full extent of climate risk impacting the business either directly or indirectly across its value chain • Support portfolio companies to engage with agricultural innovations and climate-smart technologies through investing in R&D and implementation • Facilitate resilience planning through driving integration of climate risk assessments into investment decisions at Board Level
Investors and asset owners	• Align frameworks on climate risk and sustainability into due diligence and portfolio management • Collaborate on impact initiatives to fund scalable projects in agricultural innovation and biodiversity preservation • Develop innovative financial instruments and structures to mobilise capital to support large scale agricultural transformation
Wider industry	• Promote climate resilience practices through encouraging portfolio companies to adopt sustainable sourcing policies • Foster collaboration and innovation through connecting value chain companies to co-pilot new agricultural innovations • Convene companies and stakeholders to define suitable and aligned net-zero pathways benchmarks, and climate resilience plans
Policy makers	• Engage with governments to understand and influence policy to align to climate goals, including carbon pricing, subsidies, and biodiversity conservation incentives • Collaborate on developing public-private financing schemes to support farmer transitions towards climate resilient and regenerative agricultural practices • Collaborate with policymakers to support trade agreements that advance low-carbon sustainable agricultural value chains
Civil society	• Partner with NGOs to run campaigns on sustainable consumption and the importance of climate-friendly agricultural products • Convene transparent discussions between corporates, policymakers, and civil society on sustainability challenges • Fund local projects focused on reforestation, water conservation, and biodiversity, empowering civil society to lead climate action

Image taken from pg. 50

ENERGY

How can soaring energy demand drive lasting prosperity?

By EY

View the full report here

Notable Highlights

- **Global electricity demand is expected to double by 2050**, with business driving three-quarters of this growth.
- 64% of businesses say **energy costs are impacting competitiveness and profitability.**
- 70% say they **will dedicate more time and investment to electrification, emissions, and energy costs** over the next three years.
- **99% want energy providers to provide more advanced digital tools** (including to better control and automate energy use), and 71% want AI to deliver energy advice.
- **74% say traditional energy provider account management is no longer enough.** They seek tailored advice to minimize energy costs, support in developing energy strategies and implementing energy initiatives, knowledge of relevant energy solutions and providers, and proactive product recommendations to reduce emissions.
- Pages 32-35 break down **energy demand challenges and opportunities to drive affordable, equitable, and sustainable energy growth in the following sectors:** Industrials and Manufacturing, Oil and Gas and Natural Resources, Automotive and Transport, Technology, Commercial and Retail, Financial Services, and Government, Education, and Health.

Objective

- To assess businesses' plans to adopt energy solutions to meet growing energy demand and how energy providers can adapt their business models to meet the needs of business customers, generate revenue, and drive the energy transition.

Background

- The report data is based on a survey of 2,466 "energy leaders" and decision-makers at mid-sized and large businesses across eight countries and seven sectors (and subsectors) (methodology on pg. 6-7).

- The seven sectors: Construction, Manufacturing, Services, Retail and Transportation, Natural Resources and Mining, IT, and Government, Education, and Health

Report Findings

As energy demand surges, businesses are increasingly frustrated with energy provider capabilities (pg. 11-13):

- **80% of businesses expect their electricity consumption to increase in the next three years**, **with drivers of demand growth including** new equipment (44%), EVs (43%), internal tech (e.g., owned data centers) (39%), larger/more locations (39%), use of AI (38%), heating and cooling (37%), and on-site hydrogen production (30%).
- **Industrial use, mobility, and data centers are key drivers of energy demand growth**, projected to account for 45%, 19%, and 16% of additional end-use demand growth from 2025 to 2050.
- Many energy providers have focused on enhancing the residential consumer experience in recent years. **Business customers are increasingly frustrated** with poor digital experiences and a lack of tailored options.
- While business customers are relatively satisfied, **72% say their expectations of their energy provider are increasing,** and they'll look elsewhere if their needs aren't met.

Businesses' energy challenges and plans to grow their energy expertise (pg. 15-19):

- **71% of businesses have a comprehensive energy strategy**.
- 66% **worry about whether they will be able to access reliable energy** needed to meet future demands.
- **Companies' top energy challenges** are financing and costs (39%), complex regulations (33%), utilities and infrastructure (29%), lack of internal energy knowledge (26%), and unproven technologies (25%).
- **97% plan to grow their energy expertise in the next three years, including by:**
    - Upskilling existing in-house resources with energy-related training (56%)
    - Leveraging existing in-house employees who manage energy programs (54%)
    - Hiring more employees who specialize in new energy-related capabilities (50%)
    - Outsourcing or procuring energy-related managed services (48%)

- Partnering with external vendors, specialists, or service providers (53%)

- **Energy providers should:**
  - Build relationships with energy decision-makers across businesses to get insights on how to meet businesses' expectations and energy needs.
  - Equip account managers with new skills and technology to provide tailored business recommendations.
  - Partner with other organizations to develop innovative energy solutions to meet different customer needs.

Sustainable energy is now a high priority for businesses, but businesses won't sacrifice growth to be sustainable (pg. 21-25):

- **Around 70% of businesses plan to adopt energy solutions in the next three years:**

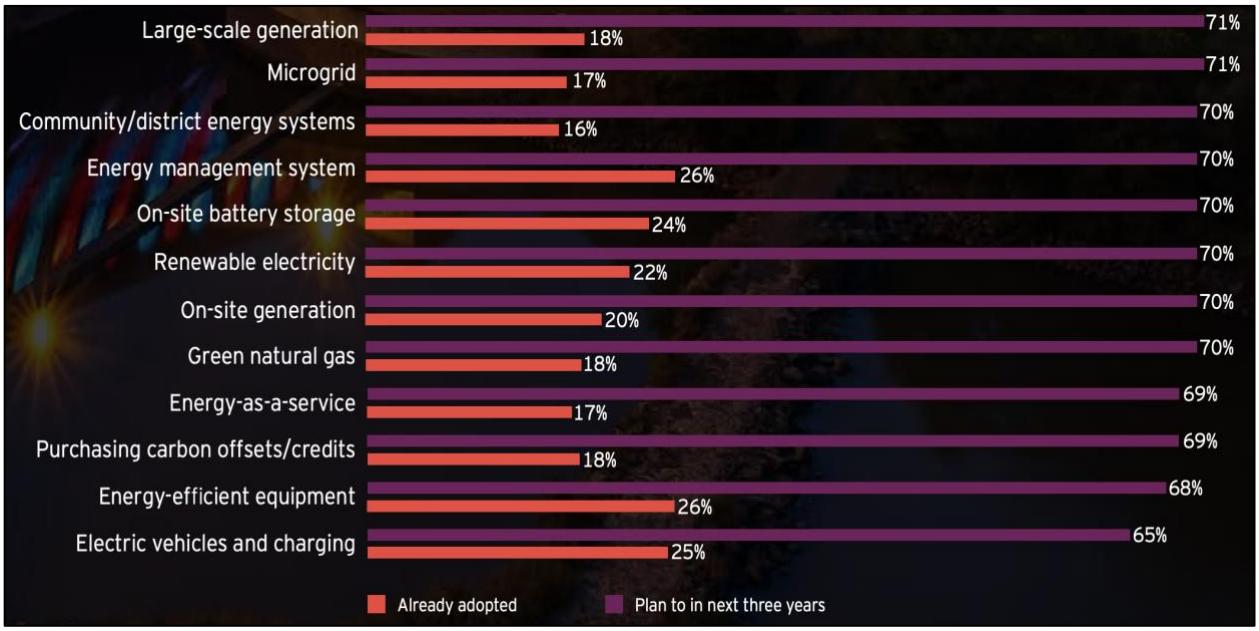


Image taken from pg. 23

- **Businesses will pay more for fast access to sustainable energy, but they expect tailored solutions that meet their specific needs.**
- **Energy reliability, affordability, and sustainability** are companies' **top three energy needs,** but affordability is always a critical concern.
- Providers can capitalize on the impending wave of clean energy investment by establishing a business-to-business-to-consumer (B2B2C) energy relationship, where they help businesses adopt new products and services for their consumers.

Energy providers should shift their business model to meet business customers' evolving needs (pg. 27-35):

- Instead of segmenting business customers by sector, energy consumption, or geography, **energy providers should dedicate teams to customer groups defined by growth potential, energy flexibility, and clean energy needs.**
- Energy resilience, expertise and innovation, and support and customization are the top three **most important factors for businesses considering energy providers.**
- Mid-sized businesses (<$250 million) often have ambitious energy goals but low confidence in their energy future. **Providers that support these companies,** rather than companies that use the most energy, **can generate more opportunities.**
- Energy providers should **break down silos to reinvent business engagement model** through collaboration across economic development, regulatory, and grid planning.

Businesses want energy providers to play four potential roles (pg. 37-39):

1. **Energy transition advocate (42% of businesses want providers to play this role):** Help business customers understand and adopt clean energy solutions. Help them access the right products, services, and incentives.
2. **Core energy operator (23%):** Provide energy options with simple rates, renewable options, and programs tailored to businesses.
3. **Specialized solution provider (23%):** Offer individual or bundled energy-related products and services (e.g., solar panels and battery storage).
4. **Energy platform orchestrator (12%):** Provide platforms, technology, and support to help businesses control and optimize energy use and costs.

- **Energy providers should understand the needs of business customers,** anticipate future regulatory and market-related opportunities and constraints, and **develop a roadmap to meet customer needs in collaboration** with the broader energy ecosystem.

DEFORESTATION

Forest 500 2025 Report: Companies Profit, Forests Fall: Everyone Pays the Price

By Global Canopy

View the full report here

Notable Highlights

- **Just 3% of the Forest 500 companies** (16 companies) **have strong commitments for all forest risk commodities** they're exposed to and **evidence of adequate implementation** ("Leaders").
- **63% (316) have partial commitments** (for some commodities they're exposed to) and/or weak implementation ("Late Majority").
- **34% (168) have no public deforestation commitments** ("Laggards").
- The following Report Findings include **the top 10 ranked companies for 2024**, **corporate case studies**, and **recommendations for companies** to help end deforestation, ecosystem conversion, and associated human rights risks.
- **Companies with commitments for some commodities they're exposed to and/or weak implementation should** (1) **conduct risk assessments** to identify the extent of exposure to high-risk commodities, (2) implement and publish **processes to make and track progress** on commitments, (3) **publicly report** on progress, (4) implement **grievance mechanisms**, and (5) **share knowledge with other companies** on how to progress toward supply chains free from deforestation, ecosystem conversion, and human rights abuses.

Objective

- To rank the 500 "most influential real economy companies" in the global trade of forest risk commodities on the strength and implementation of their deforestation, ecosystem conversion, and human rights commitments.

Background

- The report data in this annual report is based on assessments of publicly available company information (methodology on pg. 6-7, 12-13).

- Companies were assessed on their exposure to nine forest risk commodities within their supply chains (three additional commodities compared to 2024): beef, leather, palm oil, soy, pulp and paper, timber, cocoa, coffee, and rubber.
- The assessment now includes all forest types and excludes the 150 financial institutions with the most influence over deforestation. 150 additional companies were assessed, with the financial institution assessment to be released in a separate publication.
- The company ranking methodology is aligned with the Accountability Framework Initiative Common Methodology (full methodology here).
- Human rights commitments are ranked based on customary rights to land, resources, and territory; labor rights; smallholder inclusion; violence and threats against forest, land, and human rights defenders; Free, Prior and Informed Consent; and gender equality.

Report Findings

2024 rankings: The 10 companies with the highest total score (see the full rankings here for which commodities each company was assessed for):

Company	2024 score (/100%)
#1: Suzano SA	91.1%
#2: Nestlé S.A.	73.2%
#3: Unilever*	72.1%
#4: Danone	71.3%
#5: Procter & Gamble*	66.7%
#6: Mars Inc.	66% %
#7: Flora Food Group BV	65%
#8: APAR Holdings	62.9%
#9: Amaggi	62.5%
#10: Hershey Co.	62.2%
**CEF member*	

Corporate deforestation commitments (pg. 14-19):

- **Progress on deforestation commitments across all Forest 500 assessments:**

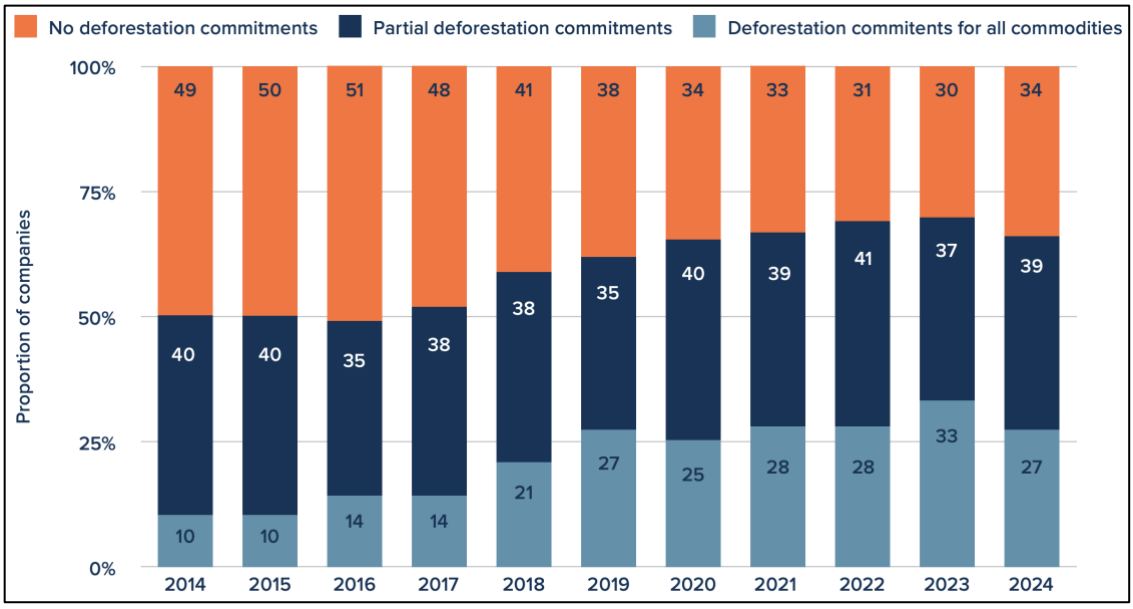


Image taken from pg. 15

- The number of companies publishing commitments for all commodities they're exposed to fell from 33% in 2023 to 27% (135), reflecting the inclusion of three additional commodities in the 2024 assessment (coffee, cocoa, and rubber).
- **Cattle and leather drive the most deforestation globally, but companies have the fewest commitments for these commodities:**

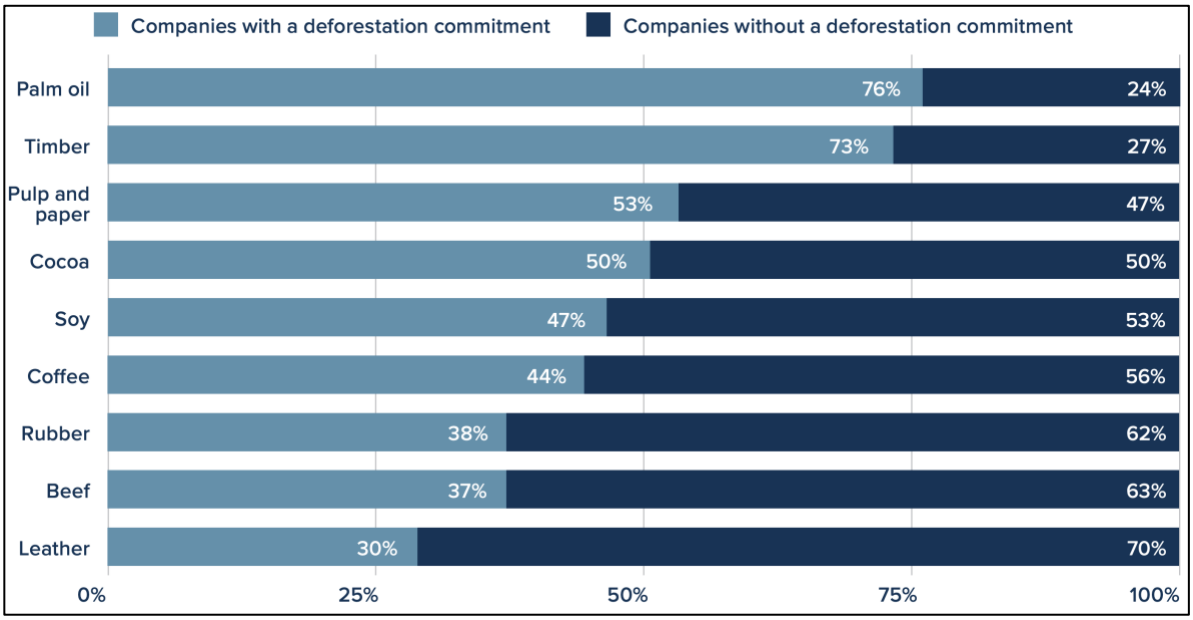


Image taken from pg. 18

- **Corporate case studies on deforestation commitments:** H&M (pg. 16) and Hershey's (pg. 18)

Corporate human rights commitments (pg. 20-26):

- **1% (7) have public commitments on all six human rights issues assessed for all commodities, while one-third have no human rights commitments.**
- Of the 67% (335) of companies with one or more publicly available human rights commitments, **86%** (288) **were backed up by evidence of implementation.**
- 6% (29) have **comprehensive human rights policies** for one or more commodities they're exposed to.
- **Three human rights issues directly relate to the prevention of deforestation and conversion:**
    - **37%** (185) have a commitment to secure the **Free, Prior, and Informed Consent** of Indigenous Peoples and local communities before new land acquisitions or developments occur.
    - **24%** (120) have a commitment to **respect the customary rights** to land, resources, and territories of Indigenous Peoples and local communities.
    - **9%** (45) have a commitment to adopt a **zero-tolerance approach for violence** and threats against forests, land, and human rights defenders.
- 62% (310) have a commitment to respect **labor rights**.
- **Companies with human rights abuses in their supply chains face operational and reputational risks.** By 2027, in line with the European Union CSDDD, large companies operating in the EU will be required to conduct due diligence to prevent and address adverse human rights impacts in their operations and value chains.
- **Corporate case studies on human rights commitments:** Colgate-Palmolive (pg. 24) and Ferrero (pg. 26)

Companies should back up commitments with evidence of implementation, due diligence processes, and transparent reporting (pg. 28-37):

- **57%** (285) of companies **don't meet Forest 500 criteria for monitoring compliance** with deforestation commitments, **93%** (465) **don't meet criteria for reporting** on progress, and 98% (490) don't meet criteria for committing to remediation.
- **25%** (125) of companies with a commitment for one or more commodities **provide no supporting evidence of implementation or reporting**.

- **Companies should trace commodities back to a point where they can verify a high likelihood of compliance** in line with company commitments.
    - **58%** (290) **had no traceability mechanisms** for any commodities.
    - Traceability mechanisms **must track the full scope of the commodity volume**.
    - Upstream companies should trace commodities back to the production unit.
    - Downstream companies should trace commodities to the point where compliance with deforestation- and/or conversion-free standards can be confirmed.
- Pg. 38-39 include a **full breakdown of percentages of companies with publicly available evidence** of all types of commitments and implementation actions assessed (e.g., reporting, traceability mechanisms) across all nine commodities.
- **Commitment implementation case studies:** Michelin (pg. 32), Nestlé (pg. 34), and Suzano (pg. 37)

Recommendations for companies to help end deforestation, ecosystem conversion, and human rights risks and impacts (pg. 40-46):

Recommendations for companies with no public deforestation commitments ("Laggards"):

- **Assess exposure** to deforestation, ecosystem conversion, and human rights **risks in the supply chain for beef and leather**. Publish the risk assessment outcomes.
- **Set and publish a deforestation commitment that covers all high-risk commodities to which the company is exposed**, including a target date for eliminating deforestation, ecosystem conversion, and human rights abuses as soon as possible.
- **Engage suppliers** and work with them to bring them into compliance with deforestation- and conversion-free standards.

Recommendations for companies with commitments for some commodities they're exposed to and/or weak implementation ("Late Majority"):

- **Conduct risk assessments** to identify the extent of exposure to high-risk commodities and prioritize action on the highest-risk commodities.
- **Implement and publish processes** to make progress toward commitments, including methods to track progress (e.g., compliance monitoring and traceability mechanisms to identify the origins of commodities).
- Implement **accessible grievance mechanisms** to enable the reporting of any grievances.

- **Set strong commitments to remediate any harm** that takes place after the commitment cut-off date.
- **Share knowledge with other companies** on how to effectively progress toward supply chains free from deforestation, ecosystem conversion, and human rights abuses.
- **Publicly report on progress toward commitments.** Start with the highest-risk commodities and include:
    1. The proportion of commodity volumes that is traceable to a specific point in the supply chain where compliance can be verified.
    2. The number of suppliers and production regions monitored and identified as noncompliant.
    3. The proportion of deforestation- and/or conversion-free commodity volumes.
    4. Whether effective processes are in place to implement human rights commitments.
    5. The number of hectares of deforestation that have occurred in the supply chain since a specific reference date (even if that is none).

Recommendations for companies with strong deforestation commitments for all commodities they're assessed for and evidence of adequate implementation ("Leaders"):

- **Publicly report on progress toward commitments.** Start with the highest-risk commodities and include the aforementioned five pieces of information.
- Show policymakers **what regulations** can make continued progress easier and quicker.
- **Continue engaging suppliers** to bring them into compliance with deforestation- and conversion-free standards.
- **Use leverage to encourage supplier action** and ensure commodity volumes are not contributing to deforestation, ecosystem conversion, or human rights abuses.
- **Actively include smallholders** in supply chains and bring them into compliance with deforestation- and conversion-free standards.

SUSTAINABILITY & ARTIFICIAL INTELLIGENCE

Sustainability in the Age of AI: The Integration Imperative

By Project Management Institute (PMI)

View the full report here

Notable Highlights

- **Companies implementing sustainability-focused projects aided by AI very successfully** ("Leaders") **consistently outperform** those with moderate or slight success ("Followers" and "Laggards") **across all ESG metrics,** with particularly strong performance in ecosystem/biodiversity management (53% vs. 33% and 13%, respectively), renewable energy use (53% vs. 35% and 23%), and human rights/labor standards (50% vs. 31% and 19%).
- **Companies "Integrating" AI across the organization report significantly higher cost savings** (52% vs. 32% for Exploring), **revenue** (35% vs. 21%), and **profitability** (39% vs. 26%) compared to companies "Exploring" AI integration.
- **Integrating companies show stronger performance** in energy consumption efficiency (31% vs. 8% for Exploring), CO2 emissions reduction (26% vs. 3%), waste reduction (13% vs. 8%), diversity and inclusion (17% vs. 10%), and ethical supply chains and sourcing (14% vs. 6%).
- **A lack of strong data quality and workforce literacy on AI and sustainability are key challenges** to integrating sustainability and AI.
- The following Report Findings include **actions for companies to successfully implement AI-supported sustainability-focused projects.**

Objective

- To explore how companies use artificial intelligence (AI) to drive sustainability outcomes.

Background

- The report data is based on interviews with 16 leaders and experts and a global study of over 650 organizations (with over $10 million in revenue) actively developing or implementing sustainability strategies and AI strategies (methodology on pg. 7, 44).
- Based on their reported levels of success in implementing sustainability-focused projects aided by AI ("Sustainability+AI projects"), organizations were classified as "Leaders"

(very or extremely successful project implementation) (31%), “Followers” (moderately successful) (40%), or “Laggards” (slightly or not successful) (29%).

- Organizations were also categorized based on their level of AI adoption: Exploring (ideation), Piloting (prototyping), Adopting (siloed within departments), or Integrating (cross-departmental implementation).

Report Findings

Leader companies (which implement Sustainability+AI projects very successfully) consistently outperform on all ESG metrics: (pg. 13):

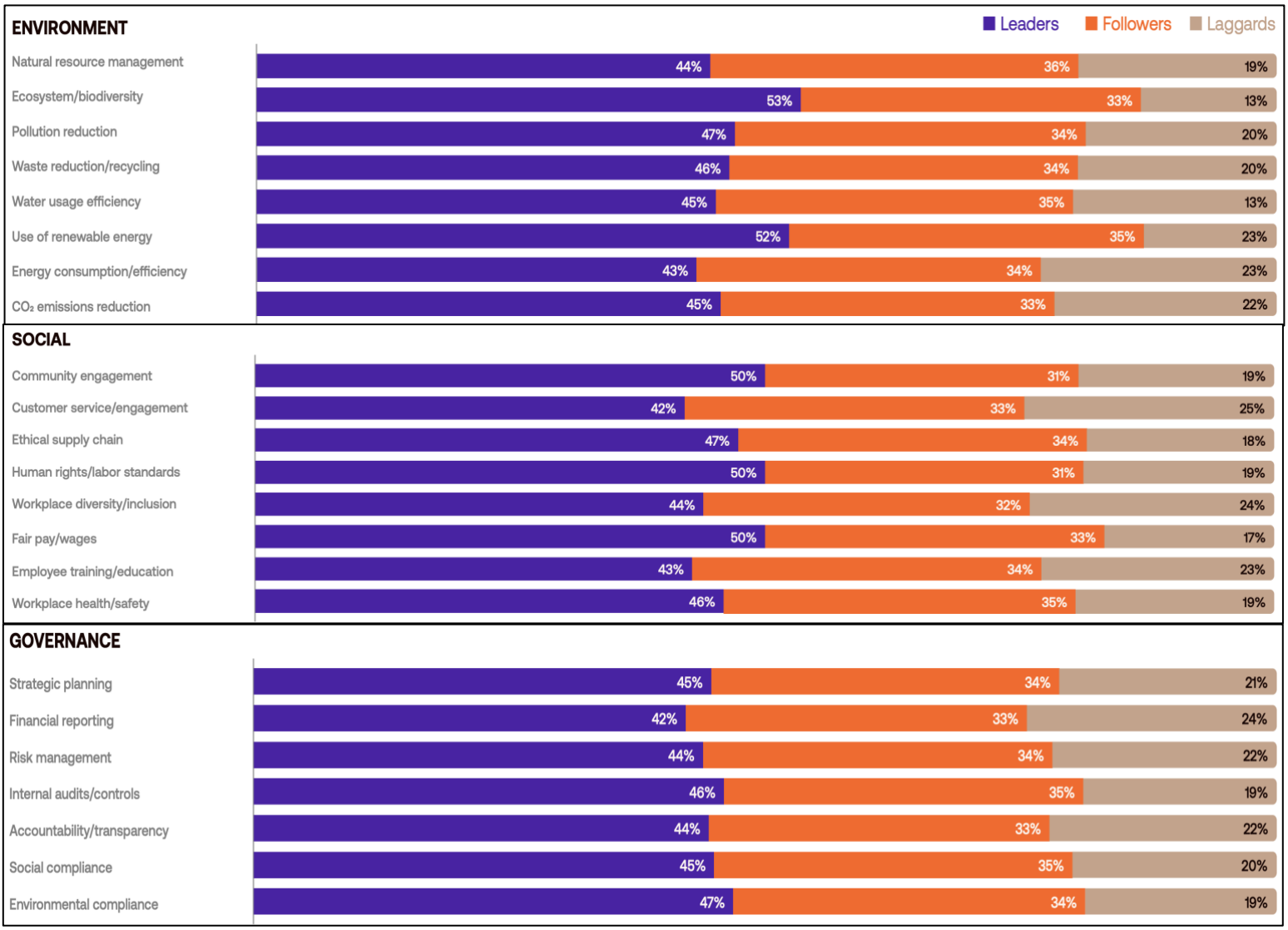


Image taken from pg. 13

Companies are using AI to drive sustainability transformation in four strategic areas (pg. 8-20):

Future-Focused Innovation

8. Employee Management

		COUNT
HR automation	34%	28
Workplace safety	23%	19
Training and development	22%	18
Workspace optimization	21%	17
		82

9. Financial Services

		COUNT
Sustainable investment zanalysis	34%	28
ESG scoring	23%	19
Risk analysis	22%	18
Sustainable lending	21%	17
		76

10. Research & Development

		COUNT
Sustainable product development	32%	23
Material research	27%	19
Drug discovery	21%	15
Green technology innovation	20%	14
		71

Operational Excellence & Resource Optimization

1. Energy Management & Sustainability

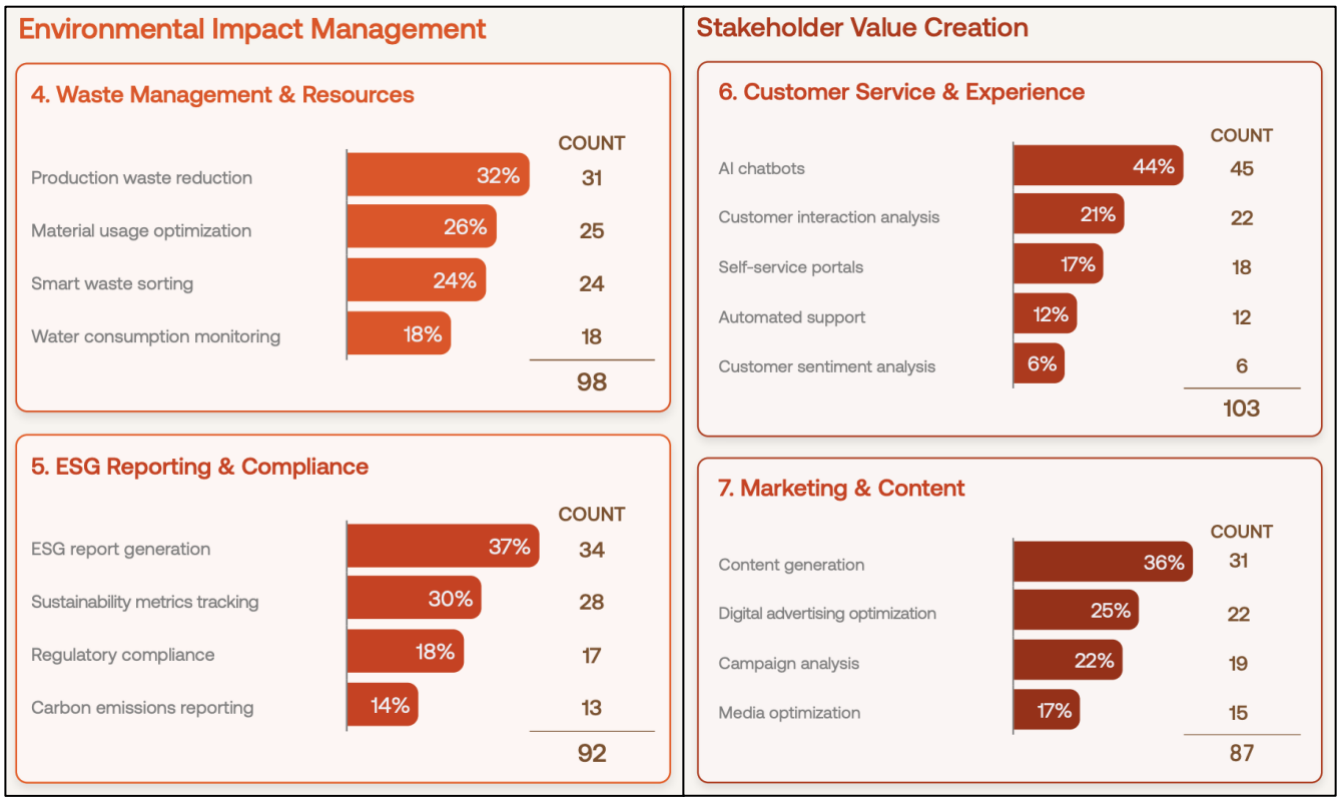
		COUNT
Building energy consumption monitoring	25%	35
Carbon footprint tracking	22%	31
Smart grid management and optimization	20%	28
Data center energy efficiency	17%	24
Renewable energy integration	13%	19
Temperature and lighting control	4%	5
		142

2. Supply Chain & Logistics

		COUNT
Route optimization	33%	42
Inventory management	24%	31
Supply chain sustainability tracking	14%	18
Warehouse optimization	13%	15
Packaging optimization	11%	14
Fleet management	6%	8
		128

3. MANUFACTURING & PRODUCTION

		COUNT
Predictive maintenance	33%	38
Quality control	23%	27
Production line optimization	20%	23
Process efficiency	17%	19
Digital twin implementation	7%	8
		115



Images taken from pg. 16

- **Examples of corporate AI applications for sustainability transformation:**
  - AstraZeneca's integration of AI in product development has enabled 64% of its pharmaceutical syntheses to meet resource efficiency targets.
  - CEF member BlackRock's Aladdin Climate system uses AI to quantify climate risks and opportunities in financial terms.
  - CEF member Google's DeepMind AI reduced data center cooling energy use by 40%.
  - HSBC uses AI to monitor over 1.35 billion monthly transactions and analyze over 75 million data points to assess ESG risks.
  - CEF member Microsoft's AI for Earth program demonstrated how computer vision can improve recycling efficiency by 90%.
  - Sandvik's AI-powered mining operations achieved a 50% lower cost per ton.
  - CEF member Unilever uses AI to create personalized consumer experiences for its beauty brands.
  - Walmart's AI-powered route optimization tech eliminated 30 million unnecessary miles and reduced emissions by 40,800 tons while achieving cost savings.
  - CEF member Wells Fargo's AI-powered chatbot helps clients manage finances electronically and reduce paper waste.

The strategic value of AI for maximizing sustainable impact (pg. 21-32):

- 19% of companies are *integrating* AI across the organization, 34% are *adopting* AI across specific departments, 35% are *piloting* AI solutions, and 12% are *exploring* AI adoption.
- AI capabilities for sustainability initiatives are predominantly housed within the IT function (31%), followed by the sustainability/ESG (19%) and strategy (14%) functions. **Successful organizations are creating pathways for collaboration between employees with technical (IT) and sustainability expertise.**
- **Leaders consistently reinvest their ESG gains** from successful Sustainability+AI projects at rates exceeding 50% **to advance their sustainability agenda further**. Laggards frequently report being "too soon" to reinvest (details on pg. 34).
- **AI can shift mindsets and organizational resistance to change** by providing data-driven evidence to help quantify sustainability impacts and opportunities, creating connections between sustainability initiatives and business value, and enabling better long-term decision-making through forecasting and scenario analysis.
- **AI can help resolve tension between short-term business returns and long-term sustainability investments** by delivering measurable short-term gains while enabling long-term forecasting.

Critical elements to integrating sustainability and AI (pg. 33-42):

- The **top three skills and competencies Leaders believe companies must have** to leverage AI for sustainability effectively are business and technology integration (47%), data quality management (46%), and using generative AI tools/technology and sustainability expertise (both 39%) (details on pg. 37).
- **AI must be integrated with robust data foundations, leadership preparedness, board oversight, and strategic prioritization to ensure effective implementation. Leading organizations are:**
    - 2x as likely as Laggards to have **comprehensive data readiness** to enable consistent measurement, reliable AI model training, and data-driven decision-making.
    - 4x more likely to have organizational **leaders who are "fully prepared"** with the necessary skills and competencies to leverage AI for sustainability.
    - 3x more likely to have **"fully involved" boards.**
    - 2.5x more likely to **embed AI-driven sustainability into their core strategy and execute** their AI and sustainability strategies.

Actions for companies to successfully implement Sustainability+AI projects (pg. 39):

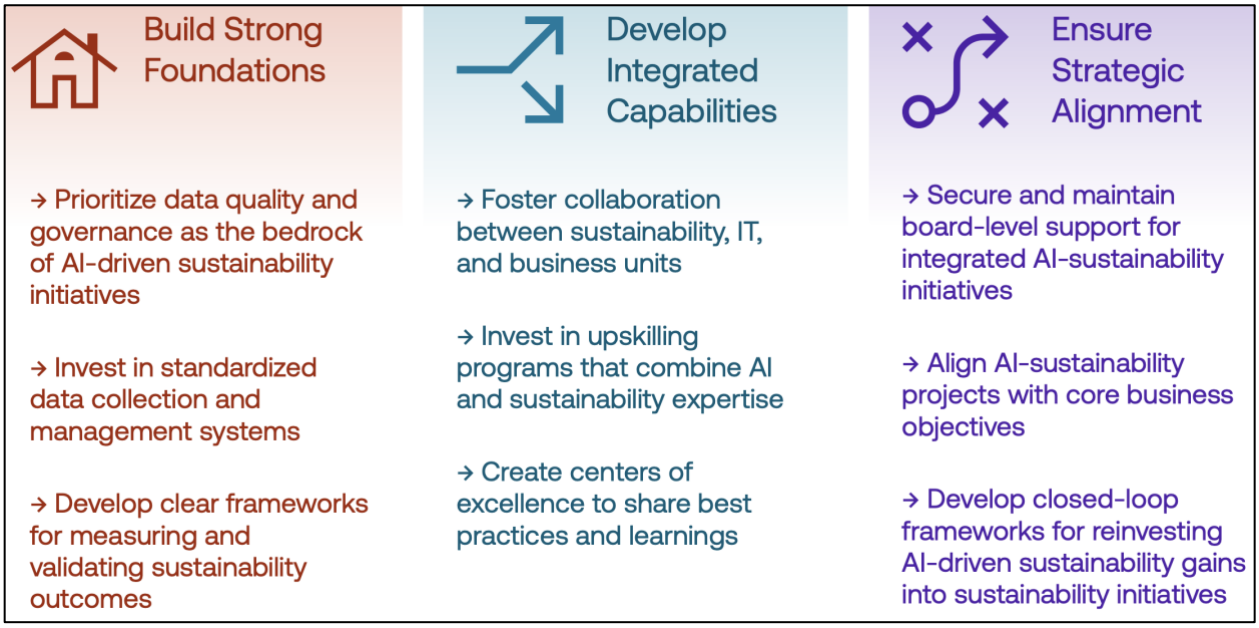


Image taken from pg. 39