In collaboration with State Grid Corporation of China

WORLD ECONOMIC FORUM

Accelerating Value Chain Decarbonization for Corporate Growth: Perspectives from Asia

WHITE PAPER

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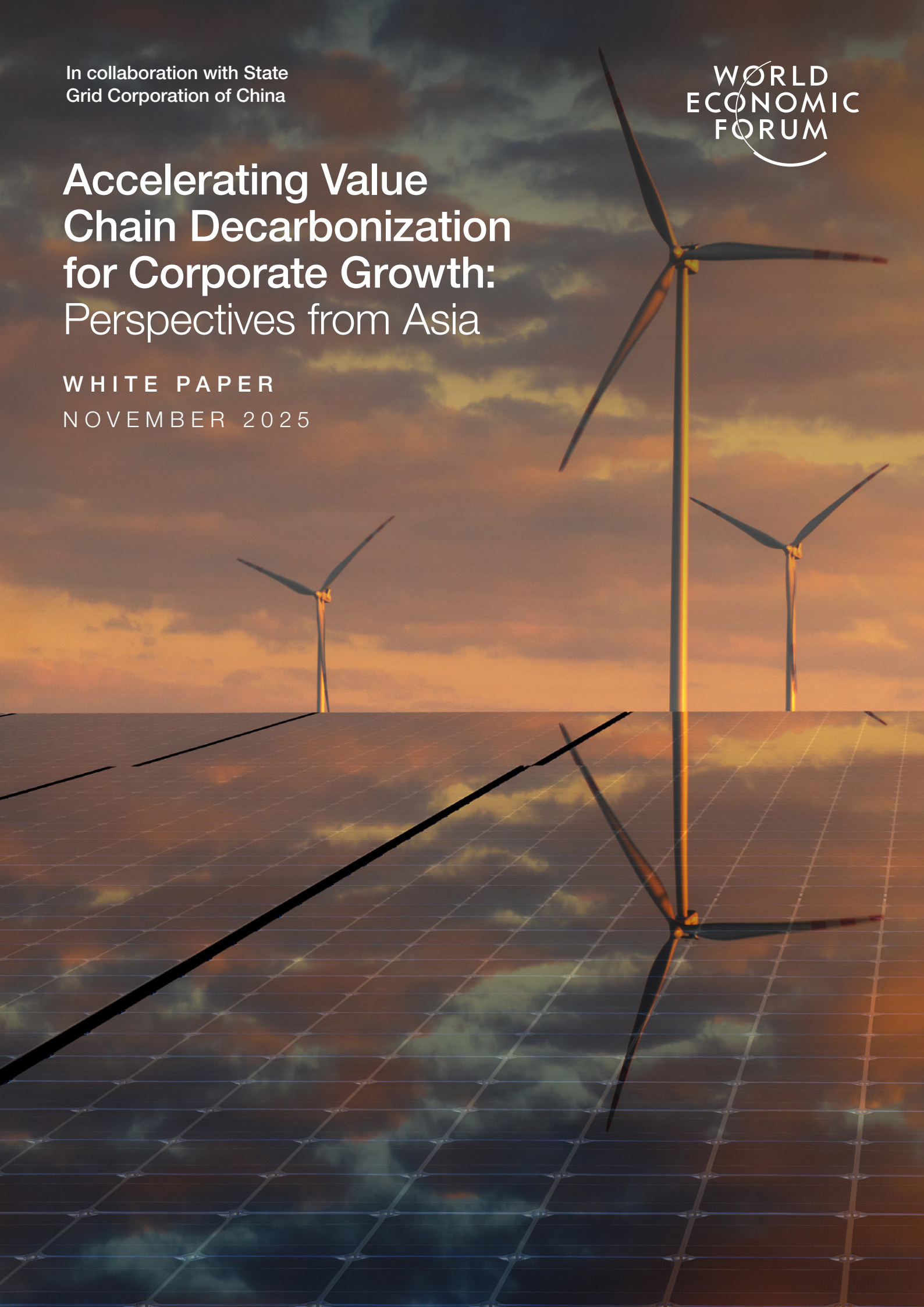

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Foreword

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Asia stands at the heart of the global transition to a green economy. Home to more than half of the world's population and much of its industrial output, the region is a key driver for global growth and innovation. In that light, how Asia chooses to decarbonize will determine not only its own economic resilience and competitiveness, but also the world's ability to meet shared sustainability goals.

Value chain decarbonization is one of the most complex and significant frontiers of corporate action. For Asia, this challenge is especially significant: the region's economies are deeply interconnected through trade, manufacturing, and resource and capital flows, making them essential to the world's collective net-zero pathway.

This white paper, *Accelerating Value Chain Decarbonization for Corporate Growth: Perspectives from Asia*, highlights the opportunities along the value chains of Asian businesses, and outlines the immediate actions enterprises can take, as well as exploring long-term strategies for success. Through case studies featuring leading businesses, the paper presents decarbonization not as merely a cost, but as a potential catalyst for transformation and value creation.

As one of the world's production hubs and innovation engines, Asia has an opportunity to be a platform for scaling value chain decarbonization. By focusing on collaboration and innovation, the region can redefine what sustainable growth means – for businesses, economies and society on a global scale.

The World Economic Forum, together with its fellowship partner, State Grid Corporation of China, and CDP, its data partner, would like to thank all the experts and business leaders involved in co-curating this white paper through our workshops and consultations.

Executive summary

Asia's value chain decarbonization is turning a global climate imperative into a leading engine for regional growth and resilience.

The success of the global transition to a low-carbon economy is critically dependent upon Asia. The region powered over half of the global GDP (gross domestic product) growth in 2024 and is one of the world's most important manufacturing hubs, with manufactured products such as photovoltaics, electric vehicles and batteries supporting the transition globally. These roles, together with Asia's surging energy demand, rapid urbanization and increasing population, have also resulted in its contribution to over half of the world's carbon dioxide emissions.

Political and geoeconomic realities across regions are shifting, while corporate action for green growth continues to deliver. Emissions along the value chain, which accounts for 65–95% of corporate carbon footprints in Asia, remains one of the hardest areas to address, as value chains operate beyond companies' direct control. Yet value chain transition is pivotal to the region, both because of Asia's historically significant and still prominent role in the global value chain as a region of critical manufacturers and suppliers, and its rising role as a system shaper and frontier clean technology provider for the global transition.

More importantly, addressing value chain transition creates substantial untapped opportunities for Asian companies and drives system change for the local ecosystem in three main areas:

1. Addressing physical and transition risks
2. Enhancing efficiency and financial performance
3. Elevating competitiveness and unlocking new revenues

Asia is rapidly emerging as a leader in this domain. For example, the region is now a key driver of growth for science-based climate target setting, with the number of validated companies in the region increasing by 134% between the end of 2023 and the end of the second quarter of 2025. Meanwhile, CDP data shows that over 8,400 Asian companies now disclose climate data, even though transparency and action remain uneven based on disclosure data; developed Asian countries lead this process, while emerging nations such as China and several South-East Asian countries are making solid progress.

From making commitments to elevating competitiveness, this white paper highlights context-based practices from leading businesses in emerging Asia, particularly in China and South-East Asia, which embed value chain action into corporate development strategy to ensure sustained value creation. It follows the framework of the World Economic Forum's Industry Net Zero Accelerator initiative, which advocates that companies pursuing a value chain decarbonization journey should follow the "no-excuse" approach:

- Start from within
- Empower supply chains
- Leverage industrial ecosystems
- Drive cultural shift

Value chain decarbonization is not a compliance burden but a $3 trillion opportunity. It lowers costs, mitigates risks, secures premium markets and strengthens resilience. With coordinated action by governments, businesses, financial institutions and technology providers, Asia can transform fragmented initiatives into system-wide progress, redefining industrial leadership in the low-carbon era.

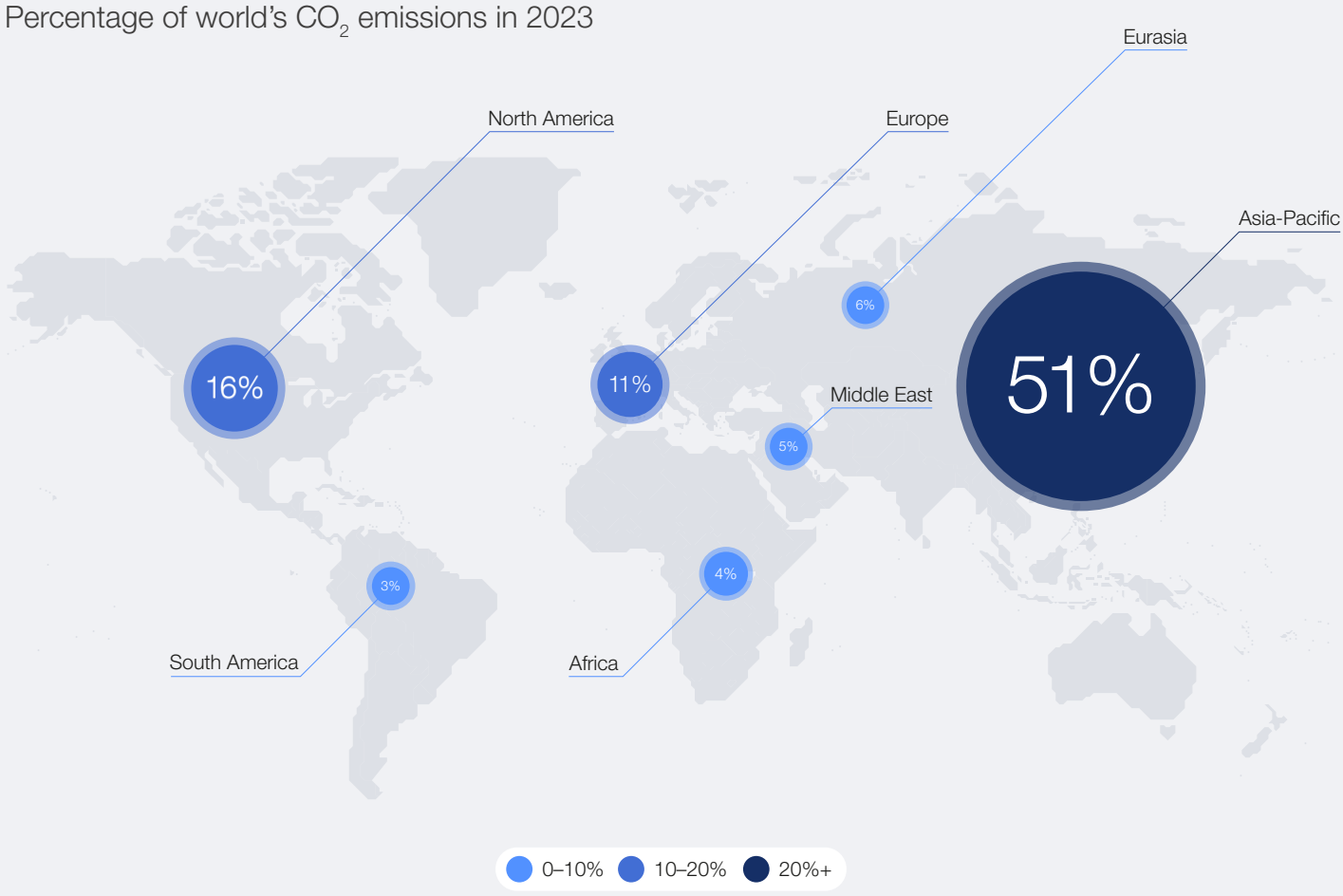
1

The state of corporate climate action in Asia: when decarbonization meets growth

Asia unifies decarbonization with growth, turning climate action into competitive advantage.

The global transition to a clean economy will be critically dependent on Asia's success. The region powered over half[1] of global GDP (gross domestic product) growth in 2024; this figure is projected to reach 60%[2] in 2025 due to Asia's booming green industries. In particular, China and the countries of South-East Asia are the world's most important manufacturing hubs, and many of the products manufactured in these countries, such as photovoltaics, electric vehicles and batteries, support the green transition across different regions. These countries generate close to 40%[3] of global manufacturing value added and more than one-third of global trade in intermediate goods. Consequently, this role also leads the region to contribute over half of the world's carbon dioxide emissions,[4] making Asia even more integral to the success of a resilient and green global economy.[5]

FIGURE 1 **The Asia-Pacific region accounts for a significant share of carbon dioxide (CO_2) emissions**



Source: World Economic Forum. (2023). *Accelerating Asia's Advantage: A Guide to Corporate Climate Action.*

1.1 Asia stands to gain from climate action

$1.5 trillion

was contributed to China's economy in 2024 by its clean-energy sectors.

Champions in corporate climate action can unlock significant growth and competitive advantage, according to the World Economic Forum's Alliance of CEO Climate Leaders, which represents $4 trillion in revenues and 12 million employees in more than 130 companies.[6] Between 2019 and 2023, its members reduced aggregate emissions by 12% while delivering revenue growth of 20%.[7]

Asian economies have the potential to transform industry responses to climate challenges and drive the decarbonization of value chains. On one hand, the region is heavily exposed to nature and climate risks, making it one of the planet's most vulnerable locations in terms of climate change. For instance, in Viet Nam, approximately 80% of the country's GDP is generated in coastal lowlands, which are highly susceptible to flooding and other climate impacts.[8] Decisive action could help Asia avoid up to $780 billion in annual GDP losses by 2050 as a result of climate shocks.[9] In other words, the region can convert passive risk into a net-positive growth driver.

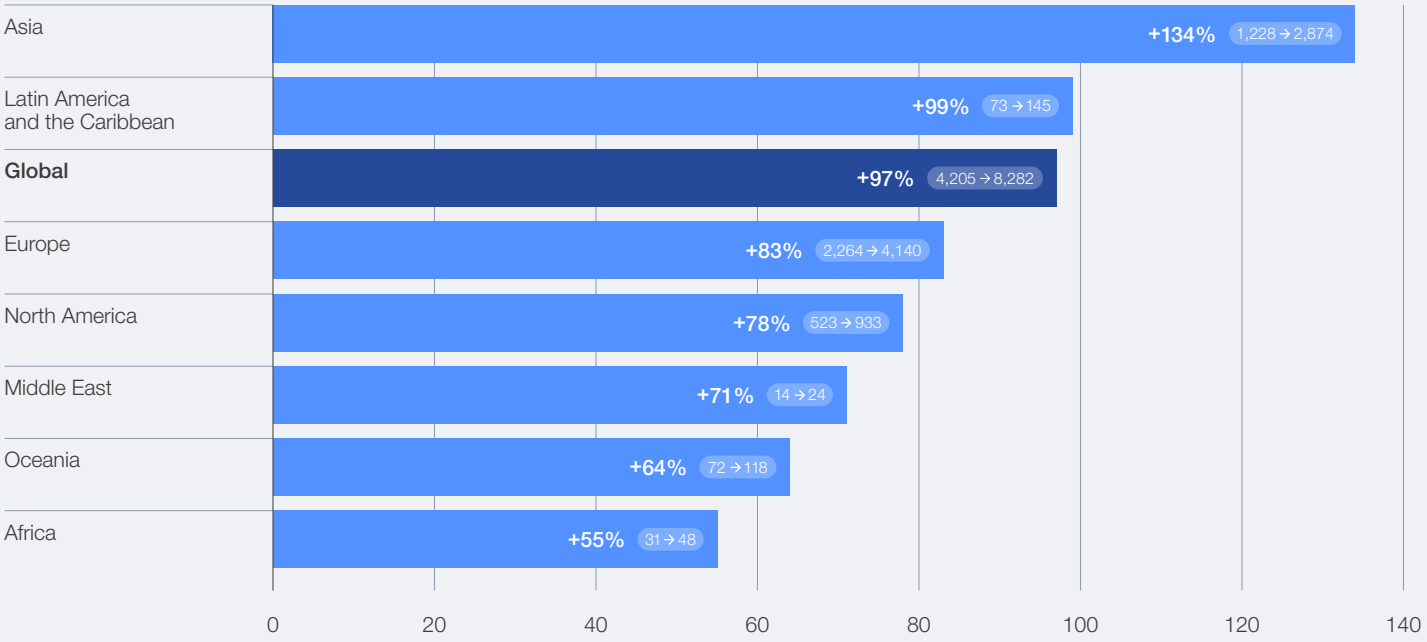
On the other hand, countries in the region are poised to leapfrog into state-of-the-art innovations through investment, policy and technological breakthroughs, such as emerging Asia-led regional improvements in energy transition readiness, with the support of considerable investment and robust regulations. For example, China's clean-energy sectors contributed $1.9 trillion to the country's economy overall, just above 10% of total GDP and accounting for 26% of all GDP growth in 2024.[10]

Additionally, proactively preparing for the emerging policy tools that could potentially impact the region's industrial development, such as the EU's Carbon Border Adjustment Mechanism, could protect as much as 12% of export revenues.[11] In short, proactive decarbonization not only keeps companies within the red lines but also opens the door to resilience in low-carbon growth.

1.2 The evolving roles of Asian businesses

Asia emerged as a key driver of growth for science-based climate target setting, as evidenced by a 134% increase in the number of validated companies in the region from the end of 2023 to the end of the second quarter of 2025. China recorded the fastest growth rate over this 18-month period, with the number of companies with science-based targets growing by 228%.[12]

FIGURE 2 **Growth in cumulative companies with Science Based Targets initiative (SBTi) targets between the end of 2023 and the end of the second quarter of 2025, by region**



Source: Science Based Targets initiative (SBTi).

Asia's increasingly prominent yet pragmatic progress, in the context of policy uncertainties and geopolitical tension, proves its pivotal role in global corporate climate action. The region is evolving from passively addressing compliance costs as upstream suppliers to leading solution providers and advocates for climate-aligned and low-carbon economies and business models.

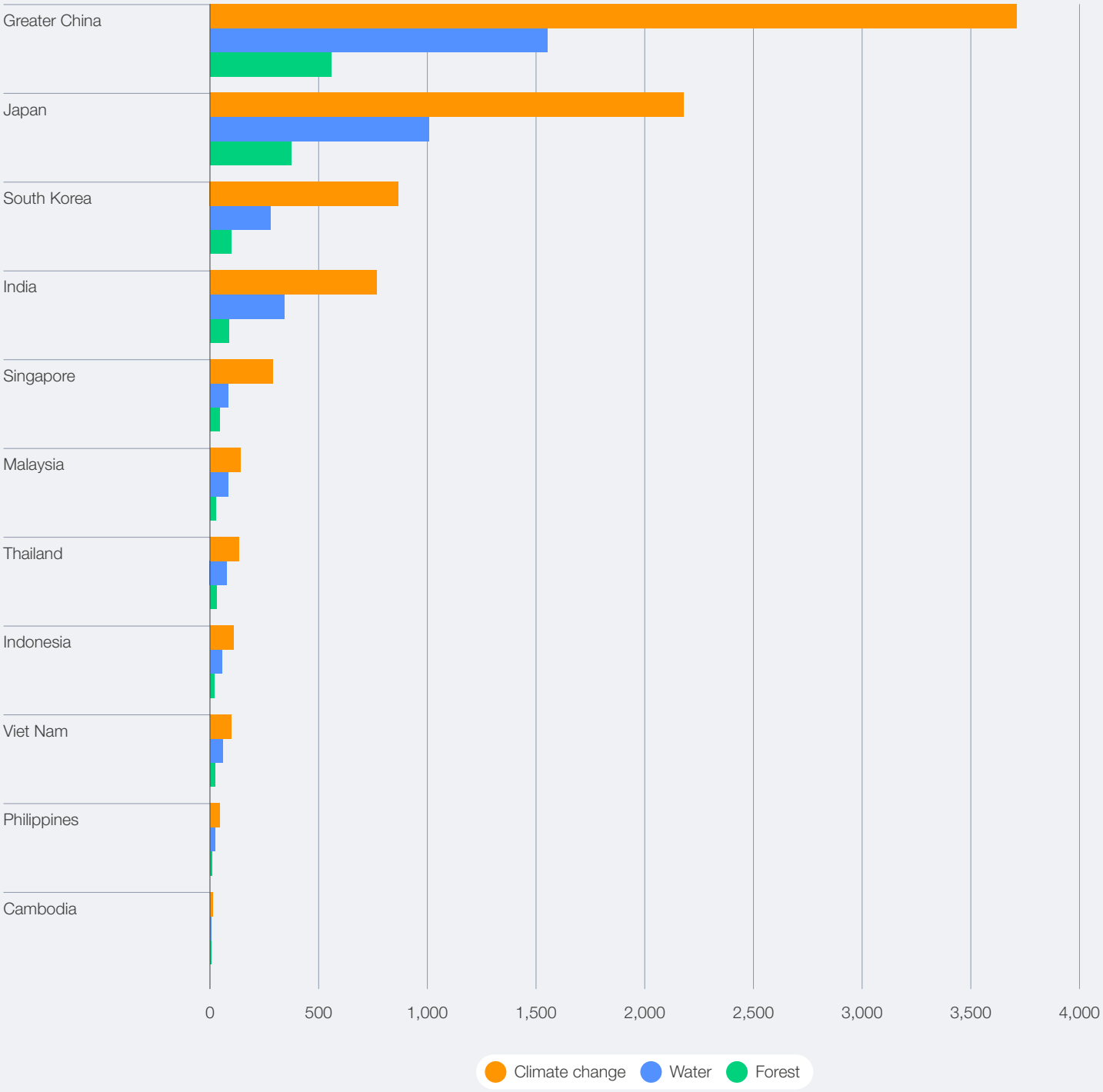
TABLE 1 **Evolving roles for Asian businesses: from followers to front-runners**

Dimensions	From	To	Key drivers
Corporate governance	Limited disclosure	Emerging leader in climate governance	Regulatory and disclosure pressure, policy enablement, board-level incentives, stakeholder expectations
Market dynamics	Made green for export	System shaper defining its own markets	Steady policy signals and increasing regulatory levers, rapid growth in demand for low-carbon products, supply chain upgrading and localization
Technology and innovation	Passive follower	Proactive tech leaders	Policy tools supporting R&D and technology transfer, scale and localization of innovation, ecosystem and cross-industry collaboration, resource and supply chain advantage
Finance and investment	Dependent on external investment and financing products	Innovator in sustainable finance and local capital markets	Recognition of climate as a financial risk, development and alignment of taxonomy, innovation in financial instruments and public-private de-risking partnerships

These shifting roles are also reflected in Asian businesses' target-setting and disclosing activities. As of the 2024 CDP disclosure cycle, companies across Asia have significantly increased their environmental transparency, with 8,449 companies reporting on climate change.

Asia's major developed and emerging economies drive its environmental disclosure landscape. Greater China leads the region by a wide margin, with 3,711 companies disclosing on climate change, 1,552 on water and 558 on forests in 2024. In contrast, while the lower absolute figures in South-East Asia are partly attributable to the region's smaller economic and corporate base, they also indicate that the practice of formal environmental disclosure has not yet permeated as deeply into the corporate mainstream as it has in Northeast Asia.[13] This disparity underscores that, beyond the sheer size of the economy, factors such as regulatory frameworks, investor pressure and the maturity of corporate sustainability strategies play a critical role in driving transparency. Therefore, South-East Asia represents a significant opportunity for growth in both corporate sustainability practices and the governance systems that support them.

FIGURE 3 | **Number of disclosing companies by topic in selected Asian countries in 2024**



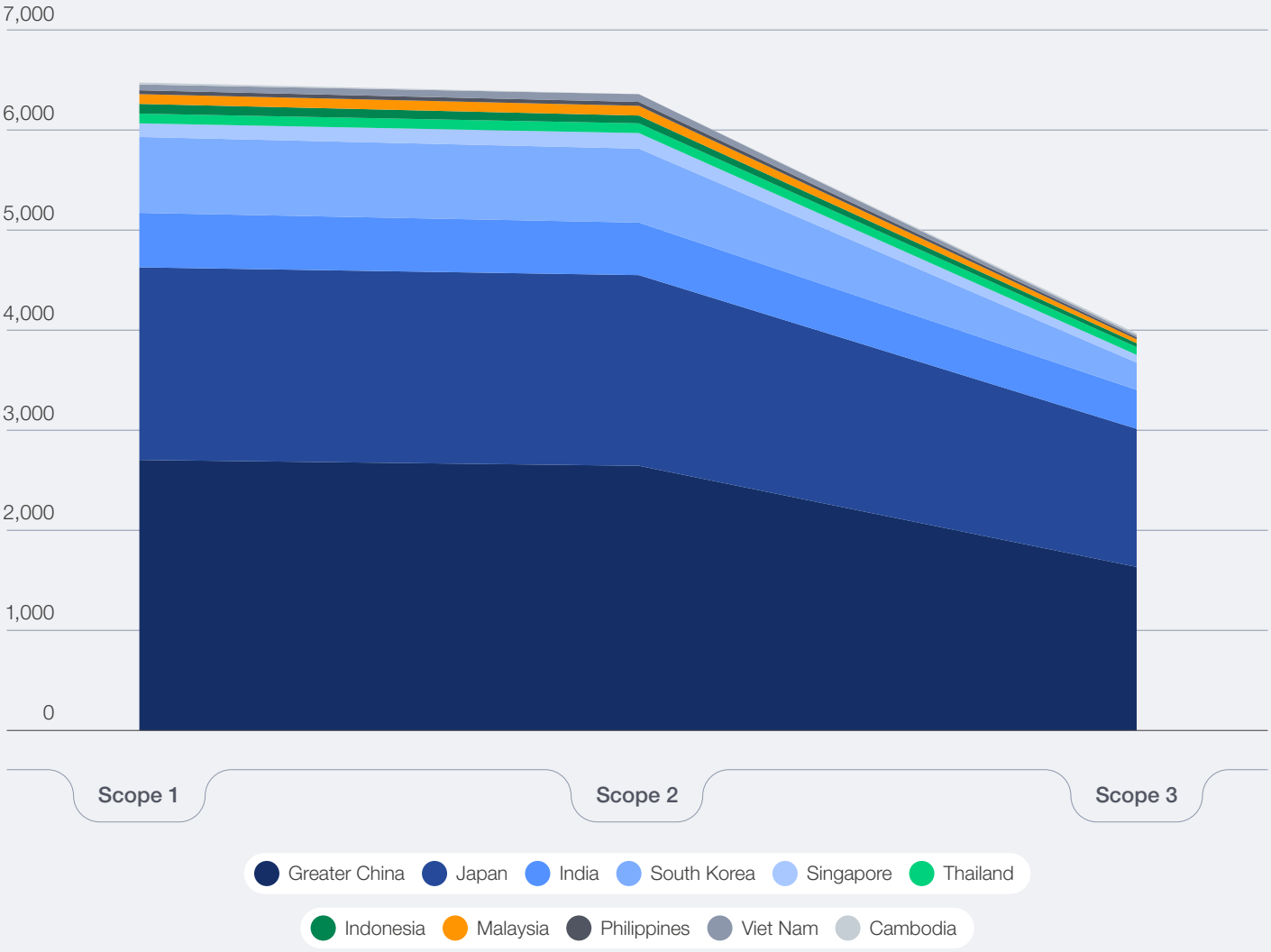
Source: World Economic Forum analysis, based on 2024 CDP data.

Measuring the emissions embedded in the upstream supply chain remains the foundational and most widely adopted step in the corporate carbon accounting journey.

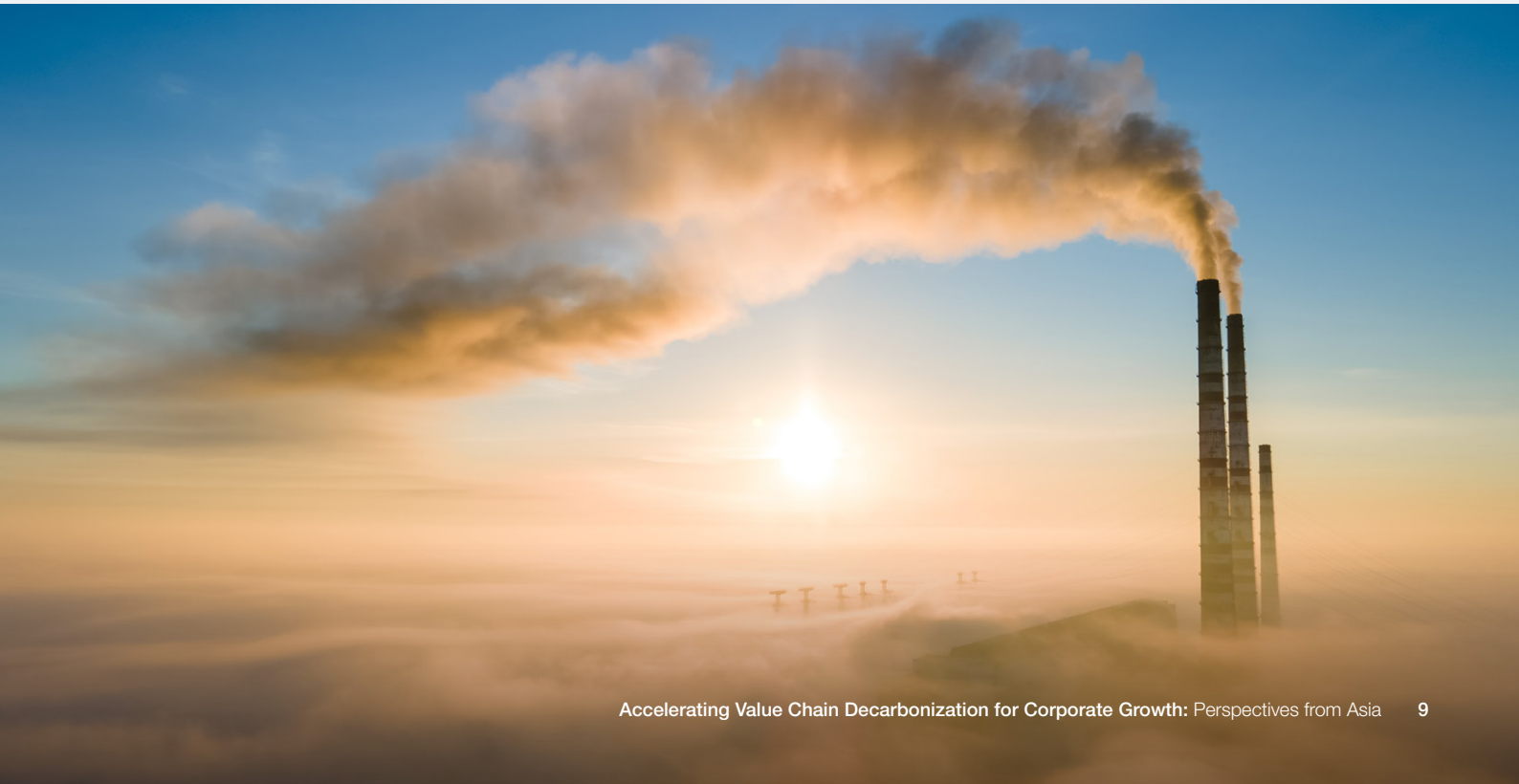
Across industries, acting on Scope 3 emissions along corporate value chains, often accounting for roughly 65–95% of total corporate emissions, is the most challenging area that could encompass substantial untapped opportunities for growth. For Asia, which is traditionally positioned in the upstream and midstream of global value chains, the quality of Scope 3 accounting and the pathway for reductions directly determine market access, cost structure and financing capacity.

CDP data indicates that disclosure participation continues to be highly uneven, solidifying a multi-tier regional landscape. Greater China and Japan have a significant lead, supported by a cohort of thousands of firms capable of comprehensive disclosure. In contrast, South-East Asian nations, with disclosure cohorts that are far smaller, with the steepest drop observed from Scope 1 to Scope 3, continue to require strengthened policy support and capacity building to bridge the gap.

FIGURE 4 | **The number of companies disclosing Scope 1, 2, and 3 carbon emissions in selected Asian countries in 2024**



Note: Scope 2 here means either location-based only, market-based only, or dual-reported; Scope 3 here means at least one disclosure of Scope 3 category.
Source: World Economic Forum analysis, based on 2024 CDP data.



2 From commitments to competitiveness: enhancing the business case for corporate value chain action

Turn climate commitments into competitiveness, efficiency and new revenue streams.

In addressing value chain emissions, businesses have the opportunity to review and address physical and transition risks that threaten supply chains and asset values. At the same time, improving operational efficiency and financial performance across suppliers and downstream partners helps reduce costs and secure access to capital. Equally importantly, value chain decarbonization strengthens business competitiveness and unlocks new revenues, as customers, regulators and investors demand low-carbon products and sustainable supply chains.

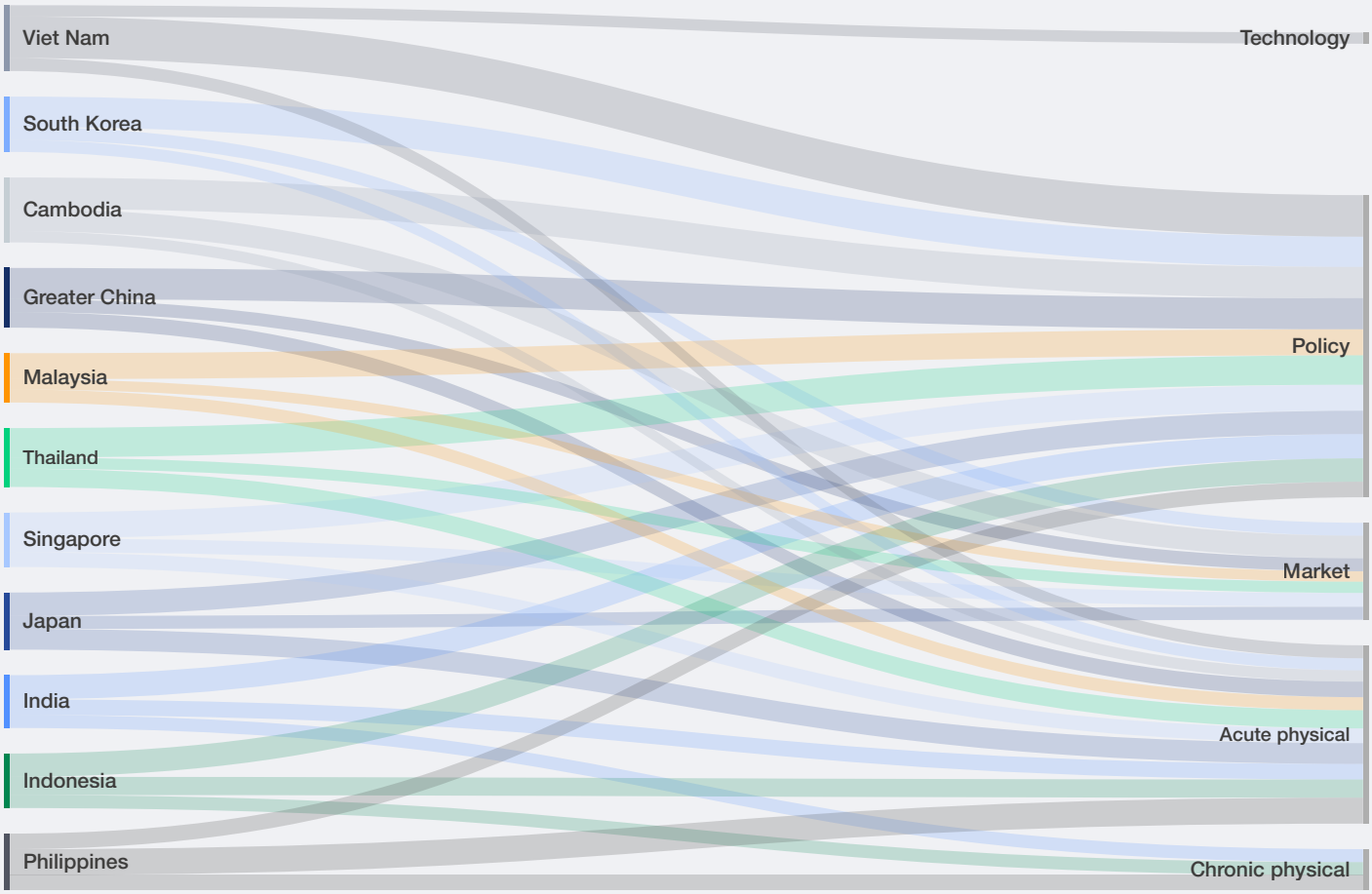
2.1 Addressing physical and transition risks

Physical risks from climate change, such as extreme weather, droughts and flooding, alongside transition risks such as tighter regulations, carbon pricing and disruptive technologies, are increasingly shaping business strategy and operations. For example, according to the *Global Risks Report 2025*, extreme weather events rank second in the short-term (2027) risk landscape, while climbing to the top position in the long-term (2035) risk ranking, becoming the most prominent global concern. Particularly in Asia, due to geographical vulnerabilities, high population density and economic structural characteristics, countries perceive extreme climate risks with greater intensity and urgency.

FIGURE 5 **Global risks ranked by severity over the short and long term**

Source: World Economic Forum. (2025). *The Global Risks Report 2025.*

FIGURE 6 | **Top perceived climate risk types across selected Asian countries**



Source: World Economic Forum analysis, based on 2024 CDP data.

79%

of companies in the Asia-Pacfic region identified environmental risks with substantive financial impacts – above the global average of 67%.

Companies that fail to address these challenges face supply chain disruption, asset impairment and higher financing costs. Conversely, proactively assessing and managing climate-related risks helps mitigate potential losses while strengthening resilience and credibility with investors, customers and regulators.

CDP data indicates that in 2024, companies across Asia recognized the materiality of climate-related risks, with policy and acute physical risks emerging as the dominant concerns. In the Asia-Pacific region, an average of **79% of companies identified environmental risks with substantive financial impacts** – above the **global average of 67%** – making it the region where awareness of environmental risk is most widespread. In Greater China, 36% of companies cited policy risk as the highest perceived area of risk, followed by acute physical risks (18%) and market-related risks (15%).

This pattern holds across much of Asia, where 32% of companies identify policy risk as their top concern, reflecting heightened awareness of regulatory tightening. Meanwhile, acute physical risks (e.g. extreme weather events) are ranked second overall (19%), particularly in climate-vulnerable countries like the Philippines and Thailand. Market risks, including shifting demand and reputational impacts, remain the third most reported category across the region (14%). These results highlight a growing regional alignment on both transition and physical climate threats.

Three key regulatory and market forces are creating decisive competitive advantages for proactive companies, while significantly escalating risks for those who fall behind:

- The rapid advancement of domestic carbon pricing and green regulations across Asia directly impacts compliance and operational costs.
- The rise of cross-border compliance mechanisms, such as the Carbon Border Adjustment Mechanism (CBAM), is reshaping international trade standards and market access requirements.
- The growing influence of buyer preferences and capital allocation signals increasingly reward robust environmental performance in procurement and financing decisions.

These drivers collectively intensify the urgency for corporate climate action.

TABLE 2 **Latest regulatory developments in selected Asian countries**

Country/region	Latest developments	Impact on Scope 3 emissions
China	– National Emissions Trading Scheme (ETS) expanding to steel, cement and aluminium in 2025. – New Product Carbon Footprint standard (GB/T 24067–2024) effective from October 2024.	Mandates detailed sector- and product-level accounting. Upstream carbon footprint data is becoming essential for trade and compliance.
Singapore	**Carbon tax rate:** – SGD 25 (Singaporean dollars)/tonne (2024–25) – SGD 45/tonne (2026–27) – SGD 50–80/tonne by 2030.	Stable carbon price improves returns on efficiency and green power, raising supplier expectations for data and renewable energy use.
Indonesia	– IDXCarbon exchange launched in 2023; opened to international access in January 2025. – Financial Services Authority rules are in place.	Provides credit and financing tools for supply chains. Enables companies to purchase reductions to hedge against supply chain emissions.
Viet Nam	– Power purchase agreement (PPA) framework progressing, with pilots and regulatory updates under way. – Green Taxonomy in preparation; expected to guide green finance in coming years.	Enables large users to procure green power directly. Clear green finance standards support overall supply chain alignment and emission reductions.
Malaysia	– Corporate Green Power Programme for virtual power purchase agreements. – Renewable energy certificate systems are operational.	Provides verifiable pathways for reducing Scope 2 emissions, which is a key factor in lowering the carbon footprint of downstream products.
Thailand	– Thailand Voluntary Emission Reduction programme ongoing. – Direct power purchase agreement pilots advancing. – ETS legislation under development.	Provides traceable green power for major energy consumers. Local carbon credits offer a supplementary option for supply chain emission reductions.
EU (external)	– CBAM currently in its transitional phase (2023–2025), requiring importers to report embedded emissions. – Full CBAM implementation, including financial obligations, will start in 2026.	Directly targets imported goods emissions. Driving supply chain carbon management.

In addition, proactively aligning with policies could bring further competitive edges for corporates when pilot innovative policy tools emerge. For example, the Chinese city of Changzhou, where some of the major renewable energy and manufacturing companies headquarter in, issued guidelines for companies to set up chief executives responsible for carbon neutrality portfolios to streamline internal governance.

BOX 1 **City of Changzhou: chief dual-carbon officers to mainstream enterprise decarbonization**

Changzhou, a major industrial hub in the Yangtze River Delta, launched a chief dual-carbon officer (CCO) guideline to embed carbon management into corporate governance. By 2025, listed and state-owned enterprises in priority sectors must appoint CCOs, expanding to all large firms by 2026. CCOs develop decarbonization strategies, monitoring, reporting and verification (MRV) systems, carbon footprint assessments, and promote low-carbon technologies. Supported by universities, research institutes and cross-department task forces, they also coordinate ESG efforts. The initiative strengthens executive-level accountability, standardizes carbon management and prepares firms for carbon markets, enhancing industrial competitiveness and climate governance.

Source: Changzhou Municipal People's Government. (2025, 8 July). *Notice from the Municipal Government Office on the issuance of the implementation plan for the Chief Dual-Carbon Officer system in Changzhou (trial)*. https://www.changzhou.gov.cn/gi_news/587175256675299.

2.2 Enhancing efficiency and financial performance

Enhancing energy efficiency and optimizing resource use are not only core measures for reducing a company's direct operational emissions, but they also serve as the foundational lever for catalysing decarbonization across the entire value chain. In Asia-Pacific, companies gain an average of $36.5 million from environmental action at a cost of $4.5 million – an eight-fold return. The top emissions saving initiatives in the region are energy efficiency in production processes, and low-carbon energy generation, according to CDP. This inside-out approach to emission reduction forms a solid foundation for attracting investment, building resilience and securing long-term competitiveness.

BOX 2

State Grid Corporation of China drives the decarbonization of the industrial and supply chains through the Green Electricity Empowerment and Process Reshaping model

State Grid Jiangsu Electric Power is assisting the local marine engineering and shipbuilding industry in achieving point-to-point energy savings across multiple process nodes through technologies such as intelligent frequency conversion control and waste heat cascade utilization. Additionally, it has introduced integrated systems combining distributed photovoltaics, energy storage and shore-based power supply. By harnessing smart grids, it can dynamically balance energy supply and demand through one-click optimization, setting a replicable benchmark for "near-zero carbon" factories. This initiative serves as an industrial anchor for building green supply chain clusters and driving decarbonization transformation upstream and downstream. So far, it has facilitated energy-saving upgrades in 12 supporting enterprises and attracted over 100 companies from within and outside Jiangsu Province to conduct on-site learning.

Source: China Energy News. (2025, 10 July). *Building a Near-Zero Carbon Factory to Support the Green Transformation of Offshore Shipbuilding*. https://www.cnenergynews.cn/zjxj/2025/07/10/detail_20250710221353.html.

CASE STUDY 1

LONGi: strengthening financial and operational performance through an efficient and responsible value chain

LONGi strategically manages its value chain not just for compliance, but as a source of operational and financial advantage, using rigorous supplier management, digital traceability and ESG capacity building to drive down costs and mitigate risks.

Core initiative

- **Supplier LCC management control mechanism:** LONGi implements gatekeeping for silicon supply chain partners; enforces on-site audits, document traceability and capability assessments; and admits only qualified suppliers into a dynamic graded management pool.
- **End-to-end digital traceability:** LONGi deploys a traceability integration system covering material, production and logistics data; enables batch-level tracking from polysilicon to finished modules; and supports third-party audits and client-facing traceability services.
- **Supplier ESG capacity building:** LONGi launched the 2024–2028 Supplier ESG Capacity Building Plan; provides training on environment, human rights, safety and ethics via the LONGi e-Learning Supplier Platform and Supplier On-site Empowerment Coaching; and promotes certifications like ISO 14001, ISO45001, ISO4064, SBTi, SA 8000 and more.
- **Green and responsible procurement:** Its initiatives enforce responsible mineral sourcing through the use of conflict minerals reporting templates (CMRT)-certified smelters.

Impact

- **Assurance supply chain continuity:** Rigorous supplier control minimizes production disruptions and quality failures, reducing rework and delay costs.
- **Enhanced asset efficiency:** Digital traceability optimizes inventory and streamlines audits, cutting capital tied up in stock and compliance costs.
- **Reduced risk profile:** A compliant supply chain de-risks the business from fines and scandals, enhancing investor appeal and lowering capital costs.
- **Market access and premium:** Verifiable responsible sourcing unlocks green markets and enables brand premium, securing revenue and boosting profitability.

BOX 3

Huaneng: using full life cycle management to drive carbon emissions reduction across the hydropower value chain

As China's leading state-owned enterprise (SOE) in the power sector, Huaneng has defined accounting boundaries and targets for carbon emissions throughout hydropower projects' life cycles.

It has established a theoretical framework that integrates multi-source data collection and intelligent analysis to achieve precise carbon accounting and efficient regulation.

Huaneng to the lead in publishing the International Electrotechnical Commission (IEC) Smart Hydropower white paper. The paper promotes the intelligentization and standardization of the entire hydropower value chain, upgrading hydropower from a single clean power producer to a core hub for integrating renewable energy and managing carbon assets, and guiding the industry towards deep decarbonization.

By collaborating with upstream and downstream partners, Huaneng has incorporated energy conservation and carbon control as crucial management and evaluation metrics, empowering SMEs across the value chain to accelerate the development and adoption of green, low-carbon technologies and products.

2.3 Elevating competitiveness and unlocking new revenues

The low-carbon transition has moved beyond regulatory compliance to become a driver of competitive differentiation and new revenue streams. By developing low-carbon products, circular business models and innovative green solutions, companies can respond to rising customer and societal expectations for sustainable value chains. At the same time, tapping into emerging markets and segments driven by low-carbon demand strengthens brand reputation and opens new opportunities for growth. Strategic integration of sustainability into core business models thus not only mitigates risks but actively enhances market position and profitability.

BOX 4 | **Shougang Group: low-carbon steel for upstream partners and automotive clients**

Shougang expands market with green steel product line. By launching an independent "green steel" product line, Shougang Group has successfully carved out new growth space. It pioneered the establishment of corporate standards for green low-carbon steel and created a corresponding certification and premium pricing system. This strategy transforms its low-carbon steel into a clearly differentiated, tradable product that not only meets the rigid emission reduction demands of automotive clients but also enables Shougang to enter a high-value market segment driven by environmental policies. Ultimately, this converts their low-carbon technological advantages into new revenue streams.

Source: Shougang Group. (2025, 8 September). *Shougang officially released its green and low-carbon trademark, enterprise standards and pricing system for low-carbon automotive steel*. https://www.shougang.com.cn/m1/sgyw/20250908/13368.html.

BOX 5 | **PETRONAS: designing low-carbon products to unlock new revenue**

PETRONAS actively advances low-carbon transformation at the product design level, launching bio-based chemicals, CO_2 utilization products, low-carbon hydrogen/ammonia and low-carbon fuels. By using low-carbon raw materials and processes, it reduces the life cycle carbon intensity of its products. Long-term offtake agreements with downstream partners stabilize market demand, further unlocking new revenue streams. This strategy supports net-zero goals while opening new sustainable business opportunities.

Source: PETRONAS. (2024). *Integrated report 2024*. https://www.petronas.com/integrated-report-2024/assets/pdf/2024/PETRONAS-Integrated-Report-2024.pdf.

CASE STUDY 2

SCG (Siam Cement Group): circular economy for low-carbon cement and materials

As one of the largest building materials companies in South-East Asia, SCG (Siam Cement Group) connects upstream raw material and energy suppliers, and community and agricultural waste sources with downstream real estate developers, infrastructure contractors and packaging clients. Through circular economy practices, SCG transforms waste into production inputs, achieving both emissions reduction and cost optimization, while delivering lower-carbon and traceable cement and packaging products to its customers.

Core initiative

- SCG actively promotes the use of biomass, community waste and agricultural by-products processed into refuse-derived fuel (RDF) as a substitute for coal, reducing fossil carbon emissions in clinker production.
- In collaboration with local governments and communities, SCG recycles construction and demolition waste as well as industrial by-products back into cement production, lowering natural limestone extraction and increasing clinker substitution rates.
- Through SCG Green Packaging, the company promotes the collection and reuse of paper and plastic packaging materials, helping downstream customers reduce emissions associated with single-use packaging.
- SCG builds regional circular economy platforms that channel agricultural residues and industrial waste into usable fuels or raw material substitutes for the construction sector, creating cross-industry value and emission reductions.

Impact

SCG's circular economy initiatives not only lower the carbon intensity of cement production but also extend the life cycle of materials:

- At multiple production sites, the share of alternative fuels has increased significantly, reducing reliance on coal
- The reuse of construction waste and industrial by-products eases landfill pressure while reducing raw material procurement costs
- Circular packaging creates new green revenue streams and strengthens customer loyalty in downstream markets
- Importantly, SCG's circular model provides waste management solutions for local communities, enhancing the company's social license to operate and reinforcing its role in regional sustainable development.

TABLE 3 **Areas to build the business case for corporate value chain decarbonization action**

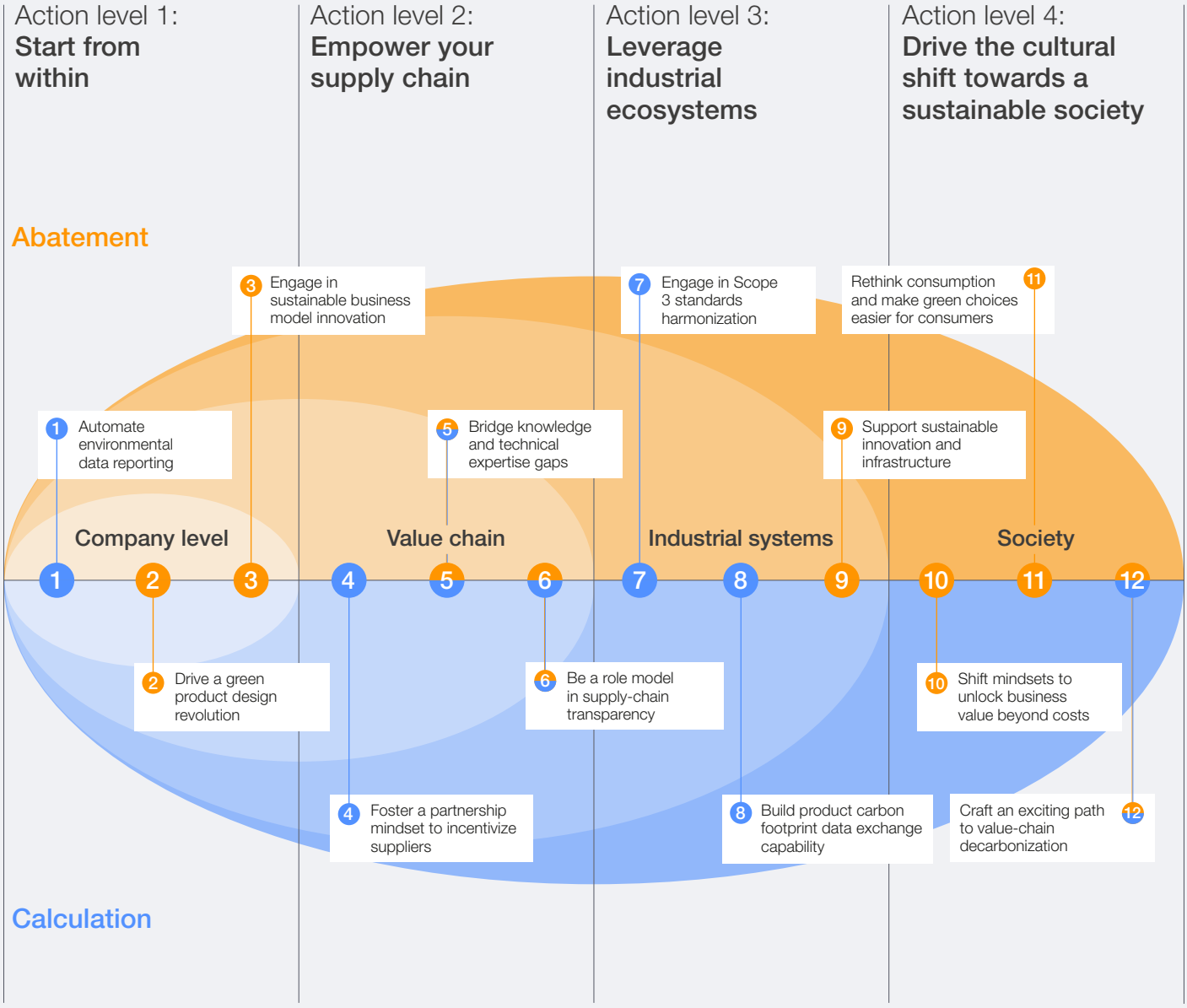
Growth lever	Mechanism	Core KPIs	Common tools
Addressing physical and transition risks	– Traceability reduces compliance and brand risk – Data and localization improve shock resistance	Traceability coverage of key materials, compliance pass rate, days of disruption.	– Scope 3 emissions reduction milestones and tracking – Supplier and material traceability systems – Digital monitoring, reporting and verification
Enhancing efficiency and financial performance	– Using green power and efficiency to lower unit cost and volatility – Optimizing processes and logistics to reduce waste – Including carbon performance in financing terms and ratings – Achieving lower funding costs and accessing broader capital pools	Unit emissions, unit energy cost, price volatility, on-time delivery rate, production yield, funding cost spread, ESG/climate scores, bond/loan approval rate, weighted average cost of capital	– Power purchase agreements – Renewable energy certificates – Process and equipment efficiency improvements – Low-carbon materials – Green warehousing and transport – Waste reduction and circular systems – Sustainability-linked loans/sustainability-linked bonds – Audit and third-party verification
Elevating competitiveness and unlocking new revenues	– Incorporating low carbon and traceability into procurement – Low-carbon products and business models create new revenue – Linking carbon performance to market access and pricing via cross-border rules	Win rate, average selling price/premium, access to restricted markets, customer retention, share of revenue from new products	– Product carbon footprint accounting and verification – Aligning supplier targets (including SBTi) – Product-level low-carbon labels – Scope 3 emissions disclosure coverage – Low-carbon product design and modular products

3 The blueprint: seizing the value chain opportunities

Low-carbon value chains should be forged across four strategic dimensions.

By transforming value chains from carbon liabilities into innovation ecosystems, businesses can unlock resilience, market access and growth. Based on the "no excuse" opportunities to drive Scope 3 decarbonization (Figure 7) developed by the World Economic Forum's Industry Net Zero Accelerator initiative, this white paper further analyses this tailored blueprint that addresses Asia's unique industrial dynamics, emphasizing collaborative models, technological leap-frogging and financial innovation through four levels.[14]

FIGURE 7 **Four dimensions of 12 "no-excuse" opportunities to drive scope 3 decarbonization**

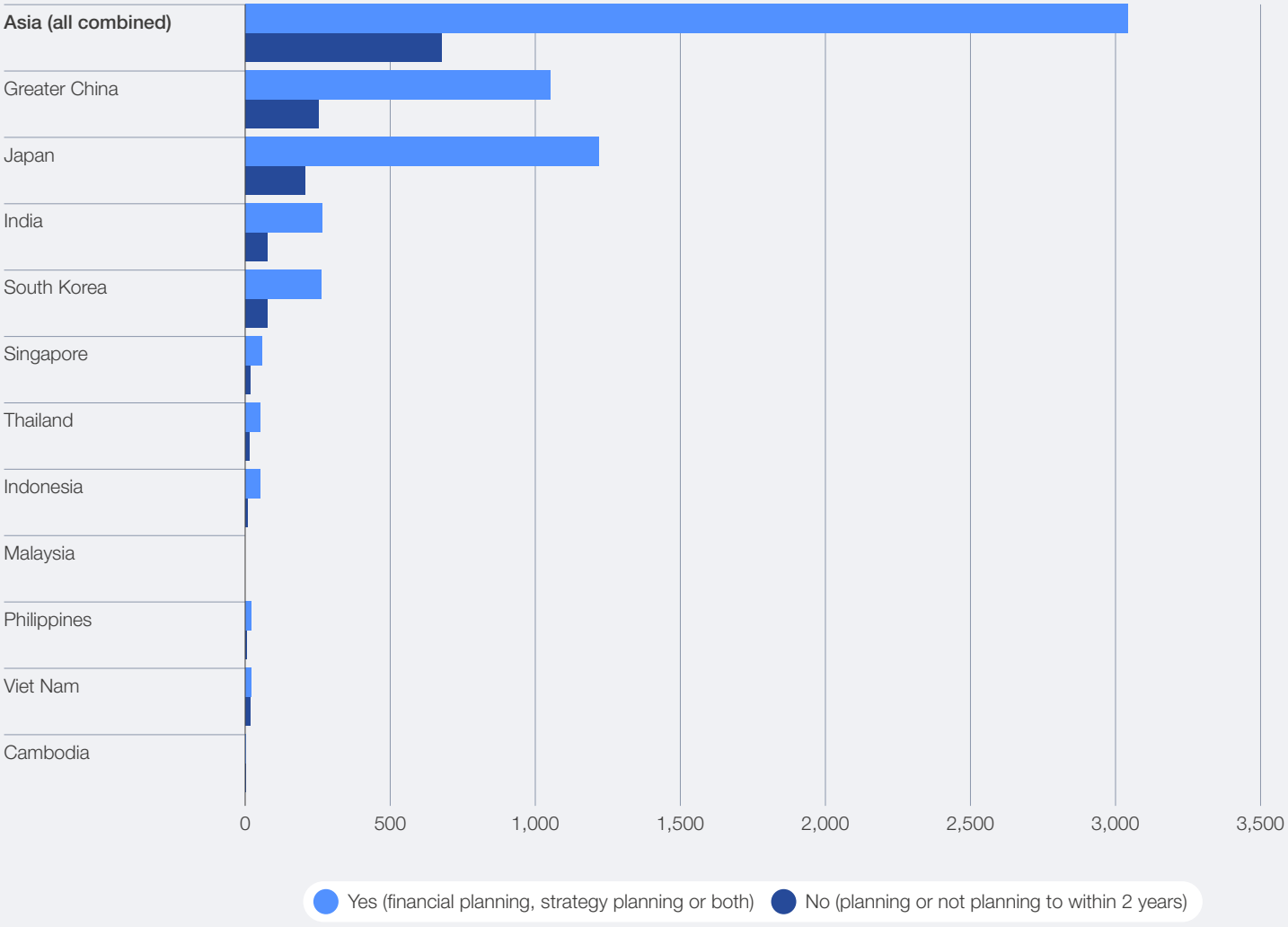


Source: World Economic Forum. (2023). *The "No-Excuse" Opportunities to Tackle Scope 3 Emissions in Manufacturing and Value Chains*. https://www.weforum.org/publications/the-no-excuse-opportunities-to-tackle-scope-3-emissions-in-manufacturing-and-value-chains/.

3.1 Starting from within

Proactive target-setting is no longer optional but a strategic imperative for market relevance. Companies establishing science-aligned Scope 3 goals and measuring carbon footprint at both the corporate and product levels signal operational maturity to global investors and buyers, mitigating transition risks while accessing green finance. This requires embedding accountability into procurement systems and bridging capability gaps across supply tiers, which is especially critical for Asia's SME-dominated industrial base.

FIGURE 8 **Number of enterprises in Asia that integrate climate change into their corporate strategies**



Source: CDP.

BOX 6 **Frasers Property: decarbonization starting from inside**

Frasers Property has implemented an internal Climate Value-at-Risk (CVaR) platform and decarbonization tool to guide value-chain emission reductions from within. The system standardizes asset, energy and emissions data, inputs them into scenario-based risk models, and simulates the impact of various decarbonization interventions on emissions, costs and asset value. This enables informed investment, financial and strategic decisions, prioritizing the most effective internal actions before extending to external operations, thereby embedding carbon reduction into the core of the business.

Source: Frasers Property. (2024). *ESG report 2024*. https://www.frasersproperty.com/content/dam/frasersproperty/feature/project/frasers_fct/who-we-are/Frasers-Centrepoint-Trust-AR2024-ESG-Report.pdf.

CASE STUDY 3

CSCEC: using full-chain carbon accounting to decarbonize construction

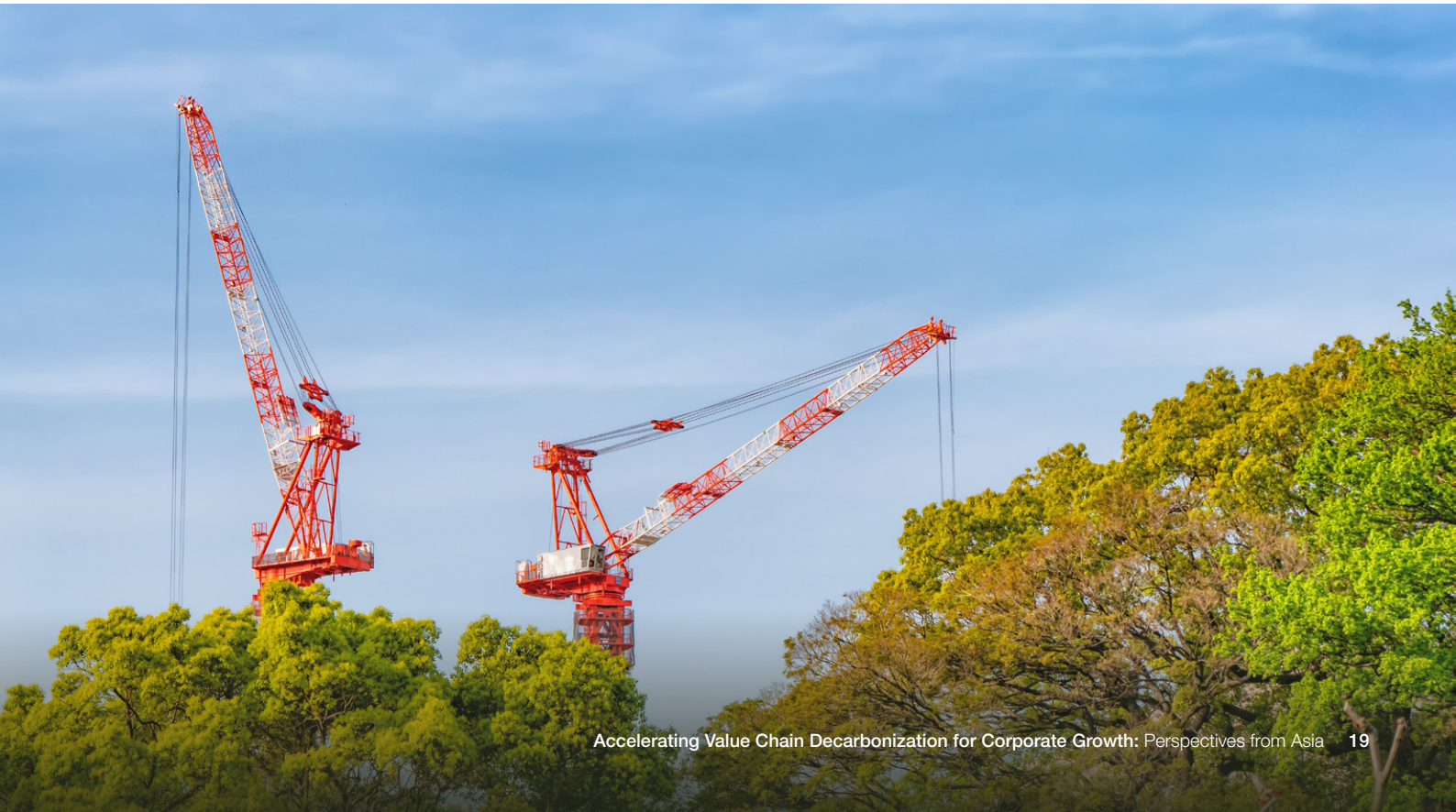
As one of the world's largest construction groups, the China State Construction Engineering Corporation (CSCEC) has built a three-tier carbon data management system (group-subsidiary-project) and a verification mechanism that covers seven business domains, positioning the group as a sector-wide "carbon-data integrator".

Core initiative

- Governance and boundaries: CSCEC creates organization-wide inventories. It establishes a group "dual-carbon" leadership role or office, issues technical documents, sets up a carbon accounting task force and engages accredited third-party assurance to ensure consistent scopes and reliable data. It led the drafting of the MoHURD (Ministry of Housing and Urban-Rural Development of the People's Republic of China) Guidelines for Carbon Accounting of Construction Enterprises to standardize system boundaries and methods.
- Digital platform: CSCEC builds and commissions a comprehensive carbon monitoring and management platform, unifying the emission factor library, activity data and dashboards. The platform enables real-time energy and/or carbon tracking, intensity analysis and scenario forecasting to support abatement decisions.
- For the second consecutive year, CSCEC has completed group-wide inventories across all business domains, cumulatively covering more than 15,000 projects.
- CSCEC embeds suppliers into accounting and governance; enhances green supplier evaluation and green procurement; onboards more than 8,000 green-material vendors to the group's marketplace; and advances material-focused decarbonization informed by accounting insights.

Impact

- **Unified scopes, auditable quality:** Guidelines plus third-party assurance create an integrated standards, process and audit system that improves accuracy and comparability of construction-sector carbon data.
- **Comprehensive coverage, sharper insights:** Accounting across more than 15,000 projects, extended to overseas sites and life cycle assessments, accelerates identification of high-emission processes and material hotspots.
- **Decision loop and efficiency gains:** The monitoring platform's intensity/trend/scenario analytics support targeted energy-saving and carbon-reduction actions across the seven business segments.
- **Supply chain decarbonization:** Scaled green-supplier programmes and procurement, coupled with low-carbon materials roadmaps, form a replicable "account>procure>abate" pathway.



3.2 Empowering supply chains

Chain leaders who co-invest in supplier capabilities can transform transactional relationships into strategic partnerships. Shared data platforms, cost-sharing mechanisms and equipping a partnership mindset to enable gap bridging can distribute transition costs while mitigating systemic risks, which is critical in Asia's fragmented manufacturing ecosystems. This collaborative ethos counters exploitative buyer-supplier dynamics, converting decarbonization into mutual value creation.

CASE STUDY 4

Siemens: scaling low-carbon solutions via Xcelerator platform

As a leading technology company, Siemens commits to achieving net-zero greenhouse gas emissions across entire value chain by 2050 and is uniquely positioned to spearhead this transformation for entire industries, with more than 90% business enabling customers to achieve a positive sustainability impact. In 2021, Siemens launched Zero-carbon Pioneer Initiative in China, to co-create a green ecosystem with all partners; in 2022, Siemens Xcelerator was launched to accelerate digital transformation, as an open digital business platform for driving sustainability.

Core initiative

- **Siemens Xcelerator "Green and Low-Carbon Theme Category":** one-stop platform offering comprehensive information, professional insights, success stories,and cutting-edge solutions co-created with partners.
- **Supply chain management (SCM) X:** A pioneering digital hub on Siemens Xcelerator, designed to empower suppliers' sustainability progress, featuring four modules: SCM Academy for knowledge building, Siemens Solutions, Supplier Collaboration and Supplier Innovation. As an all-in-one platform, it enables suppliers to explore, learn and advance sustainability.
- **Package resuable collaboration with Horen:** As an intelligent reusable transit packaging provider, Horen reduces upstream emissions of Siemens' Tianjin factory, saving 54 tons of solid waste and 80 tons of CO_2 equivalent (CO_2e) yearly, and scaling across China factories. As Siemens' partner, Horen co-developed Siemens-powered heavy-duty parts solutions for logistics, launched on Siemens Xcelerator to scale.
- **Battery recycling with NorthStar:** Co-created integrated solutions via Siemens automation, energy management, carbon footprint solution, etc., and developed flexible dismantling for power batteries and printed circuit boards (PCBs) via AI, edge computing, digital twin – all scaled via Siemens Xcelerator.

Impact

Siemens achieved sustainability outcomes for both its own operations and the value chains. From 2019 to 2025, Siemens Chengdu Factory has boosted its revenue by 73%, while increasing its energy efficiency by 20% via applications of digital twin, AI, energy management systems, etc. By 2025, Siemens has assisted more than 500 key suppliers in China to accelerate their carbon reduction journey, play important role in supporting Siemens globally to reduce CO_2 emissions in own operation by 60%, and help more than 10,000 customers in different industries to be more sustainable and resilient.

3.3 Leveraging industrial ecosystems

Standardization is a powerful enabler for scaling industrial decarbonization. By creating unified protocols, shared infrastructure and digital platforms, industrial ecosystems can reduce duplication, lower transaction costs and accelerate adoption of low-carbon solutions. In Asia, strong links between state and industry provide fertile ground for promoting standardized models that can be replicated across regions and sectors. This not only strengthens value chain coordination but also ensures credibility in carbon accounting and reporting. When embedded in industrial clusters, such frameworks allow companies to pool resources, exchange data and integrate circular practices, transforming isolated initiatives into system-wide decarbonization pathways.

CASE STUDY 5

Envision: promoting a net-zero industrial park to national level standardization

Envision is a clean technology integrator and ecosystem orchestrator, combining wind power, energy storage, green hydrogen and ammonia, and a unified energy and carbon digital management platform to deliver end-to-end net-zero solutions that link upstream energy with downstream manufacturing. Envision operates more than 60 manufacturing and R&D sites worldwide. Its Scope 3 emissions exceed 5 million tonnes (Mt) of CO_2e (excluding the power battery business) and account for most of its total emissions.

Core initiative

- Envision led the release of a group standard for low or net-zero industrial park construction (2022); promoted a Zero Carbon Industrial Park Construction Specification as an Inner Mongolia local standard (2023); and initiated a national guidance project on low-carbon or net-zero industrial parks (2024), while contributing to measurement and evaluation specifications.

- Envision built the Ordos industrial park as a net-zero industrial cluster, the first of its kind, using round-the-clock low-cost green power, coordinated microgrids and demand-side retrofits. It also formed closed-loop chains, such as batteries, by co-locating upstream and downstream firms.

- The company extended the model to Baotou and Chifeng to decarbonize steel, alloys and green hydrogen-ammonia value chains, creating a multi-park portfolio for scale-up. The model is being replicated in Spain, France and the UK.

- Envision deployed a unified energy and carbon management platform for real-time monitoring and audit-ready accounting, aligning park operations with standardized metrics and supplier programmes.

Impact

The progression from enterprise specification to local and then national standard lowers replication and verification costs and improves the comparability and auditability of carbon accounting. The Ordos park achieves over 80% green power consumption at the cluster level, synchronizes production with renewable availability and reduces supply chain emissions by integrating upstream and downstream actors. The Baotou and Chifeng projects broaden their impact to include heavy industry, positioning a scalable "China solution" for net-zero industrial parks and accelerating diffusion through a standards-based, data-driven approach.

CASE STUDY 6

State Grid: driving the low-carbon transformation of the industrial ecosystem through comprehensive coordination of green supply chains and carbon management

With its core business focused on investing in, constructing and operating power grids, State Grid Corporation of China (SGCC) is a key state-owned enterprise tasked with fulfilling national strategic missions, a backbone power company ensuring national energy security, and a public utility serving the national economy and people's livelihoods. As a critical measure, SGCC is developing a "comprehensive and in-depth" green ecosystem for its supply chain and deepening the construction of its carbon business system. This enables coordinated carbon reduction efforts across upstream and downstream partners, strengthens the integration of green power consumption accounting with carbon accounting rules, and comprehensively drives the low-carbon transformation of the entire industrial ecosystem and value chain.

Core initiative

- SGCC advanced the development of a green, modern, digital and intelligent supply chain. Harnessng its role as the anchor of the industrial and supply chains, it expanded the access to energy consumption and carbon emission data from enterprises at all levels of the supply chain. It also broadened services such as carbon emission accounting, product carbon footprint accounting, carbon trading and green finance, guiding the entire industrial chain toward green upgrading.
- SGCC comprehensively coordinated carbon management through the construction of a carbon business system. Introduced blockchain technology to ensure data immutability and building a credit evaluation system through big data monitoring; established national standards for product carbon footprints and carbon accounting in power transmission and transformation, supporting the national carbon emission statistical accounting system; and supported the development of a national carbon emission analysis platform to promote green and low-carbon development.

Impact

- A trillion-yuan procurement and supply chain management platform has been established, saving CNY 77.783 billion in procurement costs, with 147 green warehouses and 33 zero-carbon warehouses developed.
- Promoting the coordinated development of the power market with carbon emission trading, green certificate trading and other markets, supporting the Beijing Power Exchange Center in establishing a green certificate trading platform, with cumulative transactions reaching 108 million certificates.
- State Grid Information & Communication Industry Group, in collaboration with the State Grid Big Data Center, supported the National Development and Reform Commission (NDRC) in building the National Carbon Emission Monitoring and Analysis Service Platform, which innovatively applies power big data technology to monitor and analyse monthly carbon emissions at the national, regional and industrial levels, significantly improving data timeliness compared to traditional accounting methods.

3.4 Driving a cultural shift

Achieving deep decarbonization requires more than policies and technologies; it demands a cultural shift within businesses and across society. Moving from a mindset of minimum compliance towards genuine ownership of climate goals is essential for lasting impact. This transition involves embedding sustainability into corporate identity, consumer engagement and community development, so that low-carbon practices are not external obligations but internal drivers of value. By building ecosystems in which employees, partners and customers actively participate, companies can amplify their influence, build trust and accelerate behavioural change. Such cultural transformation turns climate action into a shared mission, reinforcing both competitiveness and resilience.

CASE STUDY 7

JD.com, SCEMP-AI: linking merchants and customers in a low-carbon ecosystem

Positioned as a technology- and service-driven enterprise centered around supply chain capabilities, JD.com launched the SCEMP-AI Carbon Footprint Management Platform (SCEMP-AI). This platform integrates green supply chain transformation, merchant carbon reduction certification, and consumer carbon account incentives into a cohesive digital ecosystem. By linking green production with sustainable consumption and carbon trading mechanisms, SCEMP provides a full life cycle decarbonization framework for both business-to-business (B2B) and business-to-consumer (B2C) participants. The system supports end-to-end monitoring, reporting, verification, tracking (MRV-T) and performance management of Scope 3 emissions across JD's extensive supply network. With close to 700 million annual users and a carbon footprint dominated by Scope 3 sources, JD Logistics has positioned supply chain decarbonization at the heart of its sustainability strategy.

Core initiative

- The platform integrates AI, blockchain and big data to transform carbon management. Its AI algorithms automatically identify over 1,000 emission sources, improving modelling efficiency by 85%. Through real-time GPS (global positioning system) and an innovative "spatiotemporal dual-factor" model, it boosts calculation accuracy from 60% to 99.5%. This end-to-end technical solution establishes a verifiable digital foundation for global Scope 3 carbon accounting.

- Through the JD.com Retail Green Initiative, the platform turns green consumer behaviour into a key force that accelerates supply chain decarbonization. It converts eco-friendly choices – such as selecting green logistics – into personal carbon coupons, linked to a carbon trading mechanism that turns dispersed consumption-side reductions into tradable assets and generates direct cash rewards. This approach overcomes the traditional "appeal without return" barrier, creating a self-reinforcing cycle where consumer incentives motivate brands to expand green offerings and seamlessly connect green behaviour with financial benefits.

- Built on international standards, including ISO 14064/14083 and the GHG Protocol, the MRV-T system slashes compliance costs for multinational corporations. The platform has automated carbon footprint reporting for over 1,000 brands, seamlessly connecting their value chains with global carbon border mechanisms.

Impact

The project is driving three major paradigm shifts: from reliance on industry average estimates to real-time precise measurement; from passive compliance to proactive carbon asset management; and from single-enterprise emission reduction to full supply chain collaboration – engaging hundreds of millions of consumers in decarbonization efforts. This innovative model has been recognized as an exemplary case for the World Summit on the Information Society (WSIS) by the United Nations, providing a scalable blueprint for digital climate action globally. Additionally, the trusted carbon ecosystem connects suppliers, certifiers and non-governmental organizations (NGOs) through blockchain-verified data, having processed over 120 million orders. This "JD.com solution" for Scope 3 management has already achieved over 700 tons of carbon reduction during its pilot phase, demonstrating significant potential for scalability.

BOX 7 Lippo Group: driving for low-carbon living

Lippo Group in Indonesia launched a Community Low-Carbon Living Lab to promote a cultural shift towards lower emissions. The initiative combines behavioural education, small-scale infrastructure, incentives and low-carbon measures across markets and supply chains. Pilot actions include rooftop solar installations, green market certifications and energy-efficient waste management programmes, reducing Scope-3 emissions among residents and merchants. Simultaneously, the programme strengthens brand influence and community cohesion. This strategy supports the company's net-zero ambitions while creating new sustainable business opportunities, demonstrating that cultural engagement can effectively complement technical decarbonization measures.

Source: Lippo Karawaci. (2025). *Sustainability Report 2025: Advancing Well-Being at Every Stage of Life*. https://www.lippokarawaci.co.id/uploads/file/SR%20LPKR%202025_English.pdf.

BOX 8 Kweichow Moutai: electrifying park logistics and green commuting

Kweichow Moutai is driving low-carbon growth, and one of the measures is prioritizing electrified park logistics and employee green commuting. The company mandates electrification of on-site freight and shuttle fleets, installs workplace charging infrastructure, and enforces vehicle access rules to reduce private car trips, while promoting public transit and new energy vehicle (NEV) commuting programmes for staff. Coupled with waste-heat recovery and circular by-product use, these measures cut transport fuel use and Scope 3 emissions, strengthen supply-chain resilience and model industrial decarbonization rooted in operational changes.

Source: Kweichow Moutai. (2024). *Environmental, Social and Governance Report 2024 (ESG report)*. https://www.moutaichina.com/mtjt/attachDir/2025/04/20250402204501133320.pdf.

Asia's value chain decarbonization represents not a cost, but a $3 trillion potential benefit. Leading enterprises demonstrate how Scope 3 action can drive value creation, reducing costs by up to 67%, unlocking premium markets and enhancing long-term resilience. The region's success will depend on advancing models tailored to Asia's strengths: aligning industrial policy with corporate ambition, scaling solutions through digital innovation and encouraging inclusive, community-driven growth. Those who lead this transition will not only strengthen their competitiveness, but also shape the next era of global industrial leadership.

Call to action

Progress on Scope 3 decarbonization remains uneven despite its growing centrality in corporate climate strategies. Complex global supply chains, inconsistent accounting boundaries, limited data quality, financing gaps for SMEs and behavioural shifts across production and consumption continue to slow momentum. Yet Asia's distinctive strengths – close public-private collaboration, digital scalability and dense industrial ecosystems – can transform these challenges into opportunities when aligned with shared standards, targeted investment and effective market incentives.

The journey begins within companies themselves. Setting science-aligned Scope 3 targets, embedding carbon reduction metrics into product design, business model strategy and procurement, and developing transparent, auditable data systems help translate emissions into decision-relevant metrics. Treating carbon as a factor of productivity connects decarbonization directly to value creation, resilience and competitiveness.

Empowering supply chains is equally vital. Businesses can support suppliers through knowledge sharing, co-investment and tailored financing mechanisms, linking commercial terms and incentives to verified abatement outcomes. Clear demand signals – for example, category-level roadmaps for materials, logistics and energy – allow suppliers to plan and invest with confidence.

Collaboration across industrial ecosystems multiplies impact. Shared renewable energy and storage infrastructure, harmonization of standards and protocols, circular material exchanges and interoperable digital platforms can reduce costs and accelerate collective progress. A parallel cultural shift from compliance to ownership will engage employees, consumers and communities through transparent carbon accounting and incentive structures that reward measurable results.

Enabling frameworks is essential to accelerating this transformation. Policy support can harmonize product carbon footprint methodologies and disclosure standards, promote interoperable data systems and facilitate low-carbon investment at cluster level. Financial institutions can recognize verified Scope 3 reductions as bankable outcomes and expand sustainability-linked instruments for suppliers. Technology providers can ensure interoperability through open data schemas, digital product passports and traceable footprints that make emissions reductions transferable along value chains.

The imperative is clear: businesses must act, learn and scale, rather than waiting for perfect systems or data to materialize. Value chain decarbonization is not only a climate necessity; it is a catalyst for growth. By aligning policy, finance, technology and culture, Asia can turn fragmented efforts into coordinated progress and define the next era of competitive, low-carbon value creation.

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