2024
Supply Chain CATI Index
供应链气候行动指数

Climate
Action
Transparency
Index

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CONTENTS

Introduction

The world is witnessing an accelerating increase in the number, speed, and scale at which climate records are being broken, accompanied by a growing trend of more frequent extreme weather events. According to the UNEP's *Emissions Gap Report 2024*[1], published in October 2024, global greenhouse gas emissions must be reduced by 42% by 2030 and 57% by 2035. Otherwise, the 1.5°C target set by the Paris Agreement will be out of reach within just a few years.

Despite over 150 countries and regions around the world having made carbon neutrality commitments, covering more than 80% of global CO2 emissions, GDP, and population,[2] and with global solar power capacity continuing to grow, the ongoing energy shortages and escalating geopolitical tensions are leading major economies to ramp up fossil fuel production to ensure energy security, food security, and supply chain security. Global greenhouse gas emissions continue to rise, with emissions in 2023 (excluding land use, land-use change, and forestry) increasing by 1.9% compared to 2022, reaching 53 billion tonnes of CO2 equivalent (tCO_2e).[3]

In response to the complex challenges posed by climate change, China set its "dual carbon" goal in 2020 and has gradually established the "1+N" policy framework for peak carbon and carbon neutrality. In August 2024, the State Council released the Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emissions[4], advancing the shift from energy consumption control to carbon emissions control. The plan aims to establish comprehensive policies for carbon management and evaluation at the local, industrial, corporate, project, and product levels.

In June 2024, China's Ministry of Ecology and Environment, along with 14 other departments, jointly issued the Implementation Plan for Establishing a Carbon Footprint Management System. This plan proposes the creation of carbon footprint accounting standards aligned with international practices, product carbon footprint factor databases, product carbon labeling and certification systems, and encourages the inclusion of carbon footprint in green supply chain evaluations. The goal is to guide businesses toward low-carbon transformation and promote the upgrading of industrial and supply chains to enhance green and low-carbon competitiveness.

On the international front, supply chain climate disclosures have attracted increasing attention.

The International Sustainability Standards Board (ISSB) published International Financial Reporting Standards (IFRS) S2 Climate-related Disclosures, the European Union introduced the Corporate Sustainability Reporting Directive (CSRD), and California implemented the Climate Corporate Data Accountability Act (SB 253), all of which promote the disclosure of greenhouse gas information across the full value chain of businesses and accelerate the transition to sustainable business models. In addition, in recent years, carbon-related trade policies have proliferated globally. The EU has pioneered the Carbon Border Adjustment Mechanism (CBAM), introduced regulations on batteries and waste batteries, and imposed carbon tariffs on carbon-intensive imports. The EU has also increased carbon footprint requirements for products such as photovoltaics and lithium batteries. The US, UK, Japan, and other countries have followed suit by establishing similar climate policies and green trade rules.

To guide and motivate both Chinese and international companies to achieve climate targets, particularly commitments to reduce greenhouse gas emissions in the supply chain, the Institute of Public & Environmental Affairs (IPE) launched the supply chain climate action project in 2018. In 2024, IPE upgraded the Corporate Climate Action CATI Index evaluation methodology for the seventh consecutive year, expanding its scope to include 780 companies across 23 industries.

In this round of evaluation, we observe that both Chinese and international companies are accelerating their climate action efforts, with a significant increase in the number of companies publicly disclosing climate commitments, organizational and product carbon footprints, and full value chain climate goals. More companies are reporting progress on emission reduction projects involving renewable energy utilization, the use of recycled materials, and low-carbon technological innovations. Leading companies are taking the initiative to engage suppliers in facility-level carbon management and carbon data disclosure, empowering them to extend supply chain management upstream. Nearly 100 leading companies from both China and overseas are leveraging big data and internet-based innovative solutions to improve supply chain carbon management efficiency, encouraging suppliers to join climate action efforts, and implementing supplier carbon accounting, target setting, and renewable energy utilization initiatives.

1. United Nations Environment Programme. 2024 Emissions Gap Report [EB/OL]. [2024-10-25]. https://www.unep.org/resources/emissions-gap-report-2024
2. Tsinghua University. Release of the 2023 Global Carbon Neutrality Annual Progress Report: Accelerating Carbon Neutrality Progress Requires "Actions Speak Louder Than Words" [EB/OL]. [2024-10-18]. https://www.tsinghua.edu.cn/info/1182/106866.htm.
3. European Commission's science and knowledge service. GHG emissions of all world countries 2024 Report[R/OL].[2024-10-18]. https://edgar.jrc.ec.europa.eu/report_2024?vis=co2tot.
4. General Office of the State Council. Notice of the General Office of the State Council on Issuing the Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emissions [EB/OL]. [2024-10-18]. https://www.gov.cn/zhengce/zhengceku/202408/content_6966080.htm.

Highlights

2024 Corporate Climate Action CATI Index Evaluation:

- **Top Performers:** Adidas, Foxconn, PUMA, Luxshare-ICT, Apple, Cisco, Nike, Dell, Inditex, and Levi Strauss & Co. entered the CATI Index Top 10. Foxconn, Luxshare-ICT, Avary Holding, LONGi Green Energy, Geely Automobile, Anta Sports, Lenovo Group, Hang Lung Properties, and ASUS lead the Greater China region.

- **Climate Commitments:** Over 90% of evaluated companies publicly disclosed their climate commitments during this evaluation period, with nearly half of them integrating their supply chains into their climate risk management frameworks.

- **Emissions Accounting:** 79% of companies reported on Scope 1 and 2 emissions. Attention to Scope 3 and supply chain greenhouse gas emissions continues to rise, with 51% of companies disclosing Scope 3 emissions, and 77% of those companies including supply chain emissions. A total of 127 companies across 20 sectors, including IT/ICT, photovoltaic equipment, automotive, textiles/leather, food and beverages, and household appliances, have measured and disclosed the carbon footprint of their main products.

- **Emission Reduction Targets:** 55% of companies have set emission reduction targets for Scope 1 and 2 emissions, while 40% have set carbon neutrality targets for Scope 1 and 2. 38% of companies have set emission reduction goals for Scope 3, and 24% have carbon neutrality targets for Scope 3 emissions. Leading companies like **Apple** and **Samsung** have explicitly outlined supplier facility-level carbon accounting and management requirements in their publicly available supplier codes of conduct, facilitating the tracking of supply chain emission reductions.

- **Supply Chain Engagement:** 30% of the evaluated companies are driving suppliers to adopt corporate carbon accounting or energy management practices. 25% are collaborating with key suppliers on energy management, clean energy alternatives, low-carbon or recycled material usage, and low-carbon technology innovations to implement supply chain emission reduction actions. In addition, 27% of companies are working with logistics suppliers on emission reduction projects, focusing on reducing emissions from upstream and downstream transportation and distribution through measures such as replacing vehicles with clean fuel options, developing multimodal transport logistics, optimizing logistics routes, and implementing green warehousing and packaging solutions.

- **35 companies including Adidas, Foxconn, PUMA, Luxshare-ICT, Cisco, and Nike** have motivated 2,836 suppliers to disclose carbon emissions data through the Blue Map website, marking a 27.5% year-on-year increase compared to the 2023 evaluation period, with total carbon emissions (Scope 1&2) in the most recent year reaching 55.01 million tons of CO_2e[5]. Among them, 742 suppliers achieved a reduction of approximately 3.13 million tons of CO_2e through the utilization of renewable energy.[6]

- Leading companies' efforts to guide supply chain carbon disclosure and climate action are beginning to show results, partly due to the substantial expansion of renewable energy use in China. Over two consecutive evaluation periods, 1,590 suppliers that consistently disclosed carbon data have reduced their total carbon emissions by 5.02 million tons.

Despite these, the majority of the 780 companies evaluated in this round still scored relatively low, with many showing high proportions of energy consumption and Scope 3 emissions within their supply chains. Several companies that have made commitments to achieving Scope 3 carbon neutrality have yet to effectively implement supply chain emissions reduction actions. Only 5% of the companies are actively driving suppliers to calculate and disclose emissions data, set reduction targets, and track progress on greenhouse gas reductions. The ability of suppliers to set and implement emissions reduction goals remains insufficient, highlighting the urgent need for leading companies to play a guiding role in driving the green and low-carbon transformation of the entire supply chain.

To help all stakeholders pragmatically advance climate action and curb "climate greenwashing," IPE launched the Global Business Accountability Map in 2022. This map visually tracks and presents corporate commitments and progress in addressing climate change, their greenhouse gas emissions levels, and the actions they have taken, especially regarding supply chain emissions reductions. As of September 2024, IPE has tracked 1,950 companies through the Map. These companies publicly disclosed a total of 6.63 billion tons of Scope 1 and Scope 2 greenhouse gas emissions[7] for the most recent year, accounting for approximately 12.5%[8] of global greenhouse gas emissions in 2023. These companies have collectively pledged to reduce more than 611 million tons of CO_2e.

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5. Note: Due to the possibility of inclusion or supply relationships among suppliers, this data may involve double counting.
6. Estimated according to the national average carbon emission factor for electricity in 2021 (excluding non-fossil energy electricity from market-based transactions) of 0.5942.

7. Priority is given to Scope 2 market-based calculation method, which may involve double counting in the energy industry and other industrial sectors.
8. European Commission's science and knowledge service. GHG emissions of all world countries 2024 Report[R/OL]. [2024-10-18]. https://edgar.jrc.ec.europa.eu/report_2024?vis=co2tot.
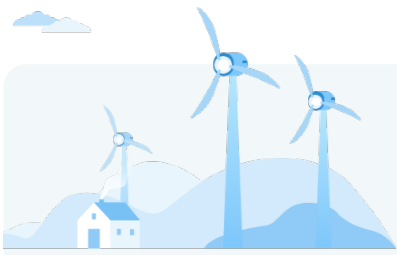
In the face of the current severe climate situation, we expect more companies to initiate the construction of zero-carbon supply chains, empower the low-carbon transformation of their supply chains, help China achieve its "dual carbon" target, contribute to the global Race to Zero, and provide consumers with more green and low-carbon products. To this end, we call for coordinated efforts from multi-stakeholders:

Building on Disclosure

Promote the public disclosure of corporate greenhouse gas information. Motivate companies to strengthen their carbon emissions calculations and disclosures, set climate science-based carbon targets, and promote climate information transparency across their own operations, affiliates, suppliers, factories, and products. Place progress on full value chain emissions reductions and carbon neutrality under public scrutiny, driving more substantial low-carbon transformation in supply chains, preventing greenwashing, and truly motivating all stakeholders to implement emissions reduction actions.

Data-Driven Assessment

Promote scientific evaluation based on publicly available enterprise information. Develop and establish evaluation mechanisms for corporate low-carbon transformation or emissions reduction performance based on data and information disclosure. This should include indicators such as supply chain climate information transparency and product carbon footprint, guiding companies in low-carbon transformation, and promoting the upgrade and transformation of industry and supply chains to enhance their green and low-carbon competitiveness.

Driving Supply Chain Leadership

Encourage companies with a high proportion of Scope 3 emissions to strengthen supply chain management. Encourage leading companies, industry organizations, and key institutions with supply chain influence and climate ambition to drive core suppliers to join the global Race to Zero and bring more small and medium-sized enterprises into the global climate process. Focus on the key segments of Scope 3 emissions, including purchased goods and services, and gradually advance Scope 3 and product carbon footprint calculations based on actual supplier data, while promoting research into decarbonization pathways and technologies within the supply chain.

Empowering through Digital Solutions

Promote corporate digital transformation to empower supply chain emissions reductions. Encourage companies, industry organizations, and third-party institutions to develop and continuously optimize digital tools for supply chain management, carbon accounting, and information disclosure. These tools will help companies efficiently and cost-effectively collect actual supply chain data, empower suppliers to calculate carbon emissions, set reduction targets, and improve the level of information disclosure regarding supply chain and product carbon footprints. This will facilitate data flow and sharing between upstream and downstream companies, while assisting stakeholders in monitoring and overseeing progress.
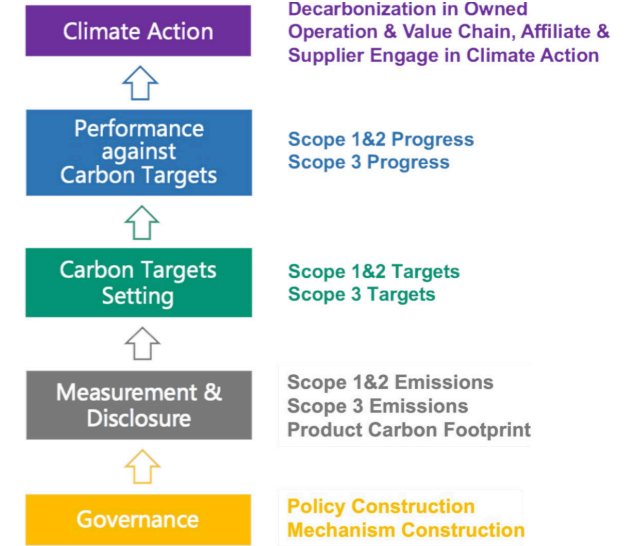
02

Corporate Climate Action Transparency Index (CATI)

During the "14th Five-Year Plan" period, China's ecological civilization entered a critical stage focused on carbon reduction as a key strategic direction, aiming to synergize pollution reduction and carbon reduction, facilitate a comprehensive green transformation of economic and social development, and achieve a qualitative improvement in environmental quality. At the same time, an increasing number of multinational companies have made greenhouse gas (GHG) reduction commitments in the post-Paris Agreement era, striving for net-zero emissions across their value chains. In this context, with technical support from the Chinese Research Academy of Environmental Sciences, IPE upgraded the Supply Chain Climate Action Index (SCTI) developed in 2018 to the Corporate Climate Action Index (CATI).

In 2024, IPE once again upgraded the CATI Index, focusing on improving product carbon footprint disclosures and value chain emissions reduction indicators. The goal is to guide companies in addressing GHG emissions across the entire product lifecycle, identifying emission hotspots, and implementing large-scale reduction projects. This includes minimizing the use of virgin materials, establishing recycling mechanisms, improving energy efficiency in raw material manufacturing, and increasing the use of renewable energy. The upgraded index also aims to motivate suppliers to calculate their GHG emissions, independently set reduction targets, and build credible Monitoring, Reporting, and Verification (MRV) systems to accelerate the green and low-carbon transformation of supply chains.

Climate Action	Decarbonization in Owned Operation & Value Chain, Affiliate & Supplier Engage in Climate Action
Performance against Carbon Targets	Scope 1&2 Progress Scope 3 Progress
Carbon Targets Setting	Scope 1&2 Targets Scope 3 Targets
Measurement & Disclosure	Scope 1&2 Emissions Scope 3 Emissions Product Carbon Footprint
Governance	Policy Construction Mechanism Construction

As an independent evaluation system based on data, we believe that the CATI Index can objectively reflect the progress of corporate climate action and their position in the dual-carbon action. We also hope that the CATI Index can provide companies with a roadmap to initiate climate action, guiding them to start from greenhouse gas accounting and inventory creation, identify key emission sources, set quantitative emission reduction targets, and develop targeted emission reduction plans. These targets should be broken down into major production processes and the value chain, carry out large-scale emission reductions based on the emission reduction pathways of their industry, track and disclose the progress of target completion, and simultaneously drive and empower upstream and downstream partners to explore the greenhouse gas emission reduction potential at each stage from raw material extraction, production, distribution, storage, use to disposal, and recycling, thereby initiating climate action.

CATI aligned with: SUSTAINABLE DEVELOPMENT GOALS

CATI Evaluation Dimensions	CATI Evaluation Objectives	The UN Sustainable Development Goals (SDGs)
Governance	Guiding companies to develop strategic roadmaps for low-carbon transition and identify climate risks and opportunities	7 AFFORDABLE AND CLEAN ENERGY / 8 DECENT WORK AND ECONOMIC GROWTH / 11 SUSTAINABLE CITIES AND COMMUNITIES / 12 RESPONSIBLE CONSUMPTION AND PRODUCTION / 13 CLIMATE ACTION / 17 PARTNERSHIPS FOR THE GOALS
Measurement & Disclosure	Guiding companies to measure and disclose Scope 1, 2 and 3 GHG emissions and product carbon footprints to establish their emissions baselines	12 RESPONSIBLE CONSUMPTION AND PRODUCTION / 13 CLIMATE ACTION / 17 PARTNERSHIPS FOR THE GOALS
Carbon Targets Setting	Guiding companies to set and disclose measurable and trackable climate targets and to extend targets to the full value chain	7 AFFORDABLE AND CLEAN ENERGY / 8 DECENT WORK AND ECONOMIC GROWTH / 12 RESPONSIBLE CONSUMPTION AND PRODUCTION / 13 CLIMATE ACTION / 17 PARTNERSHIPS FOR THE GOALS
Performance Towards Carbon Targets	Guiding companies to continuously track performance against targets to ensure that the progress is aligned with decarbonization pathways	12 RESPONSIBLE CONSUMPTION AND PRODUCTION / 13 CLIMATE ACTION / 17 PARTNERSHIPS FOR THE GOALS
Climate Action	Guiding companies to implement emission reduction projects targeting emission hotspots in their own operations and supply chains, and to disclose the associated emission reduction performance	7 AFFORDABLE AND CLEAN ENERGY / 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE / 11 SUSTAINABLE CITIES AND COMMUNITIES / 12 RESPONSIBLE CONSUMPTION AND PRODUCTION / 13 CLIMATE ACTION / 17 PARTNERSHIPS FOR THE GOALS

03

2024 Supply Chain CATI Evaluation Results

3.1 2024 CATI Evaluation Results   CATI TOP50

01 adidas 88	02 FOXCONN 85	03 PUMA 84.6	04 LUXSHARE ICT 84.5	05 Apple 83.6	06 CISCO 82.2	07 Nike 81.6	08 DELL Technologies 79	09 INDITEX 78.8	10 LEVI STRAUSS & CO. 77.9
11 Microsoft 73.6	11 M&S EST. 1884 73.6	13 Mercedes-Benz 73.1	14 new balance 71.6	14 PRIMARK 71.6	16 TARGET 71.4	17 DANONE ONE PLANET. ONE HEALTH 66.6	18 鵬鼎控股 AVARY HOLDING 66.5	19 VOLVO 65.2	20 花王 Kao 64.1
21 LONGi 63.8	22 BMW 62.9	23 TESCO 62	24 GEELY 61.9	25 Gap Inc. 61.6	26 intel 61.5	27 SCHAEFFLER 61.2	27 DECATHLON 61.2	29 VF 60.4	30 LINDEX 60.3
31 ANTA 60.2	32 Panasonic 60	33 KIA 59.7	34 Lenovo 59.6	35 极星 Polestar 59.5	36 H&M Group 59	37 gm 58.8	38 BESTSELLER 57.8	39 恒隆地產 HANG LUNG PROPERTIES 56.9	39 雀巢 Nestlé 56.9
41 Canon 56	42 HYUNDAI 55.9	43 SIEMENS Ingenuity for life 54.9	44 Renault 53.9	45 KONTOOR 53.8	46 NISSAN 52.9	47 hp 52.2	48 ASUS 52	49 Ford 51.7	50 SAMSUNG 51.5

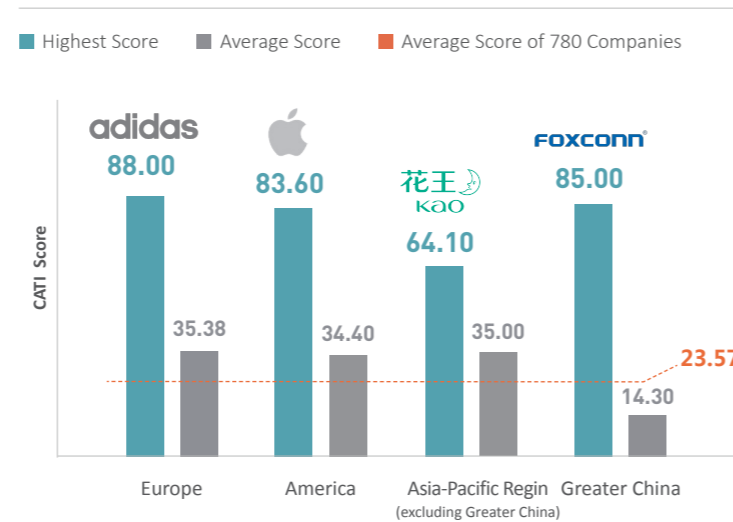(See Appendix I for a full list of 2024 CATI scores)

Industry and Regional Comparison Analysis

Companies in Europe, the Americas, and the Asia-Pacific region (excluding Greater China) have been early adopters of climate action, with relatively similar levels of corporate climate governance. Most companies in these regions disclose information based on international sustainability standards, providing more comprehensive climate-related disclosures. Although companies in the Greater China region started later, companies such as **Foxconn, Luxshare-ICT, Avary Holding, LONGi Green Energy, Geely Automobile, Anta Sports, Lenovo Group, Hang Lung Properties, and ASUS** are accelerating their efforts. These companies are beginning to establish more robust carbon management systems, including carbon accounting, setting emissions reduction targets, tracking performance, implementing emission reduction measures for their own operations, and empowering suppliers to accelerate their low-carbon transition.

Figure 3-1: **2024 CATI Regional Score Comparison**

In terms of industries, IT/ICT, automotive, textiles and leather, auto parts, and household & personal care are relatively advanced in their climate actions, with industry average scores significantly higher than the overall average for all companies. In contrast, industries such as photovoltaic equipment, real estate, and household appliances have a small number of leading companies that are far ahead, but the industry average scores remain significantly below the overall average. These sectors still require the leadership of key players to drive the industry toward a faster low-carbon transformation. Industries such as bicycle/moped, liquor, interior decoration, batteries, and battery materials have shown relatively poor overall performance and urgently need to improve climate information disclosure and accelerate climate action.

Figure 3-2: **2024 CATI Industry Score Comparison**
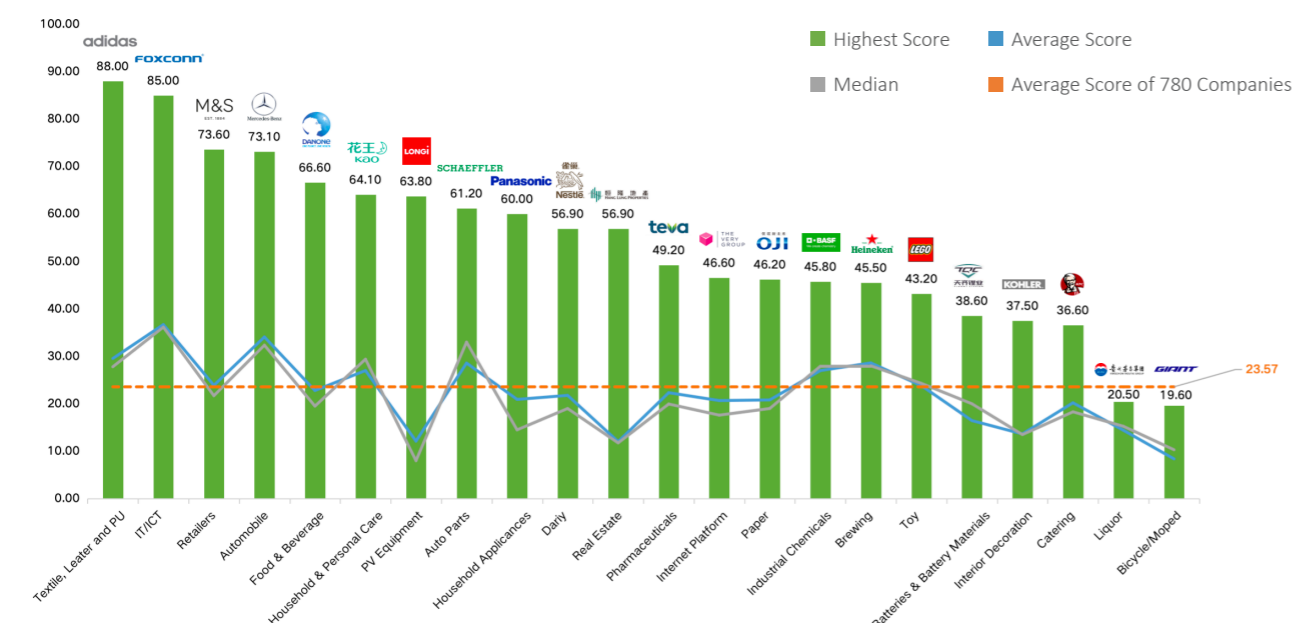
3.2 2023 vs. 2024 CATI Evaluation Scores

The average score rates for the five CATI dimensions in the 2024 evaluation period show an upward trend compared to 2023. Among these, the greatest improvement was seen in performance towards carbon targets primarily because more companies clearly defined emission baselines when setting targets and tracked and disclosed progress on their reduction goals. In contrast, the improvement in emission reduction actions was relatively small, indicating that many companies still face significant challenges in implementing climate actions across their entire value chain (Figure 3-3).

Figure 3-3: **Comparison of Average Score Rates for Each CATI Dimension in 2023 and 2024 evaluations[9]**
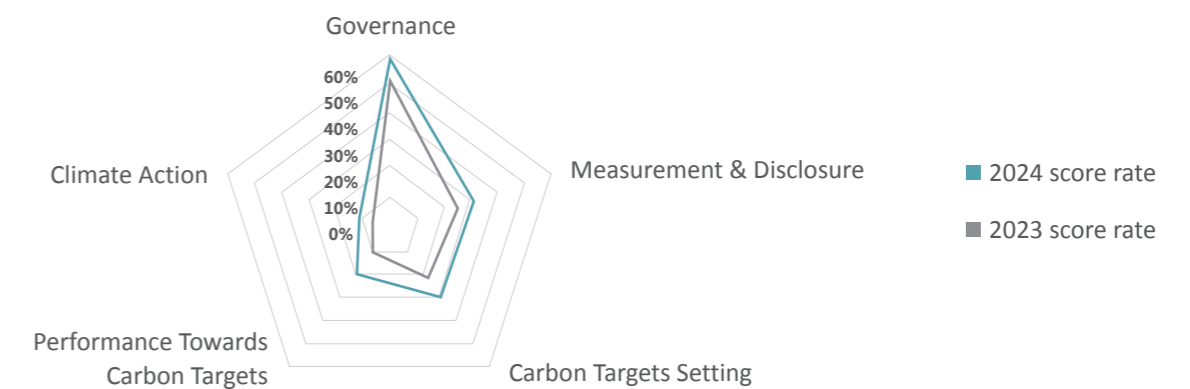
Over **90%** of evaluated companies publicly disclosed their climate commitments during this evaluation period. The average score rate for the Governance dimension reached 59%, a 7% increase from 2023, but more than half of the companies did not include supply chain risk management in their risk management procedures;

83% of evaluated companies conducted carbon accounting at the organizational level to assess their emissions and identify hotspots. The average score rate for Measurement & Disclosure increased by 5%, rising from 25% in 2023 to 30% in 2024;

63% of evaluated companies set climate targets. Of these, 55% set Scope 1 & 2 reduction targets, 40% set Scope 1 & 2 carbon neutrality targets, 38% set Scope 3 reduction targets, and 24% set Scope 3 carbon neutrality targets. The overall average score rate for Carbon Targets Setting improved by 8%, rising from 22% in 2023 to 30% in 2024;

48% of evaluated companies disclosed progress toward achieving their climate targets. The average score rate for Peformance Towards Carbon Targets showed a significant improvement, increasing by 9%, although the average score rate for 2024 remains only at 20%.

91% of evaluated companies have initiated energy-saving and emissions-reduction projects, but the average score rate for Climate Action is only 11%, a modest increase of 4% from 2023. This is mainly because 44% of companies have not extended their reduction actions to the supply chain. Furthermore, companies that have initiated Scope 3 reduction actions have mostly not disclosed the emissions reduction performance of their own operations or value chain reduction projects, or the collaboration with suppliers remains limited to pilot projects and has not yet been scaled up.

9. Note: Average score rate = Average score of all evaluated companies in this evaluation dimension / Total score of this evaluation dimension

04

2024 CATI Evaluation Findings

Finding 1

Progress in Corporate Scope 3 Carbon Disclosure, with Leading Companies Effectively Guiding Supply Chain Emission Reductions
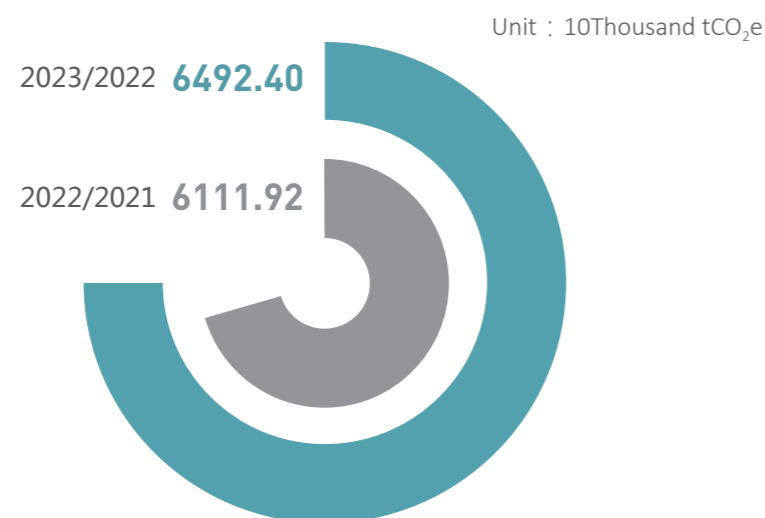
The disclosure of supply chain carbon emissions and the management of supply chain climate risks are increasingly becoming focal points for stakeholders. Conducting GHG accounting helps companies understand the impact of their value chain activities on climate change, and establishing a baseline for emissions is the foundation for initiating climate action.

Scope 1 & 2 Carbon Emissions Continue to Rise

During this evaluation period, **nearly 80% of evaluated companies calculated and disclosed their Scope 1&2 (own operations) GHG emissions through public channels such as official websites, annual reports, press releases, and the Blue Map website. The number of companies disclosing GHG emissions increased by 13% compared to the last evaluation period, and the total Scope 1&2 GHG emissions of evaluated companies in the most recent year reached approximately 732 million tons of CO_2e.**[10] Among these, 38% of companies reported emissions between 100,000 and 1 million tons of CO_2e, while 16 companies had emissions exceeding 10 million tons.

For the 508 companies that disclosed carbon data for two consecutive years (Figure 4-1), 182 companies saw an increase in Scope 1 & 2 emissions, with the total increase amounting to 38.05 million tons of CO_2e. This reflects that emission reduction efforts within companies' own operations need to continue to progress.[11]

Figure 4-1: **Comparison of Scope 1 & 2 Emissions for 508 Evaluated Companies Disclosing Data for Two Consecutive Years**

Unit：10Thousand tCO_2e

2023/2022 **6492.40**

2022/2021 **6111.92**

Progress Achieved in Scope 3 Carbon Disclosure

51% of evaluated companies disclosed their Scope 3 (value chain) GHG emissions, a 15% increase compared to the 2023 evaluation period. Among these, 77% of the disclosed data covered supply chain emissions. 19% of companies publicly reported that they have begun collecting actual measurement data from suppliers for Scope 3 emissions accounting. While significant progress has been made in corporate carbon disclosure, nearly half of the evaluated companies still have not addressed Scope 3 emissions. Given that supply chain emissions typically make up a significant portion of a company's total emissions, these companies urgently need to integrate value chain emission management into their reduction strategies and accelerate the collection of Scope 3 data and carbon accounting capabilities.

We believe the progress in corporate carbon disclosure—especially the ongoing expansion of Scope 3 and supply chain disclosures—is driven by two factors: more companies are adopting the concept of green supply chain management, and climate disclosure requirements are becoming more stringent. For a long time, large multinational corporations have referred to widely recognized frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD), the Global Reporting Initiative (GRI), and the SASB® Standards for their sustainability or ESG disclosures. As climate issues become more pressing, the International Sustainability Standards Board (ISSB) issued the IFRS S2 Climate-related Disclosures, the European Union introduced the Corporate Sustainability Reporting Directive (CSRD), and overseas stock exchanges have successively updated their disclosure rules, all of which propose requirements for Scope 3 emissions disclosure and supply chain climate risk management. These frameworks are guiding companies to enhance their supply chain climate information disclosure.

In China, climate disclosure requirements for listed companies are gradually aligning with international standards. In April 2024, the Hong Kong Stock Exchange issued a consultation summary on climate information disclosure,[12] requiring large-cap issuers to disclose Scope 3 emissions on a "comply or explain" basis, with mandatory Scope 3 disclosures starting in 2026. Similarly, the Shanghai, Shenzhen, and Beijing stock exchanges launched the new sustainability reporting guidelines (pilot) in 2024, encouraging companies to disclose Scope 3 emissions where applicable.

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10. Note: The total greenhouse gas emissions of enterprises may involve double counting.
11. Note: The data year for GHG emission statistics is from 2021 to 2023. If an enterprise specifies the Scope 2 accounting method, the statistics are prioritized based on market-based Scope 2 emissions for aggregation. There may be differences in carbon accounting boundaries, accounting methodologies, and emission factor selections over the years for enterprises. This statistical data does not consider these factors and only presents the annual changes in publicly disclosed data by enterprises for reference.

12. Hong Kong Stock Exchange. The Stock Exchange of Hong Kong Limited Publishes Consultation Conclusions on Climate Information Disclosure [EB/OL]. [2024-10-18]. https://sc.hkex.com.hk/TuniS/www.hkex.com.hk/News/Regulatory-Announcements/2024/240419news?sc_lang=zh-HK

In July 2024, the Resolution of the Central Committee of the Communist Party of China (CPC) on Further Deepening Reform Comprehensively to Advance Chinese Modernization[13] proposed deepening the reform of the environmental information disclosure system, once again emphasizing the critical role of information disclosure in enabling companies to fulfill their primary responsibility for pollution reduction and carbon reduction. To implement these major strategic decisions, standardize and guide GHG emission disclosure activities, and enhance corporate GHG management capabilities, with the approval of China Ecological Civilization Research and Promotion Association (CECRPA), several organizations—including the Chinese Research Academy of Environmental Sciences, China Environmental United Certification Center, the National Center for Climate Change Strategy and International Cooperation, the Chinese Academy of Environmental Planning, the Policy Research Center for Environment and Economy of MEE, and IPE— worked with relevant experts to develop the group standard Guidelines for Enterprise Greenhouse Gas Information Disclosure Part 1: General Principles.

We believe these evolving disclosure requirements and standards will provide stronger support for establishing climate data infrastructure across industries, further promoting multi-stakeholder participation in climate governance, and holding companies accountable for their climate commitments. These developments warrant continuous attention from all stakeholders.

Total Carbon Emissions Disclosed by Suppliers for the Most Recent Year Exceeded 50 Million Tons

In recent years, an increasing number of evaluated companies have recognized the importance of collecting measured data from suppliers and have been continuously motivating both direct and indirect suppliers to disclose carbon data. **During this evaluation period, driven by IPE and 35 Chinese and international companies, 2,836 suppliers disclosed their carbon emissions data via the Blue Map website marking a 27.5% year-on-year increase compared to the 2023 evaluation period. The total carbon emissions (Scope 1 & 2) of these suppliers in the most recent year amounted to 55.01 million tons of CO_2e.**[14]

Among them, 742 suppliers disclosed their use of renewable electricity, both purchased and self-generated, amounting to nearly 5.27 million MWh, which corresponds to a reduction of approximately 3.13 million tons of CO_2e[15], accounting for around 12% of the total Scope 1 & 2 emissions of these companies. Of these, 375 suppliers reported emissions reductions through self-built distributed photovoltaic (PV) projects, with a total self-generated PV electricity capacity of 567,000 MWh.

According to statistics from the National Energy Administration of China[16], as of the end of July 2024, China's installed capacity of new energy has reached 1.206 billion kW, achieving the goal of exceeding 1.2 billion kW of total installed capacity for wind and solar power by 2030 ahead of schedule. China's photovoltaic industry has developed rapidly, with the installed capacity of solar power reaching approximately 740 million kW by the end of July 2024.[17]

Distributed photovoltaic power generation is an important way for industrial and commercial enterprises to utilize renewable energy. Statistics released by the National Energy Administration show that in recent years, the newly added grid-connected capacity of industrial and commercial photovoltaics has continued to grow, with the proportion of newly added grid-connected capacity for industrial and commercial photovoltaics increasing from 50.6% in 2022 to 54.8% in 2023, playing an important role in China's energy structure transformation.[18][19]

To record the progress of global photovoltaic facility construction, identify exemplary cases of photovoltaics contributing to the achievement of sustainable development goals, share innovative models of photovoltaic construction, and showcase the ESG performance of photovoltaic enterprises, IPE launched the Solar Map in 2023. The map continuously tracks the cumulative grid-connected capacity of photovoltaic power generation globally and across China's provinces, including tens of thousands of distributed and centralized PV projects. Some of these projects are submitted by suppliers via the Blue Map platform, reflecting progress in supply chain emissions reductions.

Figure 4-2: **IPE Solar Map Cumulative Grid-connected Capacity of Photovoltaic Power Generation**

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13. The Third Plenary Session of the 20th Central Committee of the Communist Party of China. Decision of the Central Committee of the Communist Party of China on Further Deepening Reform and Promoting Chinese-style Modernization [EB/OL]. 2024: [2024-10-18]. https://www.gov.cn/zhengce/202407/content_6963770.htm

14. Note: Due to the possibility of inclusion or supply relationships among suppliers, this data may involve double counting.

15. Estimated according to the national average CO2 emission factor for electricity in 2021 (excluding non-fossil energy electricity from market-based transactions) of 0.5942.
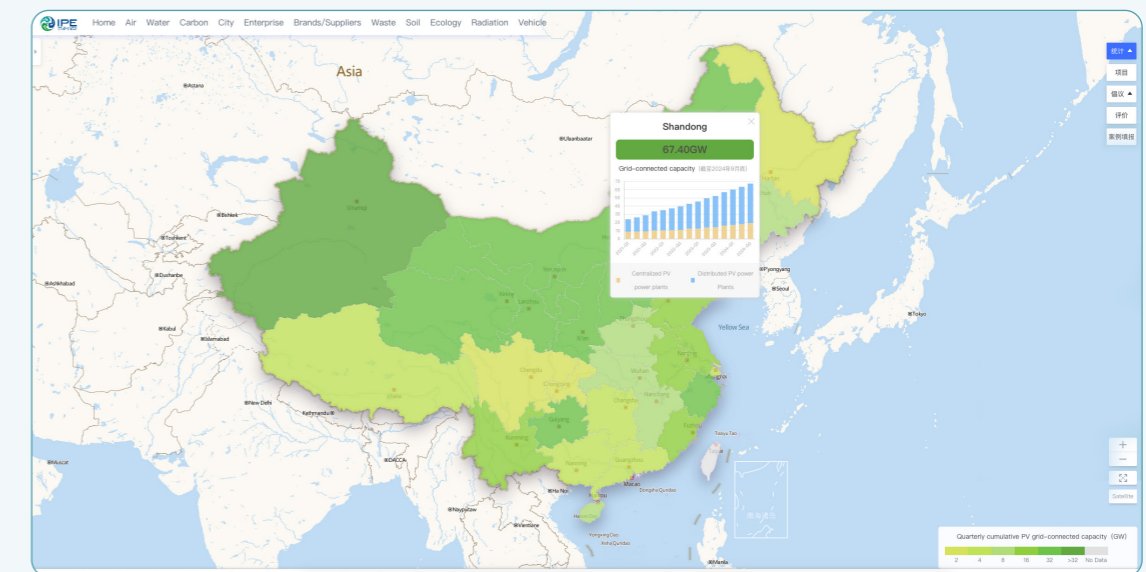
16. National Energy Administration. China's Energy Transition Achieves New Leaps and Breakthroughs [EB/OL]. [2024-10-18]. https://www.nea.gov.cn/2024-09/06/c_1310785868.htm

17. National Energy Administration. National Energy Administration Releases National Electric Power Industry Statistics for January to July 2024 [EB/OL]. [2024-10-18]. https://www.nea.gov.cn/2024-08/23/c_1310785026.htm

18. National Energy Administration. 2023 Photovoltaic Power Generation Construction Status [EB/OL]. [2024-10-18]. https://www.nea.gov.cn/2024-02/28/c_1310765696.htm

19. National Energy Administration. 2022 Photovoltaic Power Generation Construction and Operation Status [EB/OL]. [2024-10-18]. https://www.nea.gov.cn/2023-02/17/c_1310698128.htm

Figure 4-3: **Leading Companies Incorporated the Measurement and Disclosure of Carbon and PRTR Data into Supply Chain Environmental Management Requirements.**

From the distribution of emission data, approximately two-thirds of the suppliers have an annual carbon emission volume between 100 tons and 10,000 tons, with 117 suppliers having emissions greater than 100,000 tons (for the distribution of emission volumes, see Figure 4-4). A total of 2,321 suppliers used the Enterprise Greenhouse Gas Emissions Accounting Platform to calculate their GHG emissions. 420 suppliers have conducted third-party verification of their emissions and uploaded verification reports, with more than 50% (226 enterprises) coming from the computer, communication, and other electronic equipment manufacturing industries. In addition, based on the accounting and disclosure of Scope 1&2 emissions, 301 suppliers have calculated and disclosed Scope 3 emissions.

Figure 4-4: **Distribution of Carbon Emissions Disclosed through the Blue Map during the Evaluation Period**
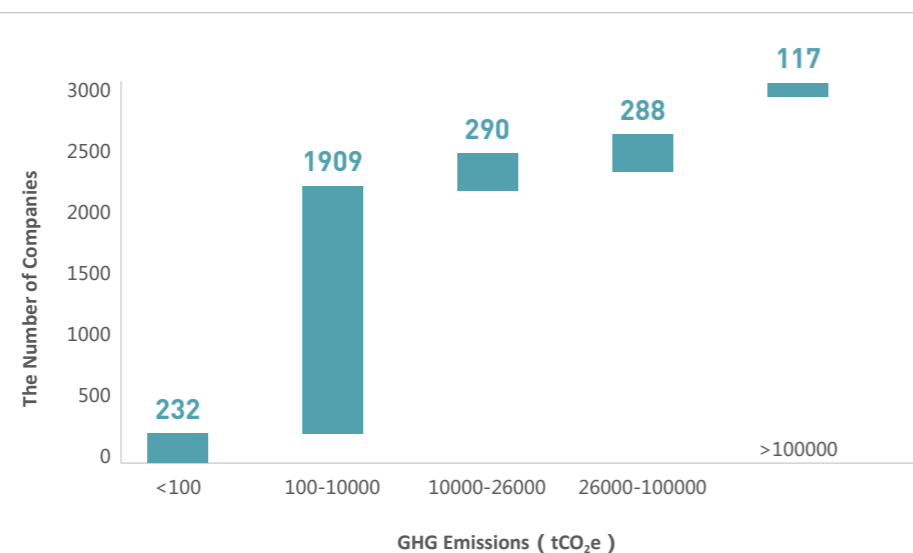
In terms of industry distribution, the suppliers disclosing carbon data are from 36 industries[20], with the majority coming from the textile industry, the computer, communication, and other electronic device manufacturing industries, as well as the leather, fur, feathers, and footwear industries. Among them, 1,055 enterprises from the textile and apparel sectors reported total emissions of 19.26 million tons of CO_2e; 481 enterprises from the computer, communication, and other electronic device manufacturing industries reported a total of 16.99 million tons of CO2 emissions.

Figure 4-5: **Distribution of Industry Emissions Disclosed through the Blue Map during this Evaluation Period**
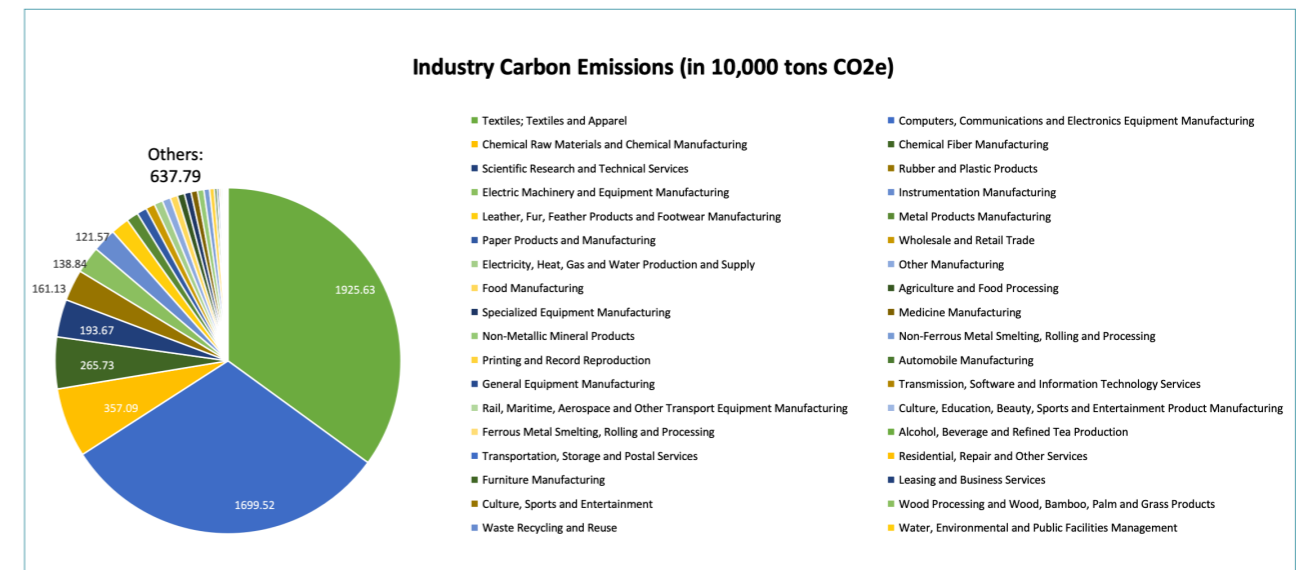
Figure 4-6: **Industry Distribution of Suppliers Disclosing Carbon Data through the Blue Map during this Evaluation Period**

20. Note: The industry classification standard for enterprises disclosing carbon data on the Blue Map website adopts the National Economic Industry Classification (GB/T 4754—2017). The industry information for some enterprises is delineated by IPE with reference to the main products of the enterprises, for reference only.

Leading Companies Driving Emission Reductions Across the Supply Chain

A total of 1,590 suppliers disclosed carbon data continuously across both evaluation periods, with their total carbon emissions decreasing by 5.02 million tons (Figure 4-7). Among these suppliers, 974 saw a decrease in emissions in this evaluation period compared to the last one, while 616 saw an increase. Among these suppliers, 454 disclosed the use of renewable energy during the evaluation period, totaling 3.97 million MWh, corresponding to a reduction of approximately 2.36 million tons of CO_2e[21]. Notably, 63% of the renewable energy usage came from suppliers in the computer, communications, and other electronic equipment manufacturing sectors. **We believe the overall reduction in carbon emissions for suppliers who disclosed data over both periods is primarily driven by the significant expansion of renewable energy utilization in China.**[22]

From an industry perspective, the textile, leather, and IT/ICT sectors have consistently led the push for supplier carbon disclosures, outperforming other industries. Of the 1,590 suppliers, 67% came from the textile and leather-related industries (including textiles, apparel, leather, fur, feathers, and footwear, and chemical fiber manufacturing, totaling 814 suppliers) and the computer, communications, and other electronic equipment manufacturing sector (257 suppliers). The carbon emissions and trends in these two industries are shown in Figure 4-8. In the textile and leather-related industries, 344 enterprises saw an increase in emissions, while 470 enterprises reduced emissions, resulting in a 2% decrease in total greenhouse gas emissions compared to the 2023 evaluation period. In the computer,

Figure 4-7: **Change in Carbon Emissions of Suppliers Disclosing Data Over Two Evaluation Periods**

Unit：10Thousand tCO_2e

2022 **3758.24**

2023 **3256.09**
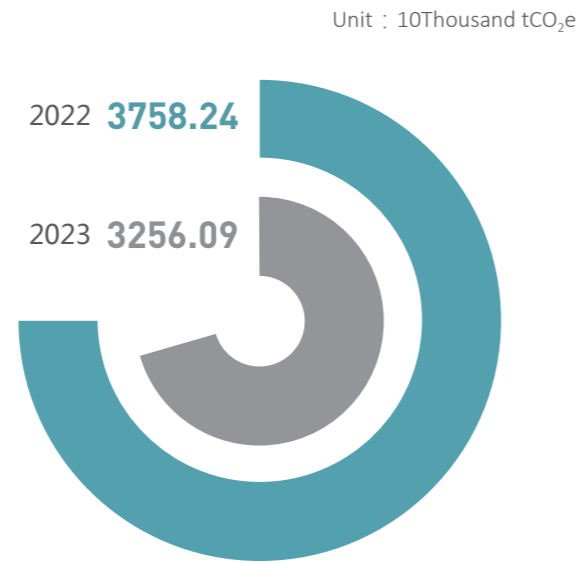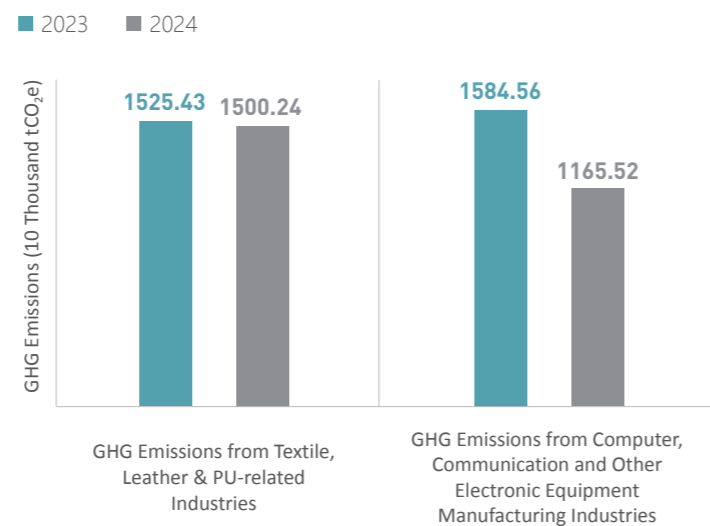

Figure 4-8: **Comparison of Emissions from Suppliers in the Textile, Leather, and IT/ICT-related Industries between 2023-2024**

■ 2023 ■ 2024

GHG Emissions (10 Thousand tCO_2e)

1525.43 1500.24

1584.56

1165.52

GHG Emissions from Textile, Leather & PU-related Industries

GHG Emissions from Computer, Communication and Other Electronic Equipment Manufacturing Industries

communication, and other electronic equipment manufacturing industries, 82 enterprises had increased emissions, while 175 enterprises decreased emissions, leading to a 26% reduction in total greenhouse gas emissions compared to 2023.

We believe the reduction in supplier emissions and the increased use of renewable energy reflect the influence of leading companies in promoting green supply chain management, with core suppliers now actively engaged in climate action. However, long-term, sustainable, and scalable decarbonization across the supply chain still requires the participation of more leading enterprises and industries, working together with upstream and downstream stakeholders to drive the low-carbon transformation across the entire value chain and achieve the industry-wide decarbonization goals.

21. Estimated according to the national average CO2 emission factor of electric power in 2021 (excluding non-fossil energy electricity from market-based transactions) 0.5942

22. Note: The increase or decrease in enterprise carbon emissions is related not only to the energy structure but also to annual output, product types, production technology application, and business types of the enterprise. Due to the limited public information from suppliers and the increase or decrease in major products compared to 2023, this report does not consider the above factors. It only outlines the trend of changes in the total carbon emission volume of these suppliers over two years for reference.

Case Study: **Apple Makes Clean Energy Usage a Requirement for Suppliers, Increasing Renewable Energy Use Across Its Value Chain**

The carbon emissions from electricity consumption during the product manufacturing stage account for a significant portion of Apple's total value chain emissions. Apple has set a goal to transition to 100% clean energy across its entire product value chain (including manufacturing and product use by consumers) by 2030. To achieve this, Apple launched its Clean Energy Program in 2015, encouraging suppliers to commit to using 100% renewable energy to produce Apple products by 2030 and empowering them to increase their renewable energy usage. According to Apple's statistics, by 2023, over 25.5 million MWh of clean energy had been used in the supply chain, avoiding 18.5 million tons of carbon emissions.[23]

Apple's 2024 Environmental Progress Report[24] shows that, as of March 2024, more than 320 suppliers have committed to use renewable energy for their Apple production. In 2024, to further scale clean energy use across its supply chain, Apple updated the Supplier Code of Conduct to require all direct suppliers to transition to renewable energy in the manufacturing of Apple products: "Supplier shall consume, develop, invest in, and procure electrical power from Clean Energy Sources equal to 100% of the electrical power used in connection with its global manufacturing operations related to Apple products (and goods for use therein) in accordance to the Apple Specification for Clean Energy". In addition, Apple will verify suppliers' carbon footprint calculation methods and renewable energy procurement documentation to enhance traceability and verifiability of clean energy use in the supply chain and improve the credibility of its climate claims.

Figure 4-9: **Progress of Clean Energy Usage in Apple's Supply Chain**

SUPPLY CHAIN CLEAN ENERGY PROGRESS
Renewable electricity operational and committed in gigawatts (GW)
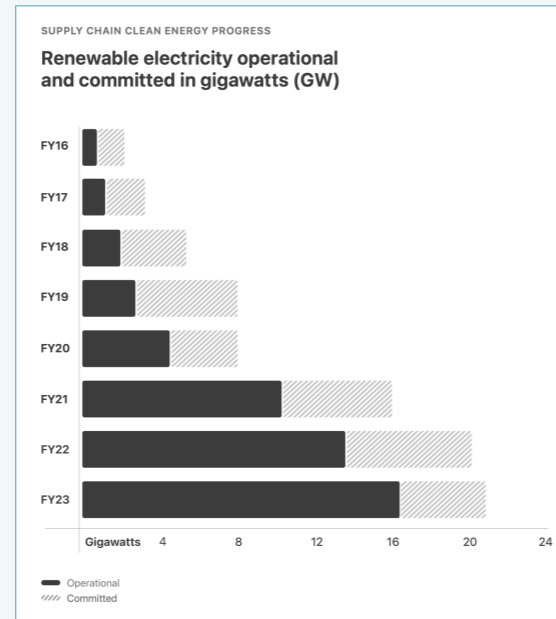
Meanwhile, companies like **Foxconn** and **Luxshare-ICT** have also begun requiring their suppliers to use renewable energy, progressively increasing the proportion of renewable energy in their value chains. For example, Foxconn disclosed in its 2023 Sustainability Report[25] that it has motivated 24 key electronic suppliers sign renewable energy agreements, committing to 100% renewable energy for the production of Foxconn products. Similarly, at Luxshare-ICT's 2023 Supplier Sustainability Conference, the company set a green and low-carbon target for its value chain, requiring suppliers to use at least 10% clean energy by 2024, with an annual increase of 15% until reaching 100% clean energy use by 2030.[26]

23. Apple. Apple ramps up investment in clean energy and water around the world [EB/OL]. [2024-10-18]. https://www.apple.com.cn/newsroom/2024/04/apple-ramps-up-investment-in-clean-energy-and-water-around-the-world/
24. Apple. Environmental Progress Report [EB/OL]. [2024-10-18]. https://www.apple.com.cn/environment/pdf/Apple_Environmental_Progress_Report_2024.pdf
25. Foxconn Technology Group. 2023 Sustainability Report[EB/OL]. [2024-10-18]. https://www.honhai.com/en-us/CSR/csr-report
26. Luxshare-ICT. Responsible Procurement [EB/OL]. [2024-10-18]. https://www.luxshare-ict.com/sustainability/our-initiatives/responsible-procurement.html.

Finding 2

Leading Companies Accelerate Life Cycle Assessment, Highlighting the Need for International Alignment on Product Carbon Footprint Standards

In 2023, IPE introduced a new indicator in the CATI Index, "measuring and disclosing product carbon footprints," with the goal of encouraging companies to consider greenhouse gas emissions across the entire lifecycle of their products, while also assisting consumers make green choices. In 2024, IPE further refined this indicator, expanding the evaluation criteria to include the number of products for which companies have conducted life cycle assessments, the data timelines, and the third-party verification of carbon accounting results. The aim is to encourage companies to broaden the scope of product life cycle evaluations and enhance the data representativeness and objectivity of the accounting results.

Life Cycle Assessment (LCA)

Within organizational boundaries, a company's greenhouse gas emissions primarily originate from the entire life cycle process of products (including services), encompassing stages such as raw material acquisition, design, production, transportation, delivery, use, and end-of-life treatment, covering the entire value chain. Life Cycle Assessment (LCA) is an internationally recognized environmental management tool and environmental footprint analysis method. Using LCA, the quantification of product carbon footprints (PCF) helps companies identify the greenhouse gas emissions and removals from raw material extraction to final disposal or recycling, pinpointing high-carbon processes, technologies, and materials. At the same time, PCF results help companies understand the impact of each stage of their product's lifecycle on climate change, benchmark against industry averages and leaders, and implement more targeted emission reduction measures.

With the rise of public awareness of green consumption, more and more consumer brands are making green low-carbon statements about their products and disclosing product carbon footprints to demonstrate their products' eco-design concepts and the implementation of their corporate climate commitments. **In this evaluation, 127 companies (16%) from 20 industries, including IT/ICT, photovoltaic equipment, automotive, textiles/leather, food and beverages, and household appliances, calculated and disclosed the carbon footprint data of their main products.** Among them, 25 companies were from the IT/ICT industry, 19 from the textiles/leather industry, 18 from photovoltaic equipment industry, 17 from the automotive industry, 10 from the food & beverage and dairy industry, and 8 from the household appliance industry. **Lenovo, Dell**, and others disclosed the carbon footprint of over a thousand products; **Apple** has released the environmental report of its carbon-neutral watch for two consecutive years, covering the progress of emission reduction in product carbon footprint and detailed information on carbon credit projects used for offsetting; **PUMA, Polestar** and others disclosed life cycle analysis reports covering information on product materials and energy use, transportation distance and mode, end-of-life treatment, etc.

Despite progress by leading companies in product carbon footprint accounting and disclosure, over 80% of the evaluated companies have not yet undertaken this work. We believe this is primarily due to challenges that companies face in determining accounting boundaries, selecting LCA factor database, defining core processes, and allocating emissions for recycled materials. As a result, data collection and calculation rules for similar products are often inconsistent, leading to a lack of comparability in accounting results. Moreover, many suppliers' product emission factors, based on their production locations, are not recognized by overseas customers or importing country regulatory bodies, meaning most companies are forced to use international LCA factor database. However, some factors in the international databases do not have regional representativeness, and the data is often outdated, causing discrepancies between the accounting results and actual production conditions. These issues highlight the urgent need for greater communication and collaboration to accelerate the development of carbon footprint accounting rules for key industries and products, and to enhance international mutual recognition and effective coordination of related mechanisms.

Case Study:	**Leading Companies of the "New Three" Actively Engage in Product Carbon Footprint Disclosure**

With the rise of the "New Three"—photovoltaics, new energy vehicles, and lithium batteries—the green attributes of related products have become a focal point for stakeholders. The photovoltaic product carbon footprint legislation introduced by France (Evaluation Carbone Simplifiée, ECS)[27] and the European Union's Regulation on Batteries and Waste Batteries[28] both impose requirements on enterprises for product carbon footprint accounting and/or disclosure. Meanwhile, the Environmental Product Declaration (EPD)

system for these products is continuously being improved, with Product Category Rules (PCR) for new energy vehicles, photovoltaic modules, and other product categories being gradually refined and released. **Driven by these regulations and accounting methodologies, 39 companies from the "New Three" sectors disclosed their product carbon footprint data in this round of evaluation, accounting for approximately 30% of the total number of companies disclosing carbon footprints in this round.**

Among them, leading photovoltaic companies such as **LONGi Green Energy** and **JinkoSolar** disclosed the full life cycle emissions data for several of their photovoltaic modules and obtained certification from EPD systems such as the International EPD System and the Italian EPD System (EPD Italy). For example, **LONGi Green Energy** disclosed the carbon footprint of its LR5-54HIB photovoltaic module as 0.0144 $kgCO_2e$/

kWh, a relatively low footprint compared to similar products, with over 90% of the emissions coming from the upstream stages. In addition to carbon footprint disclosure, LONGi's EPD report also includes environmental impact data based on the end-of-life recycling scenario, in accordance with the European Union's Waste Electrical and Electronic Equipment (WEEE) directive[29], which requires 85% recycling and 15% disposal.

Figure 4-10: **LONGi Green Energy LR5-54HIB Product Carbon Footprint Quantification Results[30]**

27. French Energy Regulatory Commission.Appel d'offres portant sur la réalisation et l'exploitation d'Installations de production d'électricité à partir de l'énergie solaire « Centrales au sol »[EB/OL].[2024-10-18].https://www.cre.fr/documents/Appels-d-offres/appel-d-offres-portant-sur-la-realisation-et-l-exploitation-d-installations-de-production-d-electricite-a-partir-de-l-energie-solaire-centrales-a2.
28. THE EUROPEAN PARLIAMENT AND THE COUNCIL.Regulation on batteries and waste batteries[S/OL].[2024-10-18]. https://data.consilium.europa.eu/doc/document/PE-2-2023-INIT/en/pdf.
29. European Commission.Waste from Electrical and Electronic Equipment (WEEE)[S/OL].[2024-10-18]. https://environment.ec.europa.eu/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en.
30. This is a screenshot of the data on the IPE Product Carbon Footprint Disclosure and Catalogue (PCFD) platform, with data sourced from the 'LR5-54HIB' EPD report: https://www.epditaly.it/en/

Geely Auto, one of the first Chinese automakers to obtain international EPD certification for its vehicle products, disclosed in its EPD report that the carbon footprint of its "Lynk & Co 01" vehicle, based on a 150,000 km lifecycle, is 0.201 $kgCO_2e$ per kilometer driven, which is lower than the average carbon footprint of compact SUV plug-in hybrid vehicles displayed on China's Automotive Industry Carbon Disclosure Platform (CPP) at 0.237 $kgCO_2e$ per kilometer. Geely's EPD report also revealed that the car's seats are made from post-consumer PET material, ECONYL®, which is produced from recycled fishing nets and other waste.
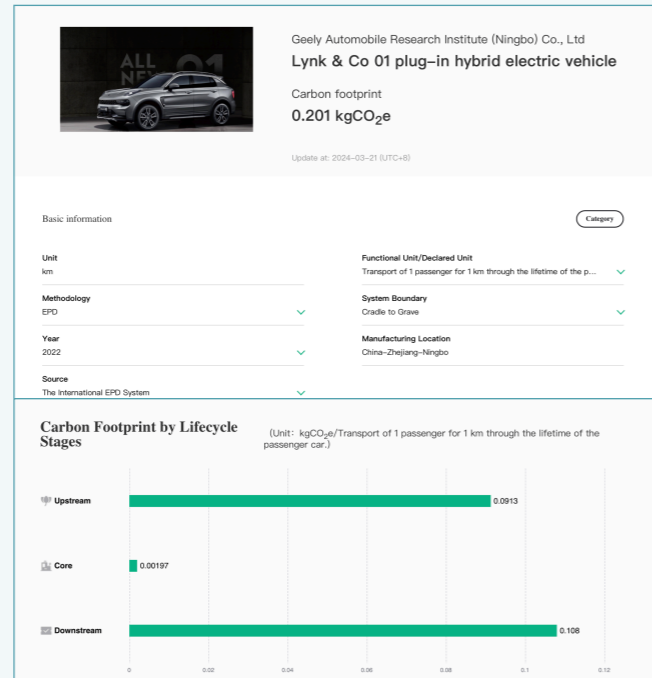

Figure 4-11: **Lynk & Co 01 Product Carbon Footprint Quantification Results[31]**

Four battery and battery materials companies also disclosed product carbon footprint data. For example, **Ronbay Technology**[32] conducted life cycle assessments for products sucn as ternary precursor materials, ternary cathode materials, and lithium manganese iron phosphate cathode materials, revealing that over 78% of the carbon footprint comes from the raw material acquisition phase in the battery supply chain, highlighting the critical role of supply chain emission reductions in achieving net-zero emissions across the product lifecycle.
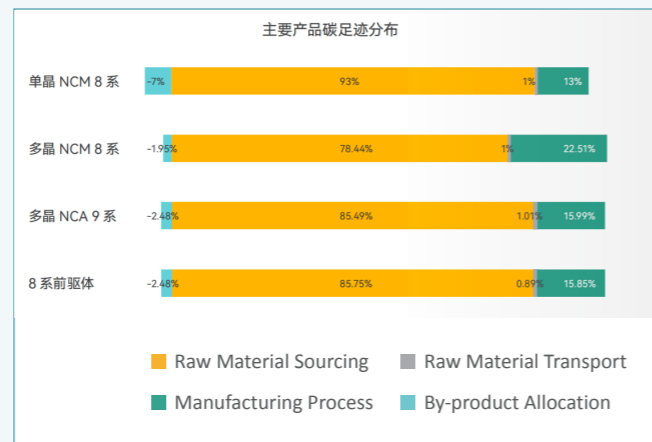

Figure 4-12: **Carbon Footprint Lifecycle Distribution of Ronbay Technology's Main Products**

To assist Chinese companies in actively responding to "green trade barriers" in international trade, support key industries and products in conducting product carbon footprint calculations, and promote industry chain collaboration on carbon reduction, the Chinese government at all levels has introduced multiple policies and regulations (see Appendix III). Among these, the State Council's Action Plan for Carbon Dioxide Peaking before 2030 proposed exploring the establishment of carbon footprint standards for key products across their entire life cycle. In 2022, the National Development and Reform Commission (NDRC), the National Bureau of Statistics (NBS), and the Ministry of Ecology and Environment (MEE) issued the Implementation Plan for Accelerating the Establishment of a Unified and Standardized Statistical Accounting System for Carbon Emissions, emphasizing the need to improve carbon emissions accounting methods for key products. The 2024 Government Work Report called for the establishment of a carbon footprint management system. In June 2024, 15 ministries and commissions, including the MEE, issued the Implementation Plan for Establishing a Carbon Footprint Management System, proposing to develop accounting rules for export products such as the "New Three" (photovoltaics, electric vehicles, and lithium batteries), as well as for carbon-intensive bulk materials like electricity, steel, aluminum, and fuels. This plan aims to establish a product carbon labeling certification and hierarchical management system, gradually aligning with international standards, thereby providing a policy foundation for companies to conduct product carbon footprint accounting and respond to market green requirements. In August, the General Office of the State Council issued the Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emission, proposing the creation of product carbon footprint accounting rules and standards, strengthening the construction of carbon footprint background databases, and establishing a product carbon labeling certification system.

To promote the accounting and public disclosure of enterprise product carbon footprints, and to assist stakeholders in data retrieval and supervision, IPE developed and launched the Product Carbon Footprint Disclosure and Catalogue platform (PCFD) in 2023. As of October 2024, the PCFD has recorded over 28,000 product carbon footprint data entries, covering major raw materials such as electricity, steel, building materials, and chemicals, as well as end products like electronics, automobiles, clothing, and food. During the platform construction process, IPE also cooperated with institutions such as the International EPD System, China Automobile Industry Chain Carbon Publicity Platform (CPP), EPD China, and EcoPlatform, and engaged in exchanges with the China Steel Industry EPD Platform and China Nonferrous Metals Industry EPD Platform to promote mutual recognition and trust in product carbon footprint accounting standards within the industry and internationally.

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31. This is a screenshot of the data on the IPE Product Carbon Footprint Disclosure and Catalogue (PCFD) platform, with data sourced from the 'Lynk & Co 01' EPD report: https://www.environdec.com/library/epd11540
32. Ronbay Technology. 2023 Environmental, Social, and Corporate Governance Report [EB/OL]. [2024-10-18]. http://static.cninfo.com.cn/finalpage/2024-04-12/1219582863.PDF

Case Study: **Innovative Application of Product Carbon Footprint in the Automobile Industry**

Leveraging the China Products Carbon Footprint Factors Database (CPCD) and the Product Carbon Footprint Disclosure and Catalogue Platform (PCFD), developed in collaboration with the China Urban Greenhouse Gas Working Group, IPE continues to collect emission factors and product carbon footprint data to assist stakeholders in retrieving, accessing, and analyzing product carbon footprints and emissions accounting. Through a partnership with the China Automobile Industry Chain Carbon Publicity Platform (CPP), the PCFD platform now includes carbon footprint data for over 7,000 vehicle models published on the CPP.[33]

Vehicles are categorized based on fuel type, model type (sedan, SUV, MPV), and size (from micro-cars to large vehicles). CPP divides more than seven thousand vehicle models into multiple categories, with average emission levels provided for each category. These data allow for carbon footprint comparisons between models within the same category. For instance, the average carbon footprint for a pure electric compact SUV is 187.76 gCO_2e/km. The carbon footprint of FAW-VOLKSWAGEN's ID.4 CROZZ PRO model is higher than the industry average, while the AION V 520 model from GAC Aion is below the industry average (Figure 4-13).[34]

In addition, CPP has piloted the use of carbon labeling (Figure 4-14), showcasing the low-carbon attributes of automotive products to provide decision-making reference for consumers, corporate buyers, and financial institutions.[34] **The accounting and disclosure of automotive product carbon footprints offers a data foundation and emissions baseline for climate action in the automotive sector. It also serves as a successful attempt at establishing and implementing a product carbon footprint grading and labeling system, which can serve as a model for other industries.**

The China Automotive Carbon Digital Technology Center Co., Ltd. has also collaborated with the Wuhan branch of Minsheng Bank to establish the "Green Finance Innovation Center for the Automotive Industry Chain," aiming to promote green finance innovation in the automotive sector. This includes exploring the use of carbon quantification and carbon labeling results from the CPP platform to influence vehicle purchasing decisions by linking loan interest rates for bulk purchases of passenger vehicles with their carbon footprint ratings, thereby encouraging the selection of more environmentally friendly vehicles and reducing overall operational carbon emissions.[35]

Grade	A	Type	SUV	Fuel	Battery Electric Vehicles

339 PCF data, with an average carbon footprint of 187.76 gCO_2e/ the use of a vehicle driving 1km (lifecycle driving distance is calculated at 150,000 km)   Sort by: Most popular   Latest

No.	Product Name	Carbon Footprint	Scope	Year
1	2024款 ID.4 CROZZ 改款 PRO	218.70gCO_2e/The use of a …↑	Cradle to Grave	2024
2	2024款 ID.4 CROZZ 改款 PURE+	218.70gCO_2e/The use of a …↑	Cradle to Grave	2024
3	2024款 ID.4 CROZZ 改款 PRIME	226.32gCO_2e/The use of a …↑	Cradle to Grave	2024
4	2024款 奥迪Q4 e-tron 40 e-tron 冠军纪念版	219.24gCO_2e/The use of a …↑	Cradle to Grave	2024
5	2024款 AION V 埃安霸王龙 520 智豪版	177.07gCO_2e/The use of a …↓	Cradle to Grave	2024
6	2024款 AION V 埃安霸王龙 520 智尊版	177.07gCO_2e/The use of a …↓	Cradle to Grave	2024
7	2024款 AION V 埃安霸王龙 520 激光雷达版	177.07gCO_2e/The use of a …↓	Cradle to Grave	2024
8	2024款 AION V 埃安霸王龙 520 行政版	177.07gCO_2e/The use of a …↓	Cradle to Grave	2024
9	2024款 AION V 埃安霸王龙 650 智豪版	186.68gCO_2e/The use of a …↓	Cradle to Grave	2024
10	2024款 AION V 埃安霸王龙 650 智尊版	186.68gCO_2e/The use of a …↓	Cradle to Grave	2024
11	2024款 AION V 埃安霸王龙 650 行政版	186.68gCO_2e/The use of a …↓	Cradle to Grave	2024
12	2024款 AION V 埃安霸王龙 750 智尊版	203.23gCO_2e/The use of a …↑	Cradle to Grave	2024

Figure 4-13: **Product Carbon Footprint of Battery Electric Vehicles**

Figure 4-14: **China's Automotive Product Carbon Footprint Quantification Label**[36 37]

33. The CPP platform is developed by China Automotive Carbon Digital Technology Center Co., Ltd., aiming to enhance carbon emission management in the automotive industry, empower low-carbon transformation through digitalization, assist China in achieving its "dual carbon" target, and promote international mutual recognition of carbon footprint information, thereby excelling in the new international trade track centered on "carbon emissions".

34. Auto.China.com. 2024 China Automotive Low-Carbon Leaders and Carbon Labeling Release [EB/OL]. [2024-07-31]. https://auto.china.com/trade/32386.html

35. China Automotive Carbon Digital Technology Center Co., Ltd. China Automotive Carbon Digital Teams Up with Minsheng Bank to Issue the First Automobile Carbon Footprint-related Loan [EB/OL]. [2024-10-18]. http://www.auto-cpp.com/News/Read/33

36. China Automobile Industry Chain Carbon Publicity Platform (CPP). 2024 Annual Low Carbon Leader Model Showcase—Xiaomi SU7 [EB/OL]. [2024-10-18]. http://www.auto-cpp.com/News/Read/39

37. China Daily Chinese Edition. 2024 China's Low Carbon Automobile Leaders and Carbon Label Release [EB/OL]. [2024-10-18].
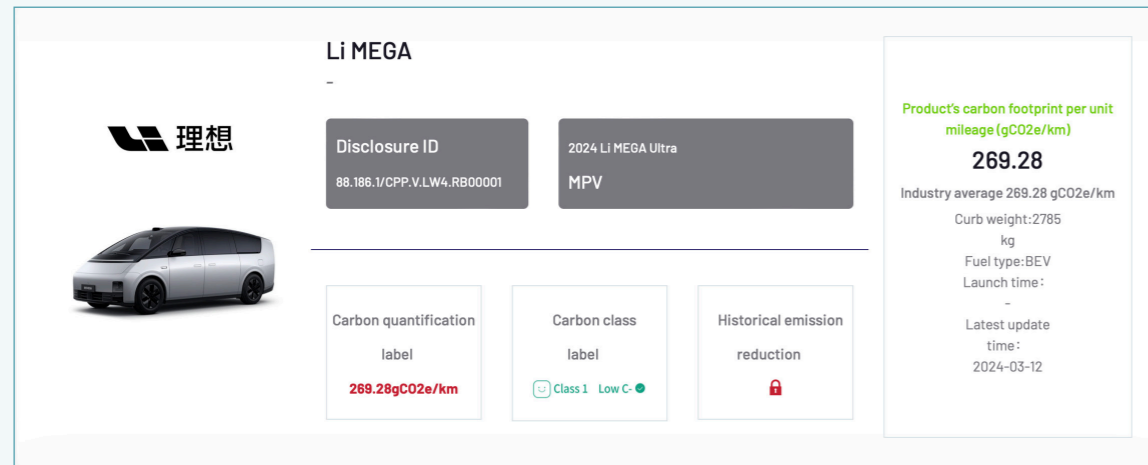
Figure 4-15: **CPP Platform Vehicle Carbon Labeling**

宝马3系。#碳足迹随手拍#
2022款 宝马3系 320i 运动套装：按照一辆乘用车生命周期行驶里程150,000千米计算，平均行驶1千米提供的运输服务的碳足迹为274.59克二氧化碳当量。
打开#蔚蓝地图#，随手拍了解产品中隐含的碳排放，培养绿色低碳消费理念。

Figure 4-16：**"Product Carbon Scan" for Identifying Product Carbon Footprints of Passenger Vehicles**

Scan the QR code to download the Blue Map APP and explore the "Product Carbon Scan" function

Finding 3   Stricter Carbon Management Requirements for Suppliers, but Achieving Supply Chain Climate Targets Remains Challenging

As the urgency and importance of global climate governance become more prominent, more companies are joining the Global Race to Zero, incorporating climate change factors into their development strategies, formulating climate policies, and setting quantifiable and traceable emission reduction targets. **Within this evaluation period, 55% of the evaluated companies set Scope 1&2 emission reduction targets, and 40% set Scope 1&2 carbon neutrality targets, representing year-on-year increases of 23% and 29% respectively compared to the 2023 evaluation period. In addition, 38% of evaluated companies set Scope 3 emission reduction targets, and 24% established Scope 3 carbon neutrality goals, showing increases of 25% and 16%, respectively, from the previous year.**

Among the companies committed to Scope 3 emissions reduction, 66% explicitly mentioned that their reduction targets include purchased goods and services. Some leading companies have further refined their value chain goals. For example, **IKEA**[38] has broken down its value chain targets into various stages, including materials, food ingredients, production, transportation, and use, tracking emissions reductions based on the baseline emissions for each stage. The target for the product use has already been more than halfway achieved (Figure 4-17). **Geely Automotive**[39], based on its carbon footprint reduction target for single vehicle lifecycle by 2025 (Figure 4-18), has further specified supply chain emission reduction targets for major carbon emission sources in raw materials: steel, aluminum, and batteries. They propose a roadmap to achieve 100% renewable electricity usage by key suppliers and 20% recycled steel, 30% recycled aluminum, and 25% recycled plastics by 2025, while also encouraging battery suppliers like VREMT Energy to initiate low-carbon procurement actions.

38. IKEA. IKEA Sustainability Report FY23[EB/OL]. [2024-10-18].
     https://www.ikea.com/global/en/newsroom/sustainability/sustainability-report-fy23-240125/
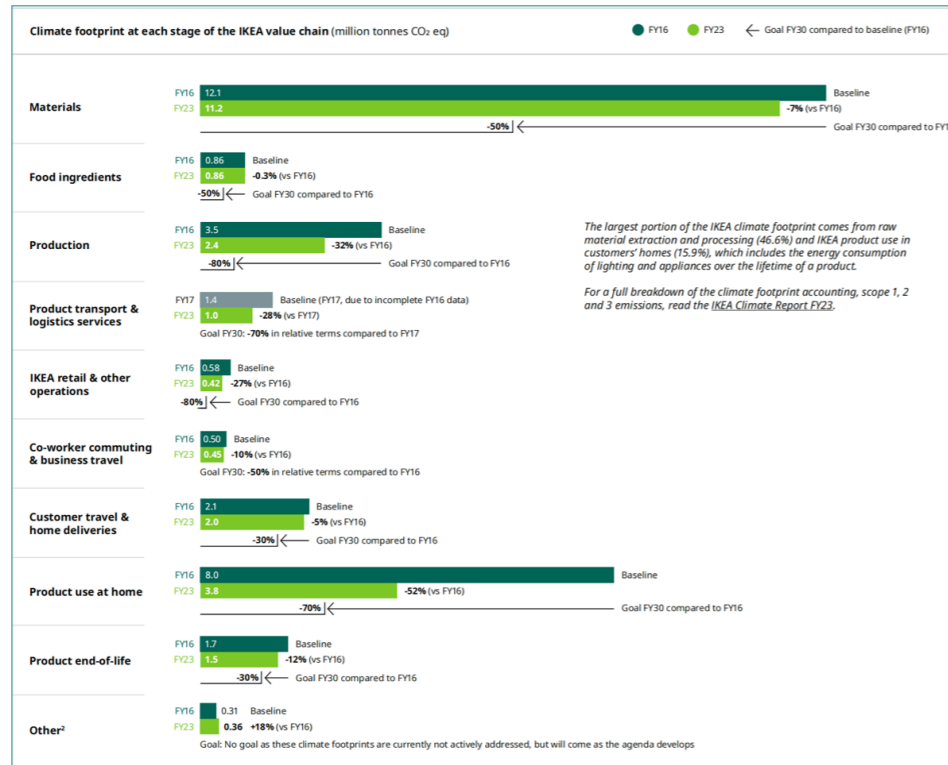39. Geely Automobile. 2023 Environmental, Social, and Governance Report [EB/OL]. [2024-10-18].
     http://www.geelyauto.com.hk/en/environmental-social-and-corporate-governance/

Figure 4-17: **IKEA's Breakdown of Value Chain Emission Reduction Targets and Progress**
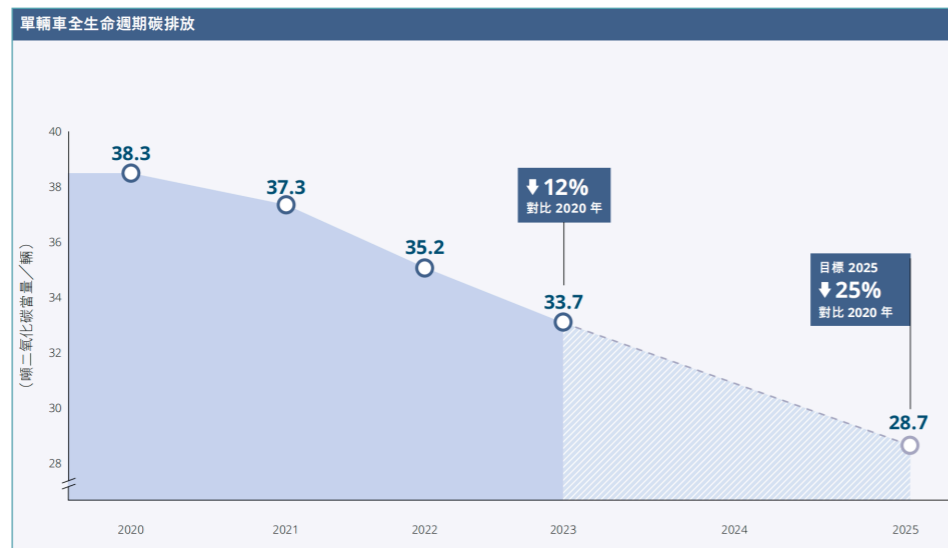

Figure 4-18: **Geely Automotive's 2025 Carbon Footprint Reduction Target for Single Vehicle Lifecycle**

1,204 Suppliers Disclosed Carbon Targets

To achieve supply chain emission reductions, 46 companies committed to promoting their suppliers to set their own climate targets based on Scope 3 targets. During this evaluation period, 35 evaluated companies, including **Adidas, Foxconn, PUMA, Luxshare-ICT, Cisco, and Nike**, motivated 1,204 suppliers to develop and publicly disclose carbon reduction targets through the Blue Map carbon data sheet. Among these, 890 suppliers set absolute emission reduction targets, a year-on-year increase of 37.6%, with a total promised emission reduction of approximately 6.46 million tons of CO_2e, more than double the reduction amount committed in 2023. This reflects that more suppliers, driven by leading companies, are taking climate action and gradually increasing their emission reduction ambitions.

Tracking Progress on Supply Chain Emissions Reduction Remains a Challenge

Despite the increasingly stringent carbon management requirements for suppliers, and more companies beginning to require suppliers to set their own emission reduction targets, less than 30% of the companies in this round of evaluation have disclosed the performance towards Scope 3 targets, indicating that tracing emission reductions in the supply chain remains challenging. Through discussions with leading companies, we learned that many companies have set up internal data reporting systems to collect supplier data, attempting to track carbon emissions assigned by procurement orders. However, as most suppliers still have limited carbon management capabilities, the accuracy of the collected data remains a challenge. According to CDP's Global Supply Chain Report 2022[40], among companies accounting for upstream Scope 3 emissions, only 13% used supplier measured data for accounting. More companies currently rely on life cycle databases to calculate emissions from purchased goods and services in Scope 3, but the lack of supplier measurement data means that the results often fail to accurately reflect the actual impact of supply chain emission reduction projects.

According to the Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard (hereinafter referred to as the "GHG Protocol"), companies must first conduct a systematic screening of their Scope 3 emissions to identify hotspots within the value chain before calculating GHG emissions for 15 categories. The GHG Protocol provides four accounting methods for purchased goods and services, including: **Supplier-specific Method** (calculating using supplier-specific product emission factors), **Hybrid Method** (combining supplier-measured data with lifecycle emissions factors), **Average-data Method** (using lifecycle emissions factors based on product quantity or weight), and **Spend-based Method** (using lifecycle emissions factors based on economic indicators). We believe that, considering data accuracy and practical calculation considerations, companies should collect actual measurement data from core suppliers wherever possible and combine it with life cycle analysis (LCA) emissions factors to account for greenhouse gas emissions from purchased goods and services.

40. CDP. Global Supply Chain Report 2022 [EB/OL]. [2024-10-18].https://www.cdp.net/en/research/global-reports/scoping-out-tracking-nature-across-the-supply-chain

Companies Need to Strengthen Carbon Management Requirements for Suppliers

Our research shows that procurement contracts between companies and suppliers are often signed at the group level, with suppliers primarily reporting carbon data and disclosing information based on the group. However, most suppliers have many factories, varied production line layouts, and complex material systems, making it difficult for companies to accurately trace the carbon emissions associated with their purchased products. Therefore, we believe that companies need to further strengthen their greenhouse gas management requirements for suppliers and empower them to improve data management capabilities, including **recording and preserving data on energy and material consumption at the factory/facility level.**

In 2022, the Measures for the Management of Corporate Environmental Information Disclosure were formally implemented, leading to significant progress in environmental information disclosure by Chinese enterprises. By 2023, over 85,000 Chinese enterprises were included in the list of entities required to disclose environmental information according to law. As of October 2024, the disclosure rate of the 2023 annual environmental information disclosure reports of these enterprises is close to 100%. Among the 780 companies evaluated in this period, 226 affiliates of 82 companies disclosed Scope 1 and 2 emissions data at the legal entity/facility level through mandatory environmental information disclosure.

Carbon Management at the Supplier Facility Level Supports Emissions Reduction Tracking in the Supply Chain

IPE has long been committed to promoting supplier facility-level carbon data reporting and disclosure by developing tools such as carbon data disclosure form and the GHG Emissions Accounting Platform. During this evaluation period, 35 Chinese and international companies pushed their suppliers to disclose facility-level carbon data through the IPE website. Companies like **Avary Holding, Luxshare-ICT, Vitasoy, Foxconn, and Marks & Spencer** explicitly required their suppliers to disclose carbon data through the Blue Map website in their annual reports or supplier management policies (Table 4-1). In addition, the Higg Facility Environmental Module (Higg FEM) system from the Sustainable Apparel Coalition (SAC) and the Responsible Business Alliance (RBA) questionnaires also support suppliers in reporting facility-level environmental management and carbon emissions data to brand customers.

Table 4-1: **Case Studies of Companies Conducting Supplier Carbon Management through the Blue Map Database**

Brand	Report Name	Report Content
鴻鼎控股 AVARY HOLDING	Avary Holding (Shenzhen) Co., Ltd. 2023 Annual Sustainability Report	Suppliers and sub-tier suppliers (e.g., chemical, sewage and solid waste treatment, logistics and raw materials suppliers) are required to register as corporate users on the IPE website, track environmental performance, and promptly rectify and issue public explanation regarding environmental violations records.... Mainland China suppliers and their sub-tier suppliers, which account for more than 80% of Avary Holding's procurement, are required to publicly disclose annual PRTR data on IPE website, measure greenhouse gas emissions, set emission reduction targets and regularly update progress.
LUXSHARE ICT	Luxshare-ICT 2023 Sustainability Report	Utilize the IPE database to track environmental violation records. Co-sponsor the launch of IPE's "Zero Carbon Supply Chain Initiative". Organize suppliers to participate in IPE product carbon footprint calculation, disclosure, and application trainings, and encourage suppliers to disclose carbon emission information on the IPE platform to promote comprehensive green supply chain transformation.
維他奶 Vitasoy	Vitasoy International Holdings Limited Sustainability Report 2023/24	We collaborate with the Institute of Public & Environmental Affairs (IPE) to screen our suppliers in their database for environmental risks and compliance status. For those with a current or historical non-compliance record, we review the latest 3-years of their performance data to monitor whether sufficient remedial actions are in place. During the reporting period, we engaged with our 30 top-spend direct suppliers in Mainland China in a pilot exercise on voluntary disclosure of environmental information. Among these, 13 suppliers disclose carbon emissions data, and 16 suppliers disclose other environmental emissions data through IPE's platform. This initiative helped to establish baseline information for our supply chain. With further verification, the data will be helpful for enhancing our scope 3 carbon accounting inventory and developing carbon reduction targets.
Fii 工业富联	2023 Fii Corporate Social Responsibility Report	Fii works closely with the Institute of Public & Environmental Affairs (IPE) to improve the environmental management of supply chain. We require Tier 1 suppliers to register on the IPE platform and pay attention to environmental compliance. We require suppliers with large environmental impact to report their annual pollutant emissions on the IPE platform. We select key suppliers to manage environmental compliance through IPE's Blue Map, including suppliers of raw materials and chemicals as well as solid waste and wastewater treatment services. Suppliers with any environmental violation are required to make corrective actions and contact the IPE for feedback within the specified time limit, so as to remove corresponding regulatory record. In 2023, we cumulatively drove 167 suppliers to register IPE Blue Map accounts to track their own environmental performance, promoted 78 suppliers to publicly disclose their annual pollutant discharge, transfer and carbon data through the IPE platform, and pushed 34 suppliers with environmental regulatory records to complete corrective actions and pass the final review to remove the regulatory records.

	ENVIRONMENT AND CHEMICAL POLICY (ECP) EXPECTATION FOR M&S SUPPLIERS	M&S expects all wet processors in China to upload their last calendar year environmental data onto the platform no later than each March. M&S uses IPE data as a useful screening tool to ensure environmental compliance at China facilities. For any pollution violations, facilities shall publish their public explanations regarding the reason for the violation, corrective actions undertaken or in progress, and current compliance status within 10 working days from receipt of the notice letter from IPE. If GCA audit is required, facilities need to verify the effectiveness of the corrective actions or continuously disclose information on corrective actions. If the facilities PRTR data and carbon data are not published on IPE platform on time, M&S will not approve the annual ECP self-assessment on Origin. The ECP assessors shall review the facilities' performance on IPE by end of each March to confirm facilities meeting the minimum requirements.

M&S EST. 1884

Some leading companies have also explicitly stated the requirements for facility-level GHG emissions accounting and management in supplier code of conducts. Among them, **Apple**'s Supplier Code of Conduct 4.10 requires that "Suppliers shall identify, manage, reduce, and responsibly control Greenhouse Gas (GHG) emissions from its company-wide operations. Supplier shall maintain a company-wide GHG inventory, which also identifies facility-level GHG emissions from all facilities involved with Apple products".[41] **Samsung**'s Electronics Supplier Code of Conduct Version 4.0 - Environment also requires suppliers to identify emission sources by identifying fuels, raw materials used in each emission facility.[42]

We believe that the public release of carbon management requirements for supply chain factories by industry leaders provides a critical foundation for suppliers to disclose carbon data at the facility level and for companies to track emission reduction progress throughout the supply chain. This approach not only supports suppliers in taking concrete climate action but also sets a benchmark that can drive broader industry change.

Finding 4

Leading Companies Accelerating Low-Carbon Transition in Supply Chains, but Upstream High-Carbon Emission Sectors Still Need to Accelerate Reduction Efforts

The supply chain represents a major source of Scope 1, 2, and 3 emissions for most industries, with the production of raw materials in the upstream supply chain being a key hotspot for emissions across the entire value chain. As climate risk management in supply chains gains greater attention, the number of companies implementing supply chain carbon management continues to rise, with large companies gradually deepening their efforts in this area. Leading companies are identifying high-carbon emission stages by assessing the emissions from Scope 3 purchased goods and services or conducting product lifecycle analyses. They are beginning to collaborate with suppliers in carbon-intensive industries to launch emission reduction projects.

Reducing Emissions in the Raw Materials Manufacturing Process

In this evaluation, 30% of evaluated companies are driving suppliers to implement corporate carbon accounting or energy management; a quarter of the companies are working with core suppliers to promote projects focused on energy management, clean energy alternatives, low-carbon or recycled materials, and low-carbon technology innovation to drive emission reductions across the supply chain. For example, many leading companies in various industries are pushing suppliers to use higher proportions of green electricity; textile companies like **Adidas, PUMA**, and **Nike** are urging suppliers to gradually phase out coal-fired boilers and replace them with lower-carbon alternatives such as liquefied natural gas and biomass, while also using recycled fabrics to reduce carbon footprints in the value chain. Retail, food, and consumer goods leaders like **Marks & Spencer**, **Danone**, and **Kao** are increasing the use of recycled plastics in packaging to reduce reliance on virgin plastics. **However, nearly 75% of companies still have supply chain carbon management at the initiative stage or are in the process of gathering carbon data from suppliers, with substantial work yet to be done in initiating emission reduction projects.**

In terms of driving decarbonization in high-carbon industries, the automotive sector's efforts in accelerating decarbonization across upstream industries such as steel, aluminum, and power batteries deserve attention. The global automotive industry is rapidly transitioning from fuel-powered vehicles to electric vehicles (EVs), but whether for traditional or electric vehicle manufacturers, achieving net-zero emissions requires a focus on reducing carbon emissions in the production of raw materials such as steel and aluminum. Automotive companies are urged to incentivize and collaborate with the steel and aluminum industries to implement energy-saving and emission-reduction measures.

41. Apple. Apple Supplier Code of Conduct [EB/OL]. [2024-10-18]. https://s203.q4cdn.com/367071867/files/doc_downloads/codeofconduct/Supplier-Code-of-Conduct-and-Supplier-Responsibility-Standards-Chinese-Simplified.pdf

42. Samsung Electronics.Samsung Electronics Supplier Code of Conduct Version 4.0 [EB/OL]. [2024-10-18].https://www.samsung.com/global/sustainability/people/supply-chain/

A study by IPE, launched in September 2023 with the support of the Energy Foundation, on "Collaborative Decarbonization of Automotive, Steel, and Aluminum Green Supply Chains" highlights that decarbonization in the automotive industry is closely linked to emissions reductions in raw materials. Whether for fuel-powered or electric vehicles, the carbon footprint of the vehicle increases with the vehicle class[43]. Among the evaluated automakers, 50 have made climate commitments and taken actions, but only 26 have disclosed decarbonization actions targeting upstream materials and components such as steel and aluminum. Of these, 17 automakers are exploring actions to reduce emissions in the steel sector, which primarily include considering the recycling needs of steel in the design phase to improve its recyclability, encouraging suppliers to obtain Responsible Steel certification, promoting the use of renewable energy in steel production, signing green steel agreements with suppliers, recycling steel from scrap vehicles and retired parts, and using recycled steel materials. In addition, 21 automakers have disclosed decarbonization actions for aluminum, with most focusing on the use of recycled aluminum. Companies like Mercedes-Benz, BMW, and Volvo are investing in or collaborating with suppliers to develop low-carbon metallurgy technologies. However, most disclosures related to steel and aluminum emissions reduction projects are qualitative in nature and lack quantitative data, making it difficult for stakeholders to understand the scale of these projects and their contribution to reducing greenhouse gas emissions in the supply chain. Furthermore, the steel and aluminum emission reduction projects currently being implemented by these automakers are mostly in pilot stages, and the effectiveness and sustainability of these initiatives remain uncertain. Therefore, despite some leading automakers setting targets for steel and aluminum emissions reduction and focusing on Scope 3 emissions, the disclosed emissions reduction projects, as of now, are insufficient to achieve these targets and have not yet exerted enough pressure on upstream material suppliers to accelerate decarbonization.

Case Study:	**Polestar's Aluminum Emission Reduction Efforts Based on Carbon Footprint Analysis in the Design, Use, and Recycling Phases**

Through product lifecycle assessment (LCA), Polestar identified aluminum and lithium battery materials as the largest sources of emissions in its products, accounting for 29% and 29% of the carbon footprint, respectively, while steel contributed 17%. These findings were published in the Polestar 2 LCA report in 2021.[44]

Design Phase: Improving Aluminum Recyclability	In order to enhance recyclability at the end of the vehicle's life, Polestar proposed a solution in 2022 to distinguish different grades of aluminum. During the design phase, all aluminum materials were labeled and color-coded, providing recyclers with an intuitive method for identifying different grades of aluminum. This labeling allows for the sorting and recycling of these materials, facilitating a closed-loop recycling system for aluminum.
Aluminum Supply Chain: Use of Renewable Energy	Over 70% of the carbon emissions from aluminum smelting come from the energy-intensive electrolysis process. To mitigate this, Polestar is working with its aluminum suppliers to increase the use of renewable energy. In the Polestar 2, the aluminum battery tray and 19-inch wheel rims were sourced from suppliers using renewable energy, reducing carbon emissions by 1.2 tons per vehicle. In the production of the Polestar 3, 81% of the aluminum used came from processes powered entirely by renewable energy. Furthermore, Polestar 4 has increased the share of hydroelectric power used in the aluminum smelting process.
Manufacturing Phase: Reducing Aluminum Usage and Using Recycled Aluminum	Polestar's R&D center has been focusing on lightweight materials to reduce vehicle weight. Publicly disclosed data shows that the dual-motor long-range version of the Polestar 4 used 69 kg less aluminum per vehicle compared to the same version of the 2021 Polestar 2, directly reducing aluminum-related carbon emissions. In addition, Polestar has made increasing the proportion of recycled materials a key strategy for reducing the consumption of primary materials. The Polestar 4 already uses 18% recycled aluminum.

Polestar's publicly disclosed lifecycle assessment data for several of its products show a downward trend in the carbon footprint and carbon intensity of aluminum and steel per kilogram in the Polestar 2 MY24 compared to the Polestar 2 MY21. In the Polestar 4 MY25, the proportion of emissions from aluminum dropped from 29% in the Polestar 2 MY21 to 24%, with a reduction of 4.7 tons of CO_2e in its "cradle-to-gate" carbon footprint, and a decrease of 0.0034 tons of CO_2e in carbon intensity per kilogram of aluminum[45]. However, the carbon intensity of steel in the Polestar 4 MY25 has slightly increased compared to the Polestar 2 MY24. Given that the emissions reduction potential of steel ranks second in Polestar's own disclosures and is also a key factor for long-term emission reductions in the overall vehicle, we believe Polestar needs to collaborate with steel suppliers to reduce emissions in steel production in order to meet its net-zero product commitments.

Table 4-2: **Comparison of Steel and Aluminum Emission Intensities for Polestar 2 and Polestar 4**

	Polestar 2 Dual Motor Long Range-MY21	**Polestar 2 Dual Motor Long Range-MY24**	**Polestar 4 Dual Motor Long Range-MY25**
Cradle to Gate Carbon Footprint (tCO₂e)	26.1	23.1	21.4
Aluminum Emissions Proportion	29%**	26%	24%
Aluminum Weight (kg/vehicle)	391	347	322
Emission per Unit (tCO₂e/kg aluminum)*	0.0194	0.0173	0.0160
Steel Emissions Proportion	17%	19%	20%
Steel Weight (kg/vehicle)	880	908	806
Emissions Intensity per Unit (tCO₂e/kg steel)*	0.0050	0.0048	0.0053

*Calculated by IPE based on data disclosed in Polestar's public reports. All other data are from Polestar's publicly disclosed information.
**This data is from the 2021 Polestar 2 LCA report, representing the average emissions of aluminum for Polestar 2 MY21.

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43. Vehicle classes from low to high are categorized into: microcar, subcompact car, compact car, mid-size car, mid-large car, and full-size car
44. Polestar. Polestar 2 LCA report [EB/OL].[2024-10-18]. https://www.polestar.cn/global/news/polestar-2-lca-report/

45. Polestar. Carbon footprint of Polestar 4[EB/OL]. [2024-10-18].
https://www.polestar.cn/dato-assets/11286/1699610322-polestar-4_lca_report_2023-11-08.pdf

Case Study: **Mercedes-Benz Collaborates with Global Suppliers to Gradually Reduce Steel and Aluminum Emissions in its Supply Chain**

Mercedes-Benz has publicly disclosed its targets[46] to achieve carbon neutrality for new passenger vehicles throughout their entire lifecycle by 2039, with an interim target of reducing the lifecycle carbon emissions of new vehicles by at least 50% by 2030. To achieve these targets, Mercedes-Benz has prioritized the reduction of carbon emissions in high-emission materials and components, such as steel, aluminum, plastics, and batteries, and is working with suppliers across various regions to explore the application of low-carbon steel and aluminum. By securing green resources in advance, the company aims to progressively reduce the carbon footprint of raw materials. As of 2023, 84% of its suppliers have committed to providing carbon-neutral materials to Mercedes-Benz by 2039.

Low-Carbon Steel Supply Chain Cooperation

Mercedes-Benz is collaborating with global steel suppliers to support its low-carbon transition (see Table 4-3). In Europe, Mercedes-Benz plans to procure over 200,000 tons of low-carbon steel annually from European suppliers for its stamping plants by 2030. The company has already signed low-carbon procurement agreements or cooperation intentions with steelmakers such as H2 Green Steel, Thyssenkrupp Steel, Salzgitter, Arvedi, and Voestalpine. In the United States, Mercedes-Benz is working with Steel Dynamics to procure over 50,000 tons of low-carbon steel annually. In China, Beijing Benz has partnered with Baosteel to gradually source low-carbon steel with significantly reduced carbon emissions starting in 2023. By 2026, Mercedes-Benz plans

to leverage Baosteel's hydrogen-based shaft furnace-electric arc furnace (HF-EAF) technology to reduce the carbon footprint of steel by 50% to 80%, with the goal of achieving more than 95% carbon reduction.

Aluminum Emission Reduction Efforts

In terms of aluminum emission reduction (Table 4-4), in 2022, Benz established a partnership with aluminum manufacturer Hydro to supply aluminum with 70% lower carbon emissions compared to traditional processes to Benz's German factories starting from the year 2023. Based on this partnership, Mercedes-Benz aims to reduce carbon emissions from aluminum used in its vehicles by 90% compared to the European average by 2030. In addition, Mercedes-Benz continues to encourage European aluminum suppliers to increase the share of renewable energy used in their production processes. The company plans for at least one-third of the primary aluminum used in all European electric vehicle models to be sourced from renewable energy in the future. In China, Mercedes has signed a memorandum of understanding with Yunnan Aluminum Co., Ltd., planning to increase the application of low carbon footprint aluminum certified by the Aluminum Stewardship Initiative (ASI)[47] Chain of Custody (CoC) standard in the production line, and gradually extend it to the production process of other components. According to Mercedes-Benz, the carbon footprint of this low-carbon emission aluminum can be reduced by 55% to 60% compared to the industry average.

Table 4-3: **Mercedes-Benz Global Low-Carbon Steel Supply Cooperation**[48]

Country	Steel Supplier	Cooperation Status	Cooperation Details	Low Carbon Emission Steel Delivery Status
Sweden	H2 Green Steel	Contract Signed	Annual supply of ~50,000 tons of near-zero carbon steel for European stamping plants	Delivery in 2025
		Cooperation Intent signed	Jointly develop North American sustainable steel supply chain	/
	SSAB	Procurement Completed	Hydrogen-based direct reduction of iron ore using water and fossil-free energy	Pilot supply in 2022, full supply in 2026
Germany	Thyssenkrupp Steel	Cooperation Intent Signed	In the case of sufficient supply of green hydrogen, the entire production process of carbon dioxide-reduced steel products will use a direct reduction system and innovative smelting devices, with the process producing almost no carbon dioxide	Delivery in 2026
	Salzgitter Flachstahl GmbH	Procurement Completed	Electric arc furnace (EAF) + 100% scrap, reducing CO2 emissions by over 60% compared to blast furnace	Delivered
		Cooperation Intent Signed	Products produced using green electric power	Not mentioned
		Plan	Carbon dioxide reduced steel	Delivery in 2026
Italy	Arvedi	Procurement Completed	Use of renewable energy	Delivered
Austria	Voestalpine	Cooperation Intent Signed	Use of electric arc furnace + scrap and steel recycling from German plants via railway	Delivery in 2027
United States	Steel Dynamics	Procurement Completed	100% green electricity and over 70% scrap in EAF, supplying over 50,000 tons of low-carbon steel to US plants annually	Delivered in September 2023
China	Baosteel Co., Ltd.	Procurement Completed	Hydrogen-based shaft furnace - electric arc furnace process to reduce carbon footprint by 50%-80%, aiming for 95%+ reduction by 2026	Delivered in 2023

Table 4-4: **Mercedes-Benz Global Low-Carbon Aluminum Supply Cooperation**

Country	Aluminum Supplier	Cooperation Status	Cooperation Details	Low Carbon Emission Aluminum Delivery Status
Norway	Hydro	Contract Signed	Use of renewable energy, energy efficiency improvements, and at least 25% post-consumer recycled aluminum to reduce emissions by 70% compared to European average	Delivered in June 2023
China	Yunnan Aluminum	MOU Signed	Procure aluminum raw materials with a low carbon footprint certified by the ASI Aluminum Chain of Custody (CoC) standard, reducing aluminum carbon emissions by 55%-60% compared to the industry average level	Not mentioned

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46. Mercedes-Benz Group. Sustainability Report 2023 [EB/OL].[2024-10-18].
    https://group.mercedes-benz.com/documents/sustainability/reports/mercedes-benz-sustainability-report-2023.pdf
47. ASI. ASI Chain of Custody (CoC) Standard – Guidance [EB/OL]. [2024-05-18].
    https://aluminium-stewardship.org/wp-content/uploads/2023/04/4.CoC-Guidance-Chain-of-Custody-Standard-Guidance-V2.1.pdf
48. The content in Table 4-3 and Table 4-4 is organized by IPE based on the disclosures in the sustainability reports of the Mercedes-Benz Group and Mercedes-Benz China.

Although Mercedes-Benz has made significant progress in global low-carbon steel and aluminum procurement and signed cooperation agreements in various countries, its Scope 3 emissions, as disclosed in its 2023 sustainability report, have shown a year-on-year increase in emissions from purchased goods and services between 2021 and 2023. We recommend that Mercedes-Benz further calculate and disclose the potential emissions reduction impact of its low-carbon materials, as well as encourage steel and aluminum suppliers to measure and disclose the carbon footprint of low-carbon products. Providing quantifiable data would help demonstrate the emissions reduction benefits of using low-carbon steel and aluminum materials to stakeholders.

Apart from automobiles, real estate is also a major purchaser of materials such as steel, building materials (cement, glass, ceramics), and non-ferrous metals. Carbon emissions from the production and transportation stages of building raw materials account for about 57% of the entire building process, with embedded carbon in steel and concrete accounting for approximately 50% of the carbon emissions related to building raw materials.[49 50] Implementing supply chain carbon management and reducing embedded carbon in building raw materials are important pathways for the real estate industry to achieve net zero emissions. Its green procurement practices will also strongly promote GHG emission reduction and local pollutant control in industries such as steel and cement.

To encourage the real estate sector to adopt green supply chain management, the China Urban Realty Association, SEE Foundation, and the China Real Estate Chamber of Commerce, in collaboration with companies like Landsea and Vanke, launched the "Green Supply Chain Action" initiative in 2016. This initiative aims to establish industry-wide green procurement standards and promote environmental management among multi-category suppliers. The "Green List" evaluation criteria cover product carbon footprints and energy consumption limits, with the goal of reducing embedded carbon in construction materials throughout the supply chain.[52] This innovative approach has addressed challenges such as insufficient individual enterprise drive and ineffective communication on industry-wide issues. In addition, the initiative encourages participating real estate companies to prioritize suppliers on the "White List" and "Green List," thus expanding the influence of green procurement through collective industry efforts.

| Case Study: | Hang Lung Properties' Procurement of Low-Carbon Concrete and Electric Arc Furnace Steel to Reduce Emissions from Upstream Materials |

According to Hang Lung Properties' 2023 Sustainability Report[51], steel, aluminum, and concrete are the three primary contributors to carbon emissions from its raw materials, together accounting for about 80% of the embedded carbon in building materials.

- 14.28% Concrete
- 39.63% Steel
- 10.65% Cement and concrete bricks
- 0.13% Glass
- 0.68% Timber
- 26.81% Aluminum
- 0.09% Gypsum
- 7.73% Others
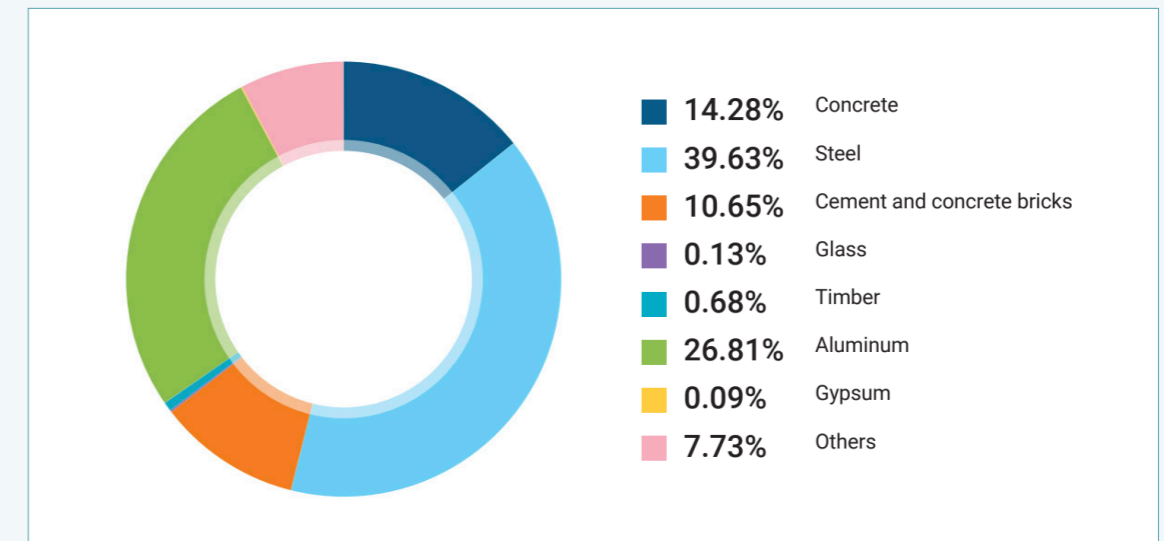
Figure 4-19： **Proportion of Embedded Carbon Emissions from Different Building Materials of Hang Lung Properties in 2023**

For concrete, Hang Lung Properties has partnered with the startup "Clean CO2" to explore the use of CCUS technology to produce low-carbon recycled concrete aggregate (RCA) and carbon-sequestering solid bricks. The embedded carbon emissions are expected to be reduced by 87.5% compared to traditional sintered shale bricks, and this approach has been successfully applied in the Hang Lung Plaza project in Hangzhou.

For steel, Hang Lung Properties has sourced short-process electric arc furnace (EAF) steel from Shagang Group and Jiangsu Yonggang Group. This material has already been applied in several projects in Wuxi and Hong Kong, with the proportion of electric arc furnace steel ranging from 6% to 16%. Given the significant emission reduction potential of short-process steelmaking, we recommend that Hang Lung Properties expand its procurement of low-carbon steel and disclose the emissions reductions achieved by replacing traditional blast furnace steel with electric arc furnace steel.

49. architecture2030. ACTIONS FOR A ZERO CARBON BUILT ENVIRONMENT Embodied Carbon[EB/OL]. [2024-10-18]. https://www.architecture2030.org/embodied-carbon-actions/
50. nbi. Lifecycle GHG Impacts in Building Codes [EB/OL]. [2024-10-18]. https://newbuildings.org/wp-content/uploads/2022/01/NBI_Lifecycle-GHG-Impacts-in-Codes_Jan2022Update.pdf
51. GSC Green Chain Action. Green List Assessment Standards [EB/OL]. [2024-10-18]. https://gsc.see.org.cn/#/content/AssessmentStandards/GreenListAssessmentStandards.

52. Hang Lung Properties. 2023 Sustainability Report [EB/OL]. [2024-10-18]. http://static.cninfo.com.cn/finalpage/2024-03-28/1219432166.PDF

Finding 5

Nearly 30% of Companies Collaborate with Logistics Suppliers to Reduce Emissions, Decarbonizing the Freight Industry Will Support Net-Zero Goals

The carbon emissions from upstream and downstream logistics processes in the enterprise value chain are usually the second largest emission hotspot, apart from the embedded carbon in purchased goods and services. To achieve net zero emissions in the value chain, leading companies need to collaborate with logistics suppliers to reduce carbon emissions in the transportation segment of the value chain. Furthermore, GHG emissions related to freight account for about 10% of global emissions.[53] Considering that future freight demand will continue to grow significantly, under current climate policies, the emission reduction volume and decarbonization efficiency related to freight are still insufficient to meet long-term climate commitments.[54] The increased demand and investment in low-carbon logistics by leading companies will also help accelerate the low-carbon transition of the freight industry.

Reducing Emissions in the Logistics Process

In this evaluation, 27% of companies are collaborating with logistics suppliers on emission reduction projects. These initiatives include replacing vehicles with clean fuel alternatives, developing multimodal transport logistics, optimizing logistics routes, and adopting green warehousing and packaging practices. For instance, **Marks & Spencer**[55] optimized its clothing and home goods business fleet, updating 35 bio-liquefied natural gas vehicles in 2023, reducing carbon emissions by approximately 65-70% compared to diesel vehicles. **Danone**[56] reduced emissions by optimizing vehicle load efficiency, strengthening local sourcing, direct delivery from factories, and changing transportation modes, aiming to cut 0.35 million tons of carbon emissions between 2023 and 2030.

Case Study: LONGi Green Energy Develops Green Logistics System to Reduce Global Logistics Emissions

An emission analysis conducted by **LONGi Green Energy** revealed that logistics processes across its value chain account for 3.36% of its total emissions.[57] Since 2020, LONGi has explored multimodal logistics, integrating river-sea, rail-sea, chartering cabin/ship transport, changing the inland trailer segment before the export port to inland waterway/rail transport, thereby reducing logistics costs while decreasing carbon emissions.
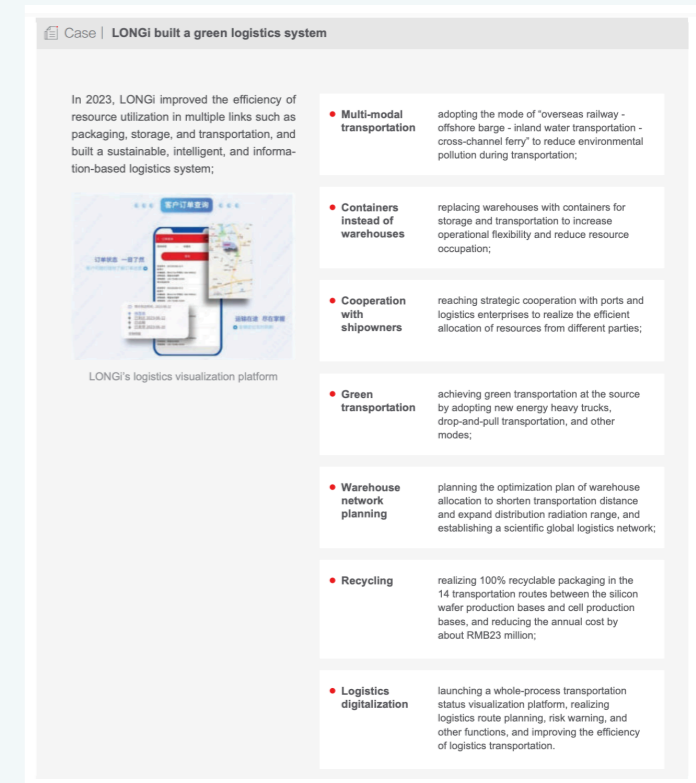
Figure 4-20: **LONGi Green Logistics System**

Currently, 86% of LONGi Green Energy's export business uses multimodal transport logistics models. In 2024, LONGi introduced multimodal delivery for customer shipments in Europe for the first time. For example, the modules exported from LONGi's Wuhu factory to Italy has changed from the traditional 380km land transport to Shanghai Port to a short haul of 30km to the nearby Zhujiaqiao River Port, using inland river barges to Shanghai Port. After sea transport to the Port of Antwerp in Europe, the traditional 1200km land transport has been adjusted to rail transport to a railway station near the Italian customer's project site, followed by a 40km road transport. Compared to the traditional land transport model, multimodal transport can reduce carbon emissions by up to 64%.[58]

In addition to green transportation, LONGi has also implemented circular packaging for the internal transport of silicon wafers, battery cells, and modules, replacing single-use cardboard boxes. This initiative saves 2.3 million boxes annually, reducing carbon emissions by 1,913 tons each year.

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53. GLEC. Global Logistics Emissions Council Framework for Logistics Emissions Accounting and Reporting Version 2.0 [EB/OL]. [2024-10-18]. https://smart-freight-centre-media.s3.amazonaws.com/documents/2019_GLEC_Framework_July_2022.pdf
54. OECD. ITF Transport Outlook 2023 [EB/OL]. [2024-10-18]. https://www.oecd.org/en/publications/itf-transport-outlook-2023_b6cc9ad5-en.html
55. Marks and Spencer Group plc. .ESG Report 2024 [EB/OL]. [2024-10-18]. https://corporate.marksandspencer.com/sustainability
56. DANONE. DANONE CLIMATE TRANSITION PLAN [EB/OL]. [2024-10-18]. https://www.danone.com/content/dam/corp/global/danonecom/about-us-impact/policies-and-commitments/en/danone-climate-transition-plan-2023.pdf

57. LONGi Green Energy. 2023 Sustainability Report [EB/OL]. [2024-10-18]. https://static.longi.com/2023-longi-sustainability-report-cn.pdf
58. LONGi Green Energy. Low Carbon Logistics: Green Footprints of a Photovoltaic Module [EB/OL]. [2024-10-18]. https://www.ipe.org.cn/GreenSupplyChain/BrandStoryDetail.aspx?id=109

Case Study: **Avary Holding Enhances Logistics Resource Efficiency to Reduce Emissions from Logistics Activities Across Its Parks**

To achieve the 2050 Scope 1, 2, and 3 net zero emissions target, **Avary Holding** has been continuously exploring green logistics in its parks since 2019. This is done by improving logistics efficiency, reducing energy consumption, and lowering greenhouse gas emissions during transportation, while disclosing annual emission reduction performance (Figure 4-21).[59]

In the year 2023, Avary Holding's Shenzhen Park, Qinhuangdao Park, and Huai'an Park vigorously promoted green logistics. By integrating freight demand and rationalizing vehicle usage, they reduced the total number of transport trips by 13,100, saving over 1.78 million liters of diesel and gasoline, thereby reducing emissions by 4,291.4 tons of CO_2e.

Figure 4-21: **Avary Holding's Annual Green Logistics Emission Reduction Performance**

■ Emissions Reduction by Green Logistics Mechanism (tCO_2e)
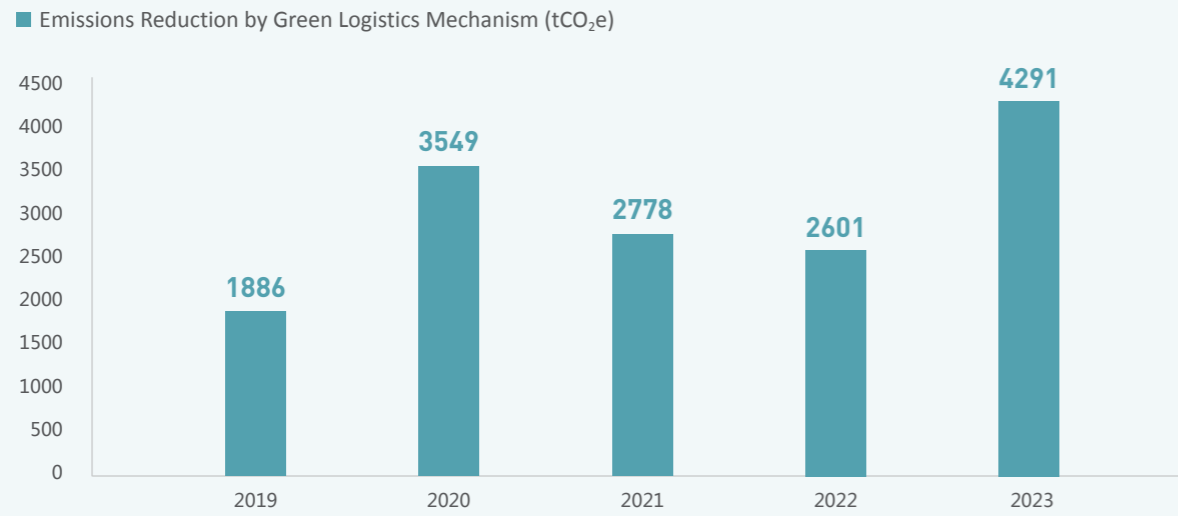
Table 4-5 : **Annual Emission Reduction Performance and Freight Integration of Each Park of Avary Holding**

Location Park	Freight Consolidation	Diesel and Gasoline Savings	Carbon Reduction
Shenzhen	Reduce 3,651 vehicles	32,913 liters	73 tCO_2e
Qinhuangdao	Reduce 3,807 vehicles	456,840 liters	123 tCO_2e
Huai'an	Reduce 2,715 vehicles	Gasoline: 2,546,920 litersDiesel: 46,591 liters	5,787 tCO_2e
Tota	Reduce 13,100 vehicles	3,083,264 liters	6,876 tCO_2e

59. Avary Holding. Avary Holding Environmental Performance Improvement in Logistics [EB/OL]. [2024-10-18].
https://wwwen.ipe.org.cn/GreenSupplyChain/BrandStoryDetail.aspx?id=113

Feature   IPE's Digital Solutions

Decarbonizing the supply chain is a key challenge for companies aiming to achieve net-zero emissions across their entire value chain. Supply chain carbon management has its unique challenges: global procurement, extensive outsourcing, a large and dispersed supplier base, and high-emission activities often located upstream in the supply chain. Moreover, obtaining reliable emissions data remains difficult, and some key decarbonization technologies are still in development or need further refinement.

Since 2020, IPE has developed and continuously optimized a series of digital tools in carbon accounting, target setting, and information disclosure platforms. These tools are designed to help companies efficiently and cost-effectively collect supply chain data, empower suppliers to set emission reduction targets, improve the level of information disclosure on supply chain and product carbon footprints, and assist stakeholders in public supervision.

Tool 1: Enterprise GHG Emissions Disclosure Platform

Driven by global climate governance and China's "dual carbon" target, more and more companies are undertaking carbon accounting and disclosing their carbon data to regulators, governments, or stakeholders. IPE, in collaboration with professional organizations, has developed and continually upgraded the enterprise carbon data disclosure platform. This platform aligns with mainstream greenhouse gas disclosure mechanisms in both China and internationally, providing companies with a data disclosure platform to showcase their emissions performance and progress on reductions.
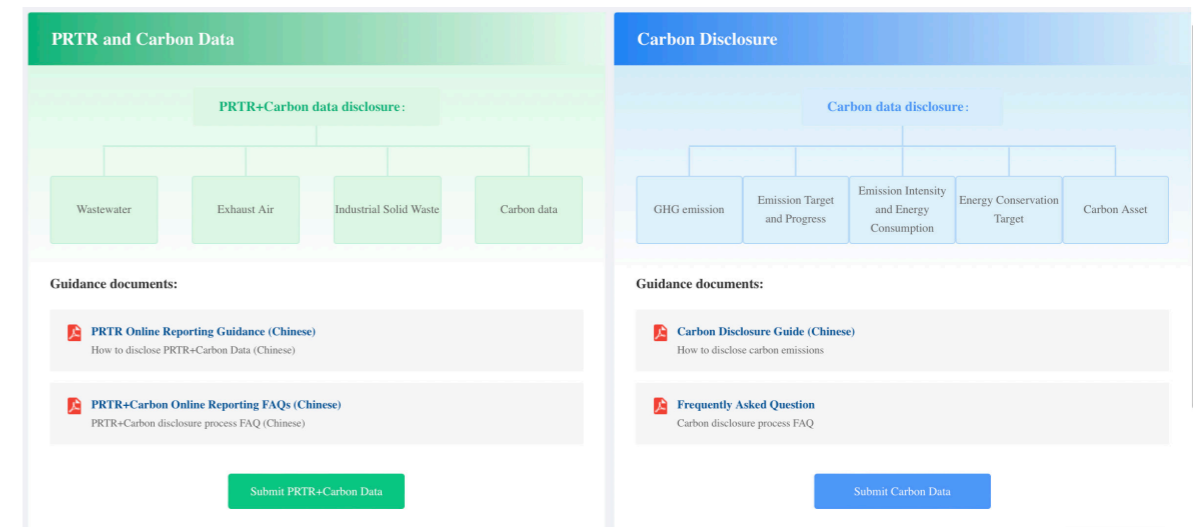
Figure 4-22: **Enterprise Pollutant Release and Transfer Register (PRTR) and Carbon Data Disclosure Form**

Tool 2: Enterprise GHG Emissions Accounting Platform

To address the lack of accounting capacity in small and medium-sized enterprises (SMEs), IPE, in collaboration with partners, developed and continuously upgrades the Enterprise GHG Emissions Accounting Platform in 2020. The platform was developed based on the Corporate GHG Emissions Accounting Methodologies and Reporting Guidelines (Trial) for 24 industries issued by the National Development and Reform Commission. It incorporates automatic parameters for various types of fossil fuels, electricity, and heat emission factors applicable to Chinese companies. The platform guides suppliers through the calculation process to identify emission sources, improving the completeness and accuracy of accounting data, and helps enterprises efficiently and cost-effectively conduct carbon accounting, providing a clear understanding of their emissions baseline.

Building on this, IPE developed the Scope 3 Calculator, based on the Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard. This tool covers multiple Scope 3 categories, including purchased goods and services, upstream and downstream logistics, and business travel. It integrates the China Products Carbon Footprint Factors Database (CPCD) LCA factors and sets recommended values to assist enterprises in conducting accounting.

Figure 4-23: **Enterprise GHG Emissions Accounting Platform - Scope 1&2**
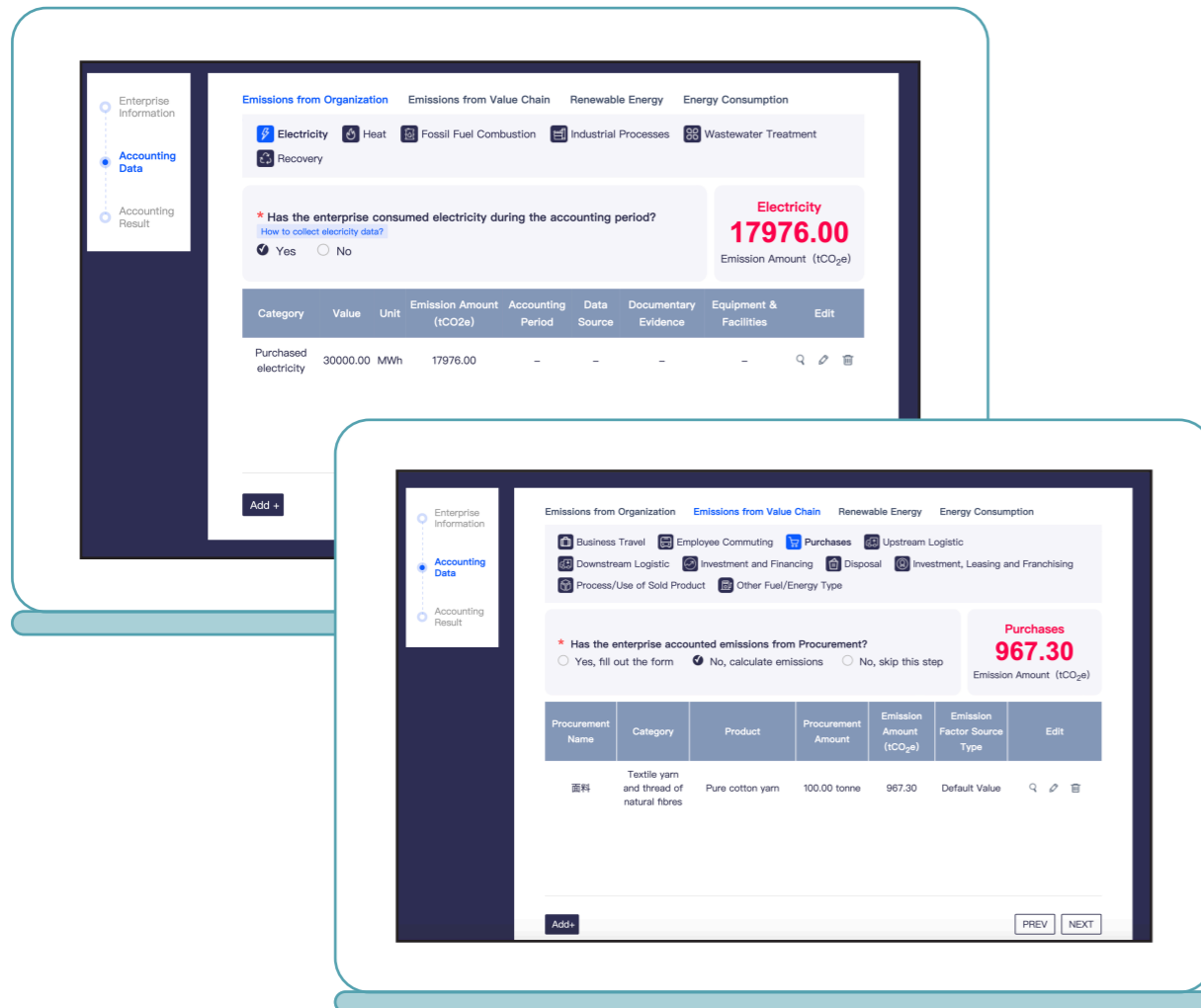
Figure 4-24: **Enterprise GHG Emissions Accounting Platform - Scope 3**

Tool 3: Enterprise Carbon Target Setting Tool

To assist enterprises in setting climate targets based on climate science and aligned with international mainstream mechanisms such as the Science Based Targets Initiative (SBTi), IPE developed and launched the Enterprise Carbon Emission Reduction Target Setting Tool in 2023. This tool generates various emissions reduction target options for companies using science-based target methodologies. It empowers SMEs to set appropriate science-based emission reduction targets (aligned with pathways of 1.5°C, well below 2°C, and 2°C). Enterprises only need to input baseline year emission data, and by combining industry, region, policy requirements, etc., the tool can easily help enterprises simulate their Scope 1&2, as well as Scope 3 emission reduction targets.
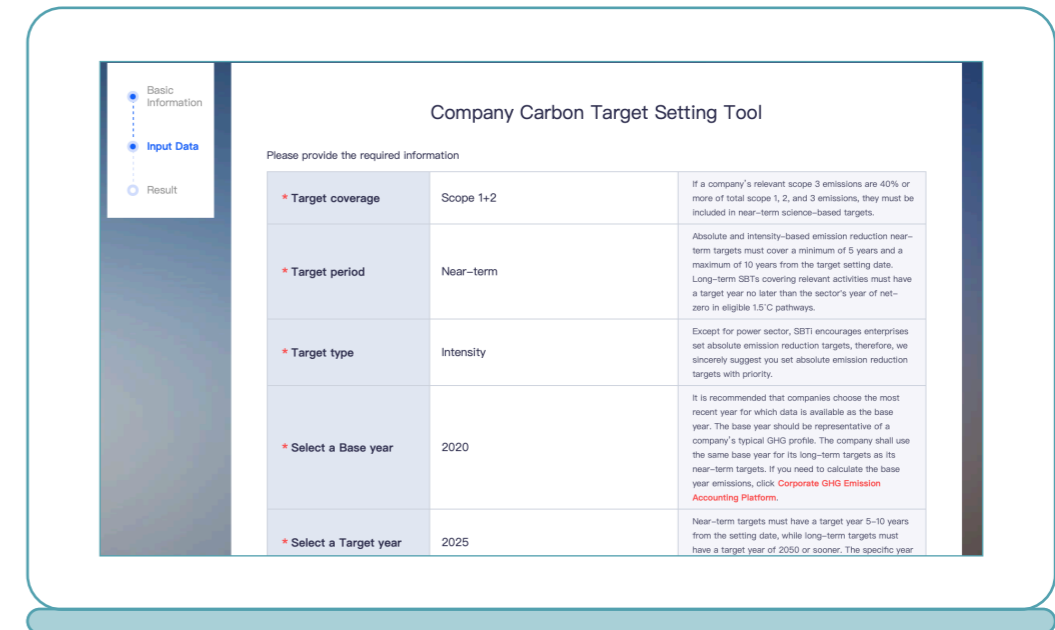
Figure 4-25: **Enterprise Carbon Emission Reduction Target Setting Tool**

Figure 4-26: **Enterprise Carbon Emission Reduction Target Setting Example**

Tool 4: GHG Emission Factor Database (CPCD) and Product Carbon Footprint Platform (PCFD)

To assist enterprises in calculating product carbon footprints, conducting lifecycle analysis, and assessing Scope 3 emissions, IPE, in collaboration with the China City Greenhouse Gas Working Group, launched the China Products Carbon Footprint Factors Database (CPCD, Figure 4-27) in 2022.

Based on CPCD 2.0, the China City Greenhouse Gas Working Group, in collaboration with Alibaba Cloud, also developed an open-source carbon footprint modeling platform called "Energy Expert", to assist enterprises in carbon footprint accounting. The factors of CPCD are also applied to the Shandong Province Enterprise Product Carbon Footprint One-Stop Service Platform, Zhejiang Province Product Carbon Footprint Service Platform, and the Ministry of Industry and Information Technology's Key Raw Materials Industry Dual Carbon Public Service Platform, among others.

In the year 2023, IPE further developed and launched the Product Carbon Footprint Disclosure and Catalogue Platform (PCFD, Figure 4-28), aiming to guide stakeholders to pay attention to the carbon footprint of the products and services they purchase or invest in through the public disclosure of product carbon footprints, and to incorporate product carbon footprints into procurement, investment, and consumption decisions.

Figure 4-27: **China Products Carbon Footprint Factors Database (CPCD)**
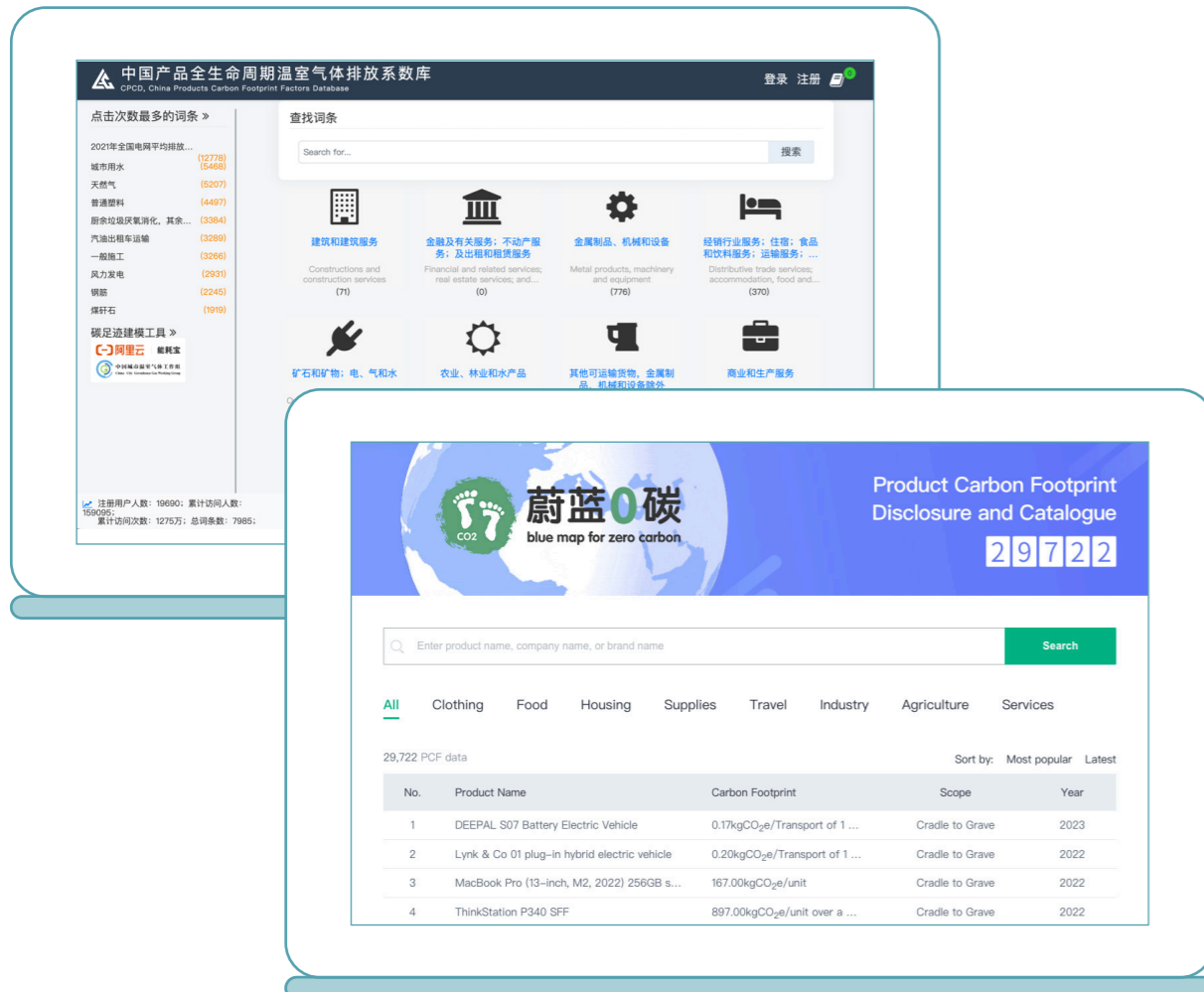
Figure 4-28: **Product Carbon Footprint Disclosure and Catalogue Platform (PCFD)**

Tool 5: Global Business Accountability Map

To promote corporate responsibility in pollution reduction and decarbonization and curb "climate greenwashing," IPE developed and launched the Global Business Accountability Map. As of September 2024, the map records and displays commitments, progress against targets, GHG emissions levels, and supply chain emission reduction actions in supply chains in China for 1,950 major brands, listed companies, and large enterprises.
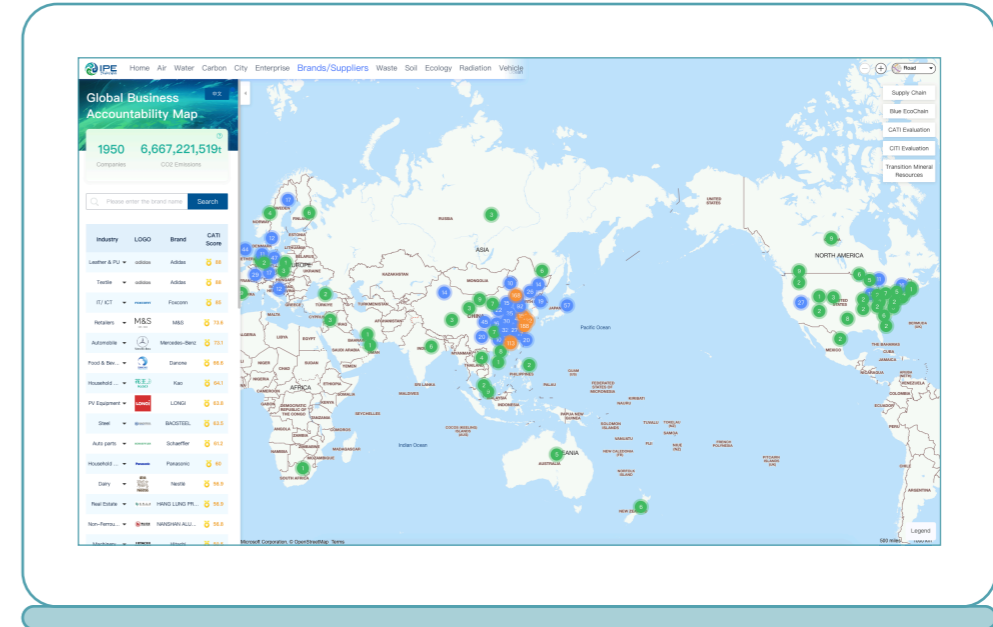
Figure 4-29: **Global Business Accountability Map**
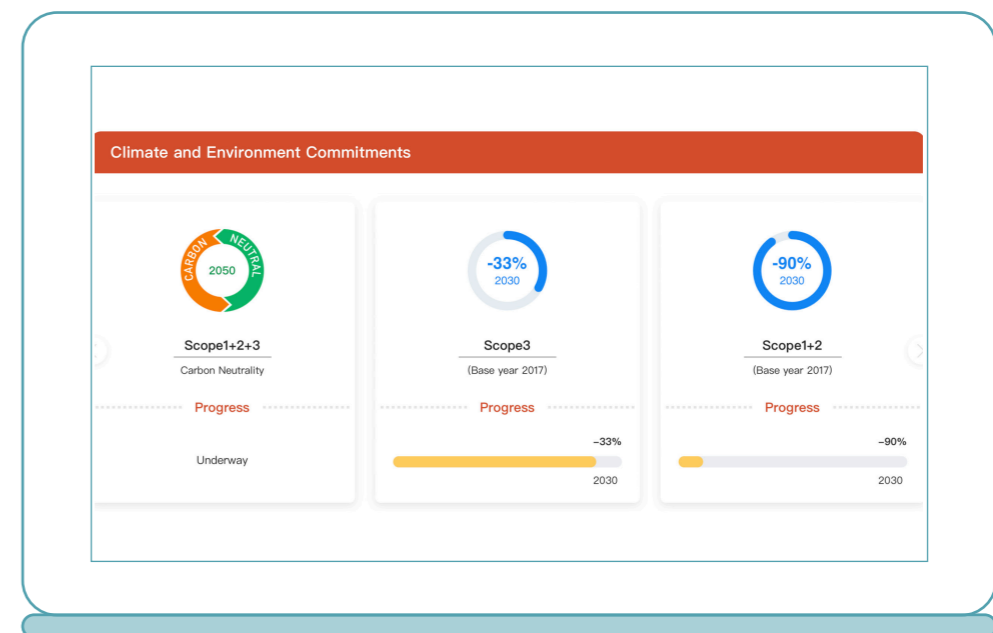
Figure 4-30: **Corporate Target Progress Tracking Detail Page**

05

Outlook and Recommendations

In the face of severe climate conditions, nearly 150 countries and regions worldwide, along with nearly a thousand major corporations and financial institutions, have committed to carbon neutrality, supporting the Paris Agreement temperature goal. In recent years, global consensus on climate action has strengthened, with increasing emphasis on Scope 3 and supply chain emissions in international disclosure requirements, alongside a rise in carbon-related trade policies. Meanwhile, China is rapidly expanding its renewable energy infrastructure, implementing its "1+N" policy framework for carbon peaking and carbon neutrality, and developing enterprise-level carbon disclosure standards. China is also refining carbon footprint accounting methods and databases to align with international standards and to address "green trade barriers" in global markets.

As supply chain emissions constitute a significant portion of the carbon footprint for many leading companies and major institutions, supply chain decarbonization is becoming a focal point across sectors. Best practices in supply chain management within China demonstrate that leveraging the influence of leading companies can drive core supply chain players toward a zero-carbon commitment, encouraging broader participation from SMEs in global climate initiatives. This could also

positively impact the low-carbon transition of developing and emerging market countries that form part of global supply chains.

To guide and motivate companies to fulfill their climate targets, IPE's seventh annual Corporate Climate Action Transparency Index (CATI) evaluation reveals that both Chinese and international companies are accelerating their climate action; climate information disclosure is advancing, with nearly a hundred leading companies now using innovative, data-driven solutions to manage supply chain emissions efficiently, supporting substantive emissions reductions across their supply chains.

Nevertheless, there remains a group of companies with high energy consumption in their supply chains and a significant proportion of Scope 3 emissions that urgently need to fulfill their commitments to addressing the climate crisis. These companies must drive suppliers to quantify and disclose emissions data and to track GHG reduction progress more effectively to promote a green, low-carbon transformation in their supply chains. We hope to see more companies embark on zero-carbon supply chain initiatives, empowering low-carbon transformations within supply chains, helping China achieve its "dual carbon" target, advancing the global Race to Zero, and providing consumers with more green, low-carbon products.

To this end, we call for coordinated efforts from multi-stakeholders:

Building on Disclosure

Promote the public disclosure of corporate greenhouse gas information. Motivate companies to strengthen their carbon emissions calculations and disclosures, set climate science-based carbon targets, and promote climate information transparency across their own operations, affiliates, suppliers, factories, and products. Place progress on full value chain emissions reductions and carbon neutrality under public scrutiny, driving more substantial low-carbon transformation in supply chains, preventing greenwashing, and truly motivating all stakeholders to implement emissions reduction actions.

Data-Driven Assessment

Promote scientific evaluation based on publicly available enterprise information. Develop and establish evaluation mechanisms for corporate low-carbon transformation or emissions reduction performance based on data and information disclosure. This should include indicators such as supply chain climate information transparency and product carbon footprint, guiding companies in low-carbon transformation, and promoting the upgrade and transformation of industry and supply chains to enhance their green and low-carbon competitiveness.

Driving Supply Chain Leadership

Encourage companies with a high proportion of Scope 3 emissions to strengthen supply chain management. Encourage leading companies, industry organizations, and key institutions with supply chain influence and climate ambition to drive core suppliers to join the global Race to Zero and bring more small and medium-sized enterprises into the global climate process. Focus on the key segments of Scope 3 emissions, including purchased goods and services, and gradually advance Scope 3 and product carbon footprint calculations based on actual supplier data, while promoting research into decarbonization pathways and technologies within the supply chain.

Empowering through Digital Solutions

Promote corporate digital transformation to empower supply chain emissions reductions. Encourage companies, industry organizations, and third-party institutions to develop and continuously optimize digital tools for supply chain management, carbon accounting, and information disclosure. These tools will help companies efficiently and cost-effectively collect actual supply chain data, empower suppliers to calculate carbon emissions, set reduction targets, and improve the level of information disclosure regarding supply chain and product carbon footprints. This will facilitate data flow and sharing between upstream and downstream companies, while assisting stakeholders in monitoring and overseeing progress.

We especially recommend that **leading companies, industry organizations, and large institutions** start from the following actions to effectively promote the construction of a zero-carbon supply chain and provide zero-carbon products and services to society:

- Fully recognize the importance of carbon emission reduction in the supply chain and effectively integrate it into corporate governance and supplier management mechanisms;

- Calculate and disclose corporate carbon data; for core segments of Scope 3 purchased goods and services, gradually base calculations on suppliers' measured data; conduct calculations and disclosures of product carbon footprints;

- Benchmark against global temperature targets and Nationally Determined Contributions, set science-based corporate carbon neutrality targets, and publicly disclose annual progress;

- Integrate supplier climate performance into procurement considerations, encouraging suppliers to perform carbon accounting, set scientific emissions reduction targets, and disclose progress;

- Promote research on industry decarbonization pathways and technologies to empower suppliers to implement effective carbon reduction measures;

- Support the exploration of nature-based solutions for supply chain emissions reduction, integrating biodiversity conservation with climate action.

We also recommend that financial institutions take the following actions to support businesses toward zero-carbon supply chains:

- Set science-based carbon neutrality targets for external investments, calculating and disclosing annual progress;

- Improve the requirements for climate information disclosure of financing enterprises, and guide enterprises to focus on the construction of zero-carbon supply chains;

- Support the development and application of key technologies for supply chain carbon neutrality;

- Provide financial support for large-scale, long-term loan projects needed for the transition to zero-carbon supply chains.

Finally, we recommend that foundations, research institutions, and environmental organizations to take the following actions to create a favorable external environment for zero-carbon supply chain development:

- Focus on the construction of zero-carbon supply chains and promote the formulation of policies, regulations, and standards conducive to accelerating supply chain decarbonization;

- Build zero-carbon supply chain data infrastructure, and develop information management platforms and digital solutions;

- Assist in improving corporate GHG emissions accounting and disclosure standards, promoting standardized disclosure by companies;

- Support the development of product carbon footprint standards to promote disclosure and global mutual recognition.

- Evaluate supply chain climate action performance based on data, creating accountability and incentive mechanisms;

- Identify, disseminate, and promote best practices in zero-carbon supply chain construction by businesses, governments, and social organizations.

Appendix I — 2024 Supply Chain CATI Scores

Company	Score	Company	Score	Company	Score	Company	Score	Company	Score
Adidas	88	Nestlé	56.9	HanesBrands	46.2	Moncler	42.2	Fonterra	39
Foxconn	85	Canon	56	Oji Paper	46.2	Bayer	42.2	Nokia	38.9
Puma	84.6	Hyundai	55.9	ZTE	46	BIMBO	42	Merck & Co.	38.7
LUXSHARE-ICT	84.5	Siemens	54.9	Stellantis	46	Natura & Co	42	Seiko Epson	38.6
Apple	83.6	Renault	53.9	BASF	45.8	BT	41.7	DuPont	38.6
Cisco	82.2	Kontoor	53.8	Fujitsu	45.7	PVH	41.6	TLC	38.6
Nike	81.6	Nissan	52.9	Heineken	45.5	McCormick	41.5	Mammut	38.5
Dell	79	HP	52.2	Burberry	45.2	Kosé	41.5	Kagome	38.4
Inditex	78.8	ASUS	52	HUGO BOSS	45.2	fenix outdoor	41.4	Amazon	38.4
Levi Strauss & Co.	77.9	Ford	51.7	Colgate-Palmolive	45.2	Toshiba	41.3	Unicharm	38.4
M&S	73.6	Samsung	51.5	Lululemon	45	Kraft Heinz	41.1	Henkel	38
Microsoft	73.6	JINKOSOLAR	50	YILI	45	Xiaomi	41	Magna	37.9
Mercedes-Benz	73.1	Coca Cola	49.5	Merck Group	44.9	SKF	41	Guess	37.8
Primark	71.6	Volkswagen Group	49.5	Meiji	44.8	JA SOLAR	40.9	Jaguar Land Rover	37.8
New Balance	71.6	Bosch	49.5	IKEA	44.7	Huawei	40.8	Next	37.6
Target	71.4	Toyota Motor	49.4	MANGO	44.6	Sharp	40.7	Armani	37.6
Danone	66.6	Teva Pharmaceutical	49.2	SUNGROW POWER SUPPLY	44.6	L'Occitane	40.7	Walmart	37.6
AVARY HOLDING	66.5	ZF Friedrichshafen	49.2	RICOH	44.5	MITSUBISHI MOTORS	40.6	LI NING	37.6
Volvo Car	65.2	Uniqlo	49	ABOUT YOU	44.2	Hankook Tire	40.6	SINYI	37.5
Kao	64.1	Royal Philips	49	Mazda	44.2	Lojas Renner	40.3	KOHLER	37.5
LONGI	63.8	SHISEIDO	48.9	Plastic Omnium	44.1	Stora Enso	40.3	TOTO	37.4
BMW	62.9	Prada	48.4	Acer	43.9	Kimberly-Clark	40.3	UPM	37.3
Tesco	62	Google	48.3	Seagate	43.8	Carrefour	40.2	Fruit of the Loom	37.2
GEELY AUTO	61.9	Deutsche Telekom	48.3	Mars	43.7	C&A	40	G-Star RAW	37.2
GAP	61.6	Ajinomoto	48.2	HTC	43.5	AEO	39.9	AkzoNobel	37
Intel	61.5	Ralph Lauren	47.8	Logitech	43.5	Novartis	39.9	Electrolux	37
Decathlon	61.2	Mondelēz International	47.6	CHANEL	43.4	APP	39.8	Aisin	37
Schaeffler	61.2	Arçelik	47.5	REI	43.3	AstraZeneca	39.7	Church & Dwight	36.8
VF	60.4	ASICS	47.2	Lego	43.2	Suntory	39.6	TRINA SOLAR	36.8
Lindex	60.3	Unilever	47	Takeda	43.2	MICHELIN	39.5	KFC	36.6
ANTA	60.2	TONGWEI	47	Sainsbury's	43.2	BOE	39.5	Sony	36.5
Panasonic	60	PepsiCo	46.6	AMOREPACIFIC CORPORATION	43.1	SWIRE PROPERTIES	39.4	Burger King	36.5
KIA	59.7	The Very Group	46.6	Tapestry	43	Dow	39.4	Arla	36.5
LENOVO GROUP	59.6	P&G	46.4	KERSEN	43	AVON	39.4	Bunge	36.4
Polestar	59.5	L'Oréal	46.4	Asahi	43	Rivian	39.3	Johnson & Johnson	36.4
H&M	59	Reckitt Benckiser	46.4	Vodafone	42.9	Subaru	39.3	Continental	36.4
GM	58.8	Honda Motor	46.4	FORVIA	42.8	PROYA	39.2	General Mills	36.3
Bestseller	57.8	GSK	46.3	Hyundai Mobis	42.6	Singtel	39.1	Pfizer	36.3
HANG LUNG PROPERTIES	56.9	LVMH	46.2	Hewlett Packard Enterprise	42.3	Carlsberg	39	Keurig Dr Pepper	36.3

Company	Score	Company	Score	Company	Score	Company	Score	Company	Score
Denso	36.3	Solvay	33.7	asos	29.8	Woolworths	26.3	HAIER	23.2
IBM	36.2	TZE	33.7	BLUE MOON GROUP	29.8	XPENG	26.3	AMD	23.1
Sanofi	36.2	Bentley	33.3	GAC GROUP	29.8	AEON	26.1	3M	23
Ericsson	36.1	FUYAO GLASS	33.3	CJ	29.7	kathmandu	26.1	RONBAY TECHNOLOGY	23
YanFeng	36.1	The Children's Place	33.2	TCL TECH.	29.7	RISEN ENERGY	26.1	CH MODERN D	23
Pirelli	36.1	CATL	33	TCL	29.6	New Hope Dairy	26	LINGYI iTECH	23
XTC	36.1	Hershey	32.8	GOERTEK	29.5	desigual	25.8	NIVEA	22.9
Clorox	35.9	Olympus	32.7	VAUDE	29.4	SHUANGHUI	25.8	Huntsman	22.9
GILEAD	35.8	KUMHO TIRE	32.7	7-Eleven	29.2	SK HYNIX	25.5	NONGFU SPRING	22.5
Crocs	35.8	CANADIANSOLAR	32.7	SHANGHAI JAHWA	29	Roche	25.5	YAHUA GROUP	22.5
Tesla	35.6	PORSCHE	32.5	Under Armour	28.8	Viessmann	25.4	Delta Galil	22.4
DSM	35.6	Deckers Brands	32.4	SERES	28.8	Peak Performance	25.2	Barry Callebaut	22.4
Cargill	35.5	Disney	32.3	GANFENGLITHIUM	28.7	XINYI SOLAR	25.2	Catalent	22.3
Arkema	35.5	Tendam	32.3	carter's	28.6	AbbVie	25.1	Benetton	22.3
MICHAEL KORS	35.4	Conagra	32.3	BOSIDENG	28.6	China Lesso	25.1	Autoneum	22.3
Lion	35.4	ABBOTT	32.3	CBC	28.5	Dystar	25.1	Chery	22.3
SUZUKI	35.4	camper	32.2	Uni-president	28.3	HENGAN INT''L	25	Yuen Foong Yu	22.3
Bristol Myers Squibb	35.3	Tata Motors	32.2	LG Electronics	28.3	TSINGTAO	25	DFI	22.1
JD Sports Fashion	35.3	Goodyear	32.1	Abercrombie & Fitch	28.2	Essity	24.8	LEAPMOTOR	22.1
Esprit	35.3	Salomon	32	Long Chen	28.1	HAI TIAN	24.7	SHEIN	22
Zebra	35.2	Kellanova	32	ABInBev	28	FILA	24.6	MUJI	22
UCB	35.1	Adient	31.9	MENGNIU DAIRY	28	Lear	24.6	SINO-OCEAN GP	21.8
Ferragamo	35.1	Midea Group	31.9	Eastman	27.9	SUNWODA	24.5	CapitaLand	21.8
Clariant	35.1	NEXEN TIRE	31.9	BROOKS	27.8	Lilly	24.3	Morrisons	21.7
Toyoda Gosei	35.1	SHUI ON LAND	31.8	River Island	27.8	Hasbro	24.3	MEC	21.6
borgwarner	35	Facebook	31.7	VELUX	27.8	Vanke	24.3	Costa	21.2
DMEGC	34.9	Zalando	31.7	Li Auto	27.8	SUN PAPER	24.3	Victoria's Secret	21.1
Starbucks	34.8	McDonald's	31.6	Bridgestone	27.8	LG Chem	24.2	TAI HING GROUP	21.1
novo nordisk	34.7	ALDI	31.4	OPPO	27.5	GWM	24.1	Feihe Milk	21
Yihai Kerry Arawana	34.5	Honor	31.4	CHINA RES BEER	27.5	Bang & Olufsen	24	CMSK	21
Tyson Foods	34.5	Thai Union	30.8	Columbia Sportswear	27.4	CNGR	24	Vip.com	20.8
SMCP	34.5	Alibaba	30.7	PPG	27.4	COSMX	24	Suitsupply	20.8
Whirlpool	34.4	CHINA MOBILE	30.6	Kohl's	27.3	GEM	24	SKYWORTH	20.6
Santen	34.3	Western Digital	30.5	EVE	27.3	Home Depot	23.8	KWEICHOW MOUTAI	20.5
OMRON	34.3	Swire Foods	30.5	HUAYOU COBALT	27.3	J.C. Penney	23.6	YUEXIU PROPERTY	20.4
SHANYING INTERNATIONAL	34.2	NIO	30.3	Sartorius	26.8	GCL TECH	23.6	UNITED LAB	20.1
Tokai Rika	33.8	Tiffany	30.2	Allbirds	26.8	GXHT	23.5	Oatly	20
na-kd	33.7	Vitasoy	30.2	M&G	26.8	Biogen	23.3	Orion	20
Razer	33.7	CHANGAN AUTOMOBILE	30.1	WULING MOTORS	26.5	ZEEKR	23.3	EASPRING	20

Appendix I — 2024 Supply Chain CATI Scores

Company	Score	Company	Score	Company	Score	Company	Score	Company	Score
Lonza	19.9	MONALISA	17.9	Arc'teryx	15	NVC	13.1	Meituan	10.9
LocknLock	19.7	JOLYWOOD	17.8	KING''S LUCK	15	CHINA TELECOM	12.9	WEICHUAN	10.9
GH	19.7	HXDQ	17.7	ANTAI GROUP	15	MINMETALS LAND	12.9	HAIDILAO	10.9
GIANT BICYCLES	19.6	JD.com	17.6	Costco	14.9	CHINA JINMAO	12.9	JOTUN	10.8
Metro	19.6	YOUNGOR	17.5	CLENERGY	14.9	CLENERGY	12.8	LUYUAN	10.7
C.BANNER	19.5	GREENTOWN CHINA	17.4	XTEP INT''L	14.9	MING FAI INT''L	12.7	JIUJIUWANG	10.6
INSPUR	19.5	Macy's	17.1	SHOUCHENG	14.9	Liby	12.7	K-BOXING	10.6
new look	19.3	Ella's Kitchen	17	Orion	14.8	CENTRAL CHINA	12.6	CSG	10.6
SHANGHAI XINMEI	19.3	Shede Spirits	17	Etam	14.8	361 DEGREES	12.6	Jollibee Foods	10.5
Wilmar	19	DONGFENG	16.9	Baxter	14.7	GREE	12.6	JOYOUNG	10.5
SANYUAN	19	Lee & Man Paper	16.9	GROHE	14.7	XIANHE	12.6	Hello Bike	10.4
Valentino	18.8	Archroma	16.7	A.O.Smith	14.6	NEW HOPE	12.5	DFAC	10.4
BANDAI	18.6	CR Land	16.6	Nippon Paint	14.5	DAPHNE INT''L	12.4	CHINA DONGXIANG	10.3
Seasalt	18.6	YANGHE	16.5	BRIGHT DAIRY	14.5	CENTRAL NEW EGY	12.4	SPEG	10.3
CSPC PHARMA	18.6	GUJING DISTILLERY	16.5	Changhong	14.4	GRANDJOY	12.3	CHINAHUAJUNGP	10.3
Fortune Brands	18.6	Hitachi Astemo	16.4	MARUBI	14.4	HOYUAN	12.3	R&F PROPERTIES	10.1
CHINA OVERSEAS	18.5	BAIC Group	16.4	Nongshim	14.3	Papa John's	12.1	CST Tires	10.1
POLY PROPERTY	18.5	BYD	16.3	SHENZHEN INVEST	14.2	Ginlong	12	Solargiga ENERGY	10.1
BAIC MOTOR	18.5	Pentland	16.2	MERIDA	14.1	YYFP	12	TRAD CHI MED	10
SAIC MOTOR	18.5	LANDSEA MGMT	16.1	PRE	14.1	CHENMING PAPER	12	CHICMAX	10
ZHOU HEI YA	18.4	BAIYUNSHAN PH	16	SHANGHAI PHARMA	14.1	DEXIN CHINA	11.9	SUNNER	10
patagonia	18.4	LENS	16	Hormel	14.1	Centrient	11.9	SCSF	10
XINYI GLASS	18.4	TRANSSION	16	MINTH GROUP	14.1	RS MACALLINE	11.9	ERDOS	10
HUASUN	18.4	WEICHAI POWER	15.8	SERAPHIM	14	AUX	11.9	YUZHOU GROUP	9.9
Sherwin-Williams	18.3	watsons	15.7	POP MART	13.9	De'Longhi	11.8	GIORDANO INT''L	9.9
Znshine Solar	18.3	SKSHU	15.7	OPPLE	13.9	BY-HEALTH	11.6	DAWNRAYS PHARMA	9.7
VINDA INT''L	18.3	GoodWe	15.6	CIFI HOLD GP	13.7	Mulberry	11.6	UNI-BIO GROUP	9.7
GLP	18.3	LACOSTE	15.5	HIKVISION	13.6	MIDEA REAL EST	11.6	MNSO	9.7
Mizuno	18.2	Domino's	15.5	CR SANJIU	13.5	XIABUXIABU	11.6	JIASHILI GP	9.6
HISENSE H.A.	18.2	BOTANEE GROUP	15.5	wondersun	13.5	SUPOR	11.5	HONGDOU INDUSTRIAL	9.5
BLOOMAGE BIOTECH	18.2	LUZHOU LAO JIAO	15.5	WULIANGYE	13.5	Hylo	11.4	AGILE GROUP	9.3
Samsonite	18.1	WINNER	15.5	SHANSHAN	13.4	Beyondsun	11.4	QUZHOU WUZHOU SPECIAL PAPER	9.2
TINGYI	18.1	NTES-S	15.4	Gymshark	13.4	TASLY	11.3	HOYMILES	9.2
WUXI APPTEC	18.1	BENTELER Group	15.4	Yingli Solar	13.4	DAQO	11.3	LVGEM CHINA	9.1
ND PAPER	18	Astronergy	15.4	FUJIYA	13.3	XINTE ENERGY	11.2	RSUN PPT	9.1
YANJING BREWERY	18	WANT WANT CHINA	15.2	LONGFOR GROUP	13.2	Sephora	11	TRIP.COM-S	9.1
PUTAILAI	18	SERVIER	15.2	YADEA	13.2	MAXWELL	11	FIRST	9.1
VTECH HOLDINGS	17.9	BCDC	15	CHINA MEHECO	13.2	ENERGY TECHNOLOGY	11	OCT HOLDING	9
OPPEIN	17.9	DALI	15	CHINA AOYUAN	13.1	YURUN FOOD	10.9	Infinitus	9

Company	Score	Company	Score	Company	Score	Company	Score	Company	Score
HUNAN CHANGYUAN LICO	9	NSIG	6.7	Paulmann	4.6	Sunport	2.6	VANTONE REAL ESTATE	0
ZHONGLIANG HLDG	8.9	Boehringer-Ingelheim	6.6	TIANNENG BATTERY GROUP	4.5	TOPRAYSOLAR	2.6	Panpan Foods	0
FAW Group	8.9	PIEN TZE HUANG	6.6	KOUZIJIAO	4.5	GREAT POWER	2.5	TAIJI GROUP	0
boohoo	8.8	XINHUA PHARM	6.5	Glorious Sun Group	4.4	DOWSTONE	2.5	Ann Taylor	0
Canada Goose	8.8	HLA	6.5	DEYE	4.4	REGAL PARTNERS	2.4	IFLYTEK	0
SUNING COMMERCE	8.7	GLORY HEALTH	6.5	JNBY	4.3	DJI	2.4	Royalstar	0
SLH	8.7	BESTORE	6.5	Nature Home	4	Wahaha	2.2	BEAR	0
Skechers	8.6	CP Group	6.5	NEBULA ELECTRONICS	4	DIDI BIKE	2.2	Macro	0
GHMC	8.6	JML	6.4	THREE SQUIRRELS	3.8	TAILG	2	Luckin Coffee	0
MILLION CITIES	8.3	PAK	6.4	Quiksilver	3.8	GOLD MANTIS	2	FJMOTOR	0
Dachan	8.3	Aimer	6.2	Meituan Bike	3.8	EASYHOME	2	ZC Rubber	0
ANJOY	8.2	WENS	6.2	CITIC Dicastal	3.8	DARE POWER DEKOR	2	AUPU	0
HT-SAAE	8.2	COSMO LADY	6.2	XTEMD	3.8	YIBIN PAPER	2	Jimei	0
CHINA LUDAO	8.1	CR Vanguard	6.1	YIBIN PAPER	3.8	TOREAD	2	JIUSHENG	0
KONKA GROUP	8.1	LAFANG	6.1	APSYSTEMS	3.8	AVATR	2	Syngenta	0
HUAZHONG IN-V	8.1	CNSIC	6	ANGEL	3.6	ANGEL	2	SINENE	0
SEMIR	8	CABBEEN	6	Clarks	3.6	HEPALINK	1.8	Haitai Solar	0
Perfetti	8	HENGLIN	5.8	SFY	3.6	Mothercare	1.8	SOFAR	0
MERCURY	8	QINQIN FOODS	5.6	Nu Skin	3.6	PERFECT	1.5	SUNTECH	0
CECEP Solar	8	ELLASSAY	5.6	SUNRAIN	3.6	Peacebird	1.4	RUNERGY	0
CHINA UNICOM	7.9	HUISEN SHARES	5.6	YOTRIO	3.5	LMZ	1.3	Dah Solar	0
vivo	7.9	JUEWEI FOOD	5.5	JINKO POWER	3.4	ROBOROCK	1	LDK	0
Pacific Coffee	7.9	HD MEDICINE	5.5	JIAWEI ENERGY	3.4	MFSP	1	SUNREV	0
YUNNAN BAIYAO	7.9	GOLDEN THROAT	5.4	Dyson	3.3	GAEA GEM	1	Zhongqing Solar	0
ecco	7.8	AIMA	5.3	hellyhansen	3.2	BEINGMATE	1	Hengyuan Intelligent	0
JMC	7.8	SC Johnson	5.3	NAYUKI	3.1	TUOPU GROUP	0.6	ChinaLand	0
TBEA	7.8	JONJEE HI-TECH	5.2	Huiyuan Juice	3	XINRI E-VEHICLE	0.6	JINERGY	0
SUNKWAN PPT	7.7	DASOLAR	5.2	HY PROPERTY	3	TENTIMES	0	WINHITECH	0
MATTEL	7.6	Galanz	5.1	Charles & Keith	3	METERSBONWE	0	ZHONGLI SCI-TECH	0
COFCO TUNHE	7.4	WXTJ	5	COOPERTIRES	3	DAFA PPT	0	TALESUN	0
TRT	7.4	AOKANG	5	Junlebao	3	Kingdom Group	0	AKCOME	0
Yingfa Group	7.4	MARY KAY	4.9	PEARL RIVER	3	DaHan	0	JSQJ	0
ECOVACS	7.3	CARPENTER TAN	4.8	Hisense	2.9	ZhongFang	0	JINCHEN	0
AUPUP	7.2	C&S	4.8	CHIXIA DEVELOPMENT	2.8	ROFFAR	0	HAOYUE	0
ZHEJIANG SHIBAO	7.1	HOSHINE SILICON INDUSTRY	4.8	BAOXINIAO	2.8	yahe	0	KDL	0
HMD	7	GITI TIRE	4.7	Nice	2.8	TIANI Group	0	KANHOO	0
TIANDA PHARMA	6.9	JAC	4.7	SEPTWOLVES	2.7	EAST SEA	0	Guangzhou Battsys Co.ltd	0
EGING PV	6.8	Hush Puppies	4.6	Greenland Holdings	2.6	LINGPAI GROUP	0	XTIC	0
Lafuma	6.7	iRobot	4.6	ASD	2.6	SCEGC REAL ESTATE GROUP	0	YOUNGY	0

Appendix II

Terms and Definitions

Supply Chain:

The chain or network of production and distribution processes through which products are ultimately provided to end-users, and that includes multiple tiers of suppliers.

Supplier:

An entity that provides products and services to a brand, including but not necessarily limited to a brand's subsidiary factories and other affiliates, production subcontractors, raw materials providers, service providers for production processes (e.g. centralized wastewater treatment facilities, solid waste transportation and disposal entities) and logistics providers.

Direct Supplier:

A supplier that has directly signed a procurement contract with a brand.

Indirect Supplier:

A supplier that has not directly signed a procurement contract with a company, but is a part of the supply chain for the company's main products or services.

Affiliated Company/Affiliates:

Based on operational boundary setting methodology, affiliated companies or affiliates refer to companies that are owned or controlled by the company under evaluation, including its own factories, stores and warehouses, as well as its subsidiaries and branches.

Blue EcoChain:

Powered by IPE's Blue Map Database and AI technology, Blue EcoChain provides supply chain oversight for environmental and carbon risks. In terms of supply chain carbon management, it provides companies instantaneous updates via email or mobile app when suppliers disclose their greenhouse gas emission data, reduction targets and progress, and supplier carbon data analysis reports. It also empowers suppliers to measure and publicly disclose their greenhouse gas emission data and conduct carbon management over its own supply chains.

Greenhouse Gas (GHG):

GHGs are the seven gases listed in the Kyoto Protocol: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF_6); and nitrogen trifluoride (NF_3).

Carbon Neutrality/Net Zero:

In CATI evaluation system, carbon neutrality is a state of net-zero carbon dioxide/greenhouse gases emissions. This can be achieved when anthropogenic emissions of carbon dioxide/greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.

Scope 1:

Emissions from operations that are owned or controlled by the reporting company.

Scope 2:

Emissions from the generation of purchased or acquired electricity, steam, heating or cooling consumed by the reporting company.

Scope 3:

All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.

Value Chain:

In the CATI evaluation system, "value chain" refers to all of the upstream and downstream activities associated with the operations of the reporting company, including the use of sold products by consumers and the end-of-life treatment of sold products after consumer use.

Carbon Intensity:

Ratios that express GHG impact per unit of physical activity or unit of economic value (e.g. tonnes of CO_2 emissions per unit of electricity generated).

Product Carbon Footprint:

Sum of GHG emissions and GHG removals in a product system, expressed as carbon dioxide equivalents and based on a life cycle assessment.

Life Cycle:

Consecutive and interlinked stages related to a product, beginning from raw material acquisition or generation from natural resources to end-of-life treatment.

IPE's Carbon Data Disclosure Platform:

A platform developed by IPE where suppliers can disclose their annual GHG data, energy consumption, climate targets and carbon asset data.

Reference:

IPCC, Global Warming of 1.5° C, Annex I: Glossary

IPCC WGIII, Climate Change 2022 Mitigation of Climate Change

ISO, ISO 14067: 2018

WBCSD & WRI, The GHG Protocol Corporate: A Corporate Accounting and Reporting Standard

WBCSD & WRI, The GHG Protocol Corporate: Corporate Value Chain (Scope 3) Accounting and Reporting Standard

WBCSD & WRI, The GHG Protocol Corporate: Product Life Cycle Accounting and Reporting Standard

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, Standardization Administration, Supply Chain Risk Management Guideline

Appendix III	**Compilation of Policies Related to Product Carbon Footprint after the "Dual Carbon" Target**

Policy/Document Name	Publication Date	Issuing Department	Relevant Content
Action Plan for Carbon Dioxide Peaking Before 2030	October 2021	State Council	Establish a legal framework conducive to green, low-carbon development by promoting the formulation and revision of laws on energy, energy conservation, electricity, coal, renewable energy, circular economy, and cleaner production. Accelerate updates to energy efficiency standards, revising mandatory national standards for energy consumption limits, product and equipment efficiency, and construction standards to raise energy-saving and carbon reduction requirements. Strengthen the renewable energy standards system and expedite the development and revision of standards across related sectors. Establish and improve standards for hydrogen production, storage, transmission, and utilization, as well as a green, low-carbon industrial standards system. **Develop standards for carbon emissions monitoring, reporting, and verification for key enterprises, and explore the establishment of full lifecycle carbon footprint standards for key products. Actively participate in the development and revision of international standards on energy efficiency and low-carbon practices, strengthening coordination with international standards.**
Implementation Plan for Accelerating the Establishment of a Unified and Standardized Statistical Accounting System for Carbon Emissions	April 2022	National Development and Reform Commission (NDRC), National Bureau of Statistics, and Ministry of Ecology and Environment (MEE)	Conduct methodology research. Encourage universities, research institutions, and enterprises to advance studies on carbon emissions methodologies, with a focus on extended calculations such as carbon emissions from consumption, cumulative per capita emissions, embedded carbon, and product carbon footprints in key industries. Promote research on accounting methods for non-CO_2 GHG emissions, carbon capture, storage and utilization, and carbon sinks to further strengthen methodological foundations. **Enhance international exchanges in carbon emissions accounting and actively participate in the development of global carbon emissions standards.**
2024 Report on the Work of the Government	March 2024	State Council	Promote the growth of a green, low-carbon economy. Drive the green transformation of industry, energy, transportation, and urban-rural development. Implement conservation strategies, prioritize energy and water-saving upgrades in key sectors, and **strengthen fiscal, financial, and market mechanisms to support green development. Foster a circular economy, advance low-carbon technologies, and establish a green supply chain**. Develop pilot zones for green, low-carbon development in building a "Beautiful China." Steadily advance carbon peaking and neutrality. Implement the "Ten Actions for Carbon Peaking", **improve capacity in carbon accounting and reporting, establish carbon footprint management system, and expand national carbon market coverage**. Drive the energy transition, limit fossil energy use, and build a new energy system. Strengthen large wind and solar projects, promote distributed energy, advance new storage solutions, and support green power usage and international recognition while ensuring energy security with coal as backup.

Policy/Document Name	Publication Date	Issuing Department	Relevant Content
Implementation Plan for Establishing a Carbon Footprint Management System	June 2024	MEE, NDRC, and 13 other ministries	**By 2027, a foundational carbon footprint management system will be established**. National standards for product carbon footprint accounting will align with international practices, with approx. 100 key product carbon footprint accounting standards developed. An initial product carbon footprint factor database, labeling certification, and tiered management system will be in place, with significant progress made toward international alignment of key product carbon footprint standards. **By 2030, this system will be fully refined and widely applicable.** Around 200 product-specific carbon footprint accounting standards will be implemented, supported by a comprehensive, high-quality, internationally recognized carbon footprint factor database. A complete labeling certification and tiered management system will also be established, with an optimized application environment for carbon footprints. Product carbon footprint accounting rules, factor databases, and certification systems will gradually align with international standards, enabling substantial participation in global rule-making for product carbon footprints. **Encourage the integration of product carbon footprints into green, low-carbon supply chain and product evaluation criteria**, fully leveraging carbon footprints to promote the adoption of low-carbon technologies, implementation of low-carbon upgrades, optimization of energy resources, and fulfillment of social responsibility across the value chain.
Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emission	July 2024	General Office of the State Council	**By 2025, the carbon emissions accounting system will be further refined, with industry-specific standards for corporate carbon accounting and product carbon footprint standards established and implemented. A national greenhouse gas emission factor database will be largely completed and regularly updated**, with enhanced measurement, statistical, and monitoring capabilities, laying the groundwork for implementing dual carbon control nationwide during the 15th Five-Year Plan period. **During the 15th Five-Year Plan, a dual carbon control system focusing on intensity control, supplemented by total emissions control, will be implemented. A comprehensive evaluation system for carbon peaking and neutrality will be established**, strengthening carbon accounting capabilities in key sectors and refining management systems for major energy consumers and carbon-emitting entities. Carbon assessments for fixed asset investment projects will be conducted, while a product carbon footprint management and labeling system, tailored to China's context, will be developed to ensure the carbon peaking targets are achieved on schedule.

Policy/Document Name	Publication Date	Issuing Department	Relevant Content
National Standard GB/T 24067 Greenhouse Gases — Product Carbon Footprint — Quantification Requirements and Guidelines	September 2024	State Administration for Market Regulation, and MEE	The product carbon footprint accounting standard primarily draws from ISO 14067, the international standard by the International Organization for Standardization (ISO), and aligns with widely used lifecycle assessment standards (GB/T 24040 and GB/T 24044). **It defines the scope, principles, and quantification methods for assessing product carbon footprints**, establishing a foundation for international data exchange and mutual recognition of carbon footprint accounting methods. Compared to the international standard, this standard adds a reference framework for developing specific product carbon footprint standards, suggestions for geographic data boundaries, and other enhanced, practical elements. In addition, it includes guidelines for verification review, product carbon footprint declarations, and specific product carbon footprint frameworks, providing comprehensive guidance and support for its effective implementation.
Notice on Conducting Pilot Work for Product Carbon Footprint Certification	September 2024	State Administration for Market Regulation, MEE, NDRC, and Ministry of Industry and Information Technology (MIIT)	By conducting pilot programs, encourage broad participation from government, industry, and enterprises at all levels in product carbon footprint labeling and certification. These pilots aim to build a unified product carbon footprint labeling system based on practical experience, ensuring data security while generating effective, replicable, and scalable models. This effort supports robust quality certification, strengthens industrial and supply chains, and advances carbon peaking and neutrality targets, fostering a comprehensive green transformation of the economy and society. **Priority is given to products with high market demand, significant export pressure, substantial emissions reduction potential, complete data availability, and strong supply chain impact, including lithium batteries, solar products, steel, textiles, electronics, tires, cement, electrolytic aluminum, urea, phosphate fertilizers, and wood products.**
Work Plan for Improving the Carbon Emission Statistics and Accounting System	October 2024	NDRC, MEE, and six other ministries	**Establish a robust carbon footprint management system: Accelerate the development and release of carbon footprint accounting standards for key products**, create guidelines for preparing these standards, and gradually expand coverage. Define rules and procedures for adopting industry and group standards, promoting well-developed group standards to industry or national standards. Strengthen the use of green power certificates in carbon footprint accounting for key products. **Build a national greenhouse gas emission factor database:** Develop a plan for constructing the database, organizing its development, and establishing a management system for factor data and regular operation. **Promptly publish emission factors for major energy types and key foundational products, providing essential baseline data for local and corporate carbon accounting efforts.**

About IPE

The Institute of Public & Environmental Affairs (IPE) is a non-profit environmental organization based in Beijing, China. Since its establishment in 2006, IPE has developed and operated the Blue Map Database (wwwen.ipe.org.cn), and launched the Blue Map app in 2014, promoting environmental information disclosure, facilitating green supply chain and green finance, empowering the green transition and growth of enterprises, and boosting multi-stakeholder participation in environmental governance.

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Note

This round of evaluation was performed from October 1, 2023, to September 30, 2024;

The information used for evaluation was obtained from official websites of corporations; annual reports, corporate social responsibility (CSR) reports, environmental, social, and governance (ESG) reports, and other regular reports; information released in public channels, such as on official websites; data released by credible sources collected by the Blue Map database; and responses to CDP climate change questionnaires publicly disclosed by companies.

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