Shanghai Advanced Institute of Finance

Embarking on the Path of Sustainable Development

The 2025 Shanghai ESG Report

SUSTAINABILITY
GLOBAL LEADERS CONFERENCE

October 2025

Embarking on the Path of Sustainable Development

The 2025 Shanghai ESG Report

This is the translation of the Chinese version of the same report released on October 16 at the 2025 Sustainability Global Leaders Conference

Lead Institution

Shanghai Advanced Institute of Finance at Shanghai Jiao Tong University

Participating Institutions

Shanghai Exchange Group Co., Ltd (Ch.2, Ch.4)

Orient Securities Co., Ltd (Ch.2, Ch.3)

State Grid Yingda Carbon Asset Management (Shanghai) Co., Ltd. (Ch.2, Ch.5)

Yingtou Information Technology (Shanghai) Co., Ltd. (MioTech) (Ch.2, Ch.5)

Shanghai Pudong Development Bank Co., Ltd. (Ch.3)

Guotai Haitong Securities Co., Ltd. (Ch.3)

China Pacific Insurance (Group) Co., Ltd. (Ch.3)

Fullgoal Fund Management Co., Ltd. (Ch.3)

Harvest Fund Management Co., Ltd. (Ch.3)

Ernst & Young Hua Ming LLP (Ch.5)

China Securities Index Co., Ltd. (Ch.5)

Hiways Law Firm (Ch.5)

Sina Finance ESG Rating Center (Ch.6)

Shanghai Juss Sports Development (Group) Co., Ltd. (Ch.6)

Prestige and Fortune Fintech (Beijing) Co., Ltd. (Ch.7)

Preface

Over the past year, the global sustainable development and Environmental, Social, and Governance (ESG) agenda has continued to evolve amid a complex economic and geopolitical landscape. Uncertainties stemming from geopolitical conflicts, industrial restructuring driven by technological transformation, and structural pressures intensified by climate change and resource constraints have collectively challenged traditional business logic. Against this backdrop, ESG has gradually transitioned from conceptual advocacy to practical implementation, becoming a critical pathway for driving industrial upgrading, optimizing governance structures, and enhancing organizational value and resilience. With the growing demand for transparent, comparable, and verifiable information, ESG is no longer merely a voluntary choice for enterprises but is transforming into an imperative requirement for their future resilience and long-term competitiveness.

As a major economic and financial center in China, Shanghai continues to play a leading and exemplary role in promoting ESG principles and implementing sustainable practices. Across areas such as green finance innovation, corporate sustainability, modern urban governance, and social responsibility initiatives, Shanghai is exploring diverse models and gradually developing replicable experiences in institutional design and cross-sector collaboration mechanisms. These explorations not only highlight Shanghai's pioneering role in China's ESG development but also provide valuable insights for understanding and advancing a path to sustainable development with Chinese characteristics.

Following the inaugural *The Implementation of Sustainable Development—The 2024 Shanghai ESG Development Report*, which systematically presented a panoramic view of Shanghai's ESG ecosystem, this year’s edition of the report adheres to practice-driven and problem-oriented principles and offers a more in-depth and focused introduction to the ESG development practices of various entities in Shanghai. The report not only documents new developments over the past year but also strives to identify future challenges faced by these entities, offer structured and actionable policy recommendations, and provide an analysis of progression path that could be referenced for the sustainable development in Shanghai and across China.

This report continues to center on various types of entities, focusing on three key dimensions. The first one is dynamic tracking; the report systematically presents the latest practice and progress of various entities over the past year. The second dimension is case analysis; the report classifies observations of practices, ranging from individual enterprises to industrial peer groups, distilling replicable experiences and pathways to address critical issues. the third is action focus; the report proposes feasible solutions to core bottlenecks faced by various entities. The concluding chapter integrates diverse approaches to propose cross-entity collaborative solutions and delivers systematic implementation recommendations.

We hope that this report not only clearly presents the description of developmental stages and evolving trends of ESG in Shanghai, but also reveals the interactive mechanisms between institutional innovation and market practices through multi-dimensional case studies. By analyzing the action logic and collaborative needs of various entities, we aim to provide practical solution proposals for policymakers, corporate decision-makers, and investment institutions, while also offering the public a more concrete perspective on understanding the significance of ESG development.

Looking ahead, as both the global community and China continue to explore paths toward green transformation, high-quality growth, and sustainable development, Shanghai will strengthen its role as a “pioneer” and “enabler” within China’s ESG landscape. We firmly believe that by focusing on innovative models and enhancing cross-sector collaboration, Shanghai will not only set a shining example of practical experience and institutional wisdom for China’s ESG development, but will also contribute a more distinct “Shanghai model” and “Shanghai solution” to the global journey of sustainable development.

Executive Summary

As global economic volatility increases and pressures from climate change and ecological degradation intensify, corporate sustainability demands grow increasingly complex. ESG issues continue to gain strategic importance in international policy, industrial practice, and capital markets. Compared to the previous year, Shanghai's ESG development in 2025 is advancing toward a new stage characterized by more systematic institutional support, more standardized actions, more quantifiable performance, and closer collaboration. As China's center for economic development, finance, and innovation, Shanghai is not only advancing its ESG ecosystem through policy guidance, industrial planning, and innovations in financial support mechanism, but also serving as a model across the national and international landscapes.

Building upon the inaugural comprehensive overview of *The Implementation of Sustainable Development—The 2024 Shanghai ESG Report*, which first systematically presented the full scope of Shanghai's ESG ecosystem, this year's report further centers on practical case studies. It focuses on the explorations and experiences of different categories of entities in addressing common challenges. By integrating data with case analyses, this report distills replicable practical models and proposes systematic, cross-entity action recommendations for existing bottlenecks, thereby providing a clear blueprint for future development.

Government and regulatory bodies have played a core role in institution building and governance innovation. Over the past year, national and local authorities have intensively issued policies to promote tiered and categorized information disclosure, green financial reform, and market supervision system enhancements, gradually shaping up a systematic institutional framework. In the process of policy implementation, Shanghai has actively explored alignment with international standards, providing direction and guidance for all entities and laying the groundwork for the standardization and scaling of ESG practices.

Enterprises serve as cornerstones of Shanghai's ESG ecosystem. State-owned enterprises have taken a demonstrative lead in information disclosure and governance, while private and foreign-invested enterprises have engaged in diverse explorations in green product development, supply chain collaboration, and social responsibility practices. However, small and medium-sized enterprises (SMEs) face challenges such as limited awareness and

capabilities, high technical and financial barriers, and difficulties in implementing governance structures. This results in slow progress in realizing and capitalizing on the value of ESG development, creating bottlenecks in expanding ESG practices among these firms. Moving forward, enterprises' advance of ESG practices will move from scattered attempts to systematic integration by optimizing internal governance, implementing phased investments, establishing incentive mechanisms, and leveraging financial, policy, and industry platforms for resource coordination and technology sharing. This approach will foster replicable experiences.

Financial institutions provide capital and intrumental support for Shanghai's ESG development. The green finance product ecosystem continues to expand, with banks, securities firms, and insurers progressively integrating ESG factors into investment decisions and risk management frameworks to secure financing for corporate low-carbon and sustainable development initiatives. However, persistent challenges including data accessibility barriers, inconsistent information quality, product homogeneity, standardization gaps, and insufficient long-term capital incentives continue to constrain sectoral growth. To advance development, financial institutions should enhance product innovation through improved data governance and digital solutions while actively promoting standardized frameworks and policy incentives, ultimately expanding financial service coverage, improving operational efficiency, and accelerating corporate transitions toward low-carbon and sustainable business models.

Shanghai's trading platforms are facilitating ESG development. The Shanghai Stock Exchange has strengthened information disclosure requirements for listed companies, while the carbon emission trading and green electricity trading platforms offer pathways for corporate low-carbon transition. Other trading platforms are also exploring appropriate standards and service tools. However, institutional lags, fragmented standards, data fragmentation, and insufficient participation from small and medium-sized enterprises remain prevalent challenges. In the future, Shanghai can refine disclosure frameworks and establish integrated data platforms to drive financial innovation. By enhancing cross-regional coordination and global connectivity, the city can stimulate market dynamism while advancing its "dual carbon" objectives and fostering sustainable economic development.

Third-party service institutions are progressively becoming the "integrator" within Shanghai's ESG ecosystem. These service providers support corporate practices and financial

collaboration in areas such as carbon assessment, green certification, disclosure consulting, and the development of digital and artificial intelligent tools. However, insufficient data standardization, diverse evaluation standards, methodological differences, and talent shortages limit service depth and consistency. Looking ahead, Shanghai can invigorate the market and better contribute to the achievement of the "dual-carbon" goals and sustainable economic development by refining disclosure standards and establishing a unified data platform, fostering financial instrument innovation, and strengthening cross-regional coordination and international alignment.

Talent cultivation and public participation are emerging as key drivers of Shanghai's continued progress in ESG development. As the demand for specialized professionals in ESG and sustainable development rises rapidly, universities, research institutes, and training platforms in Shanghai are accelerating the establishment of interdisciplinary, practice-oriented training mechanisms—yet a gap between supply and demand persists. Meanwhile, the public is deepening its understanding of and engagement with ESG through channels such as public spaces, sporting events, environmental initiatives, and media outreach, helping to extend ESG discourse from an elite narrative to a broader social consensus. This trend not only raises society's overall awareness of ESG, but also lays the groundwork for long-term alignment between values and actions.

The role of international cooperation and foreign-invested enterprises as exemplars is increasingly prominent within Shanghai's ESG ecosystem. Leveraging their global governance experience and multinational operational advantages, foreign enterprises have created a demonstrative effect in information disclosure, supply chain management, and the fulfillment of social responsibilities, encouraging local companies to benchmark against international practices. Cross-border collaborative projects and the adoption of international standards have spurred innovation in institutional design and practical methodologies, while also providing regulatory frameworks for financial product innovation and cross-border capital flows. Through the interaction between local and foreign enterprises, Shanghai is gradually forming an ESG practice model that combines local characteristics with international comparability, showcasing the "Shanghai experience" on the global stage.

Building on the analysis of current actions and progress pathways across stakeholder groups

in Shanghai, this report advances a set of forward-looking, **systematic recommendations** to guide further development, the core of which is to advance the “Four Dimensions of ESG Transformation”: the **internalization** of ESG into enterprise governance and business activities, the **standardization** of ESG information disclosure, the **systematization** of ESG evaluation frameworks, and the **materialization** of ESG value. These four dimensions form a mutually reinforcing closed-loop system: internalization provides foundational data and governance logic for corporate actions; standardized disclosure transforms this into transparent, comparable information; systematic evaluation generates feedback and improvement directions through quantifiable metrics; and the materialization of value validates the effectiveness of front-end practices through economic, social, and ecological benefits, thereby reinforcing the impetus for internalization.

Regarding the action paths for various entities, enterprises must deeply embed ESG principles into their governance structures, strategic planning, and daily operations to transition from being driven by external pressures to being motivated by internal dynamics. Financial institutions and trading markets must provide capital, tools, and market-based incentives for ESG practices, enabling corporate actions to be linked to economic returns. Third-party institutions enhance the implementability and replicability of corporate ESG initiatives through standardized services, specialized training, and evaluation tools. Education and communication systems must cultivate public awareness and a sense of responsibility through curricula, media, and social activities. Finally, international cooperation can provide Shanghai with benchmarks and references, allowing all entities to more precisely define their roles within the global framework.

Through this systematic action network, Shanghai’s ESG development is poised to achieve deep implementation within various entities and form a closed-loop through cross-stakeholder collaboration. This will foster mutual reinforcement among concepts, practices, data, evaluation, and value creation, thereby constructing a regional practice system that is both demonstrative and replicable. Such a system will not only provide solid support for the city's sustainable development but will also further strengthen Shanghai's discourse power and leadership role in national and global ESG governance.

List of Content

Chapter 1: The Current State and Policy Evolution of the ESG Development in Shanghai

Section I: Background of ESG Development

Faced with increasingly severe global climate challenges and rising demands for social responsibility, the question of how enterprises can integrate environmental, social, and governance (ESG) principles into their business practices while pursuing economic benefits—thereby driving sustainable development—has become a core issue of widespread international concern. As a leading city in China's economy and a vital hub of the international financial system, Shanghai's innovative ESG practices not only guide domestic development trends but also hold significant standing within the global ESG landscape.

I. The Connotation and Key Issues of ESG

In essence, ESG is a comprehensive evaluation framework based on long-term value creation and risk management. Its core architecture consists of three dimensions: Environmental, Social, and Governance. The framework positions the enterprise as the central actor and requires the systematic integration of environmental protection, social responsibility, and corporate governance into strategic decision-making, operational management, and performance evaluation. At the same time, government policymakers and regulators, financial institutions, capital markets, and market participants all play critical roles. By actively incorporating ESG factors into investment analysis, risk management, and capital allocation, these stakeholders jointly guide enterprises and the broader market toward a sustainable development trajectory.

The modern origins of the ESG concept can be traced back to 2004, with the landmark report *Who Cares Wins*, which was led by the United Nations Global Compact, initiated by UBS Group, and jointly authored by over 20 major global financial institutions. The report systematically posited for the first time that integrating environmental, social, and governance issues into the financial market's investment analysis and decision-making could effectively enhance asset risk control and long-term returns, while also enhancing overall societal well-

being. This concept, guided by the core value of *Who Cares Wins*, incentivizes market participants to focus on the profound impact of non-financial factors on the development of enterprises and society (see Figure 1.1).

Figure 1.1 Diagram of the ESG Multi-Stakeholder Collaborative Mechanism: Jointly Building a Sustainable Market and Society

Source: *Who Cares Wins*.

Specifically, the three dimensions of ESG each encompass multi-faceted key issues (see Table 1.1): The Environmental (E) dimension focuses on the impacts and responsibilities of an enterprise or organization concerning the natural ecosystem. Its core issues include greenhouse gas emissions, climate change risk assessment and response, water resource management and pollution control, biodiversity protection, and the efficient utilization of resources, all of which reflect the respect for and protection of natural resource. The Social (S) dimension centers on

the relationships between an organization and its employees, supply chain, community, and the broader society. It covers labor rights protection, occupational health and safety, gender equality, supply chain responsibility, and community development, thereby demonstrating the concrete practice of corporate social responsibility. The Governance (G) dimension emphasizes the standardization and transparency of a company's internal governance structure, including the independence and diversity of the board of directors, protection of shareholder rights and interests, and the soundness of anti-corruption and compliance mechanisms, to ensure the legality, compliance, and long-term stability of corporate operations.

Table 1.1 Issues Covered by Each ESG Dimension in the Global Reporting Initiative (GRI) Standards

Dimension	Specific Issues
E	Materials; Energy; Water and Effluents; Biodiversity; Emissions (greenhouse gases, toxic substances, etc.); Waste; Environmental Compliance; Environmental Supplier Screening
S	Employment; Labor/Management Relations; Occupational Health and Safety; Training and Education; Diversity and Equal Opportunity; Non-discrimination; Freedom of Association and Collective Bargaining; Child Labor; Forced or Compulsory Labor; Security Practices; Rights of Indigenous Peoples; Human Rights Assessment; Social Supplier Screening; Public Policy; Customer Health and Safety; Customer Privacy
G	Anti-corruption; Anti-competitive Behavior; Corporate Governance and Compliance; Risk Management and Internal Controls; Board Structure and Diversity; Executive Remuneration and Decision-making; Stakeholder Engagement

Source: GRI Standards

II. ESG and Sustainable Development

ESG and sustainable development are closely related (see Table 1.2), yet they differ in their primary focus. Sustainable development, as a macroscopic global development agenda, emphasizes the coordinated harmonization of economic growth, social equity, and environmental protection. Its core objectives are embodied in the United Nations Sustainable Development Goals (SDGs). In contrast, ESG is more focused on translating these sustainable development goals into a practical framework for corporations and financial markets, serving as an institutionalized tool and a set of metrics for implementing the concept of sustainable development at the micro-level.

In recent years, with heightened global attention on issues such as climate change, social inclusion, and governance transparency, ESG has progressively become a critical instrument

for policymakers, investment institutions, and corporate management. In its *A Blueprint for Responsible Investment*, the United Nations Principles for Responsible Investment (UNPRI) organization stated that by deeply embedding ESG factors into investment practices, institutional investors can convert broad sustainable development objectives into specific performance indicators and risk management tools. According to the Organisation for Economic Co-operation and Development (OECD) report *ESG Investing: Practices, Progress and Challenges*, the ESG framework provides an "actionable and measurable" operational structure for financial decision-making concerning environmental and social factors. Furthermore, the World Economic Forum's report, *Stakeholder Capitalism Metrics*, emphasizes that the ESG system enhances the comparability, transparency, and accountability of non-financial information, thereby serving as a vital bridge connecting macroscopic sustainability goals with microscopic corporate practices.

Table 1.2 Correspondence Between ESG and the Sustainable Development Goals (SDGs)

E	S	G
2 Zero Hunger 3 Good Health and Well-being 6 Clean Water and Sanitation 7 Affordable and Clean Energy 8 Decent Work and Economic Growth 9 Industry, Innovation and Infrastructure 11 Sustainable Cities and Communities 12 Responsible Consumption and Production 13 Climate Action 14 Life Below Water 15 Life on Land 17 Partnerships for the Goals	1 No Poverty 2 Zero Hunger 3 Good Health and Well-being 4 Quality Education 5 Gender Equality 8 Decent Work and Economic Growth 10 Reduced Inequalities 12 Responsible Consumption and Production 16 Peace, Justice and Strong Institutions 17 Partnerships for the Goals	5 Gender Equality 12 Responsible Consumption and Production 17 Partnerships for the Goals

Source: Compiled from publicly available information.

In sum, ESG is not only the concretized and institutionalized expression of the sustainable development paradigm, it also provides enterprises, financial institutions, and governments with a clear set of quantitative indicators, disclosure standards, and supervisory mechanisms. These elements enable macro-level objectives—such as enhancing climate resilience, fulfilling social responsibilities, and optimizing governance structures—to be effectively embedded into day-to-day management. As a pivotal mechanism advancing the institutionalization and marketization of the global sustainable development agenda, ESG is guiding capital toward

opportunities with greater long-term value and social responsibility, while charting a sustainable pathway for economic governance and corporate value creation in the new era.

III. Global Trends in ESG Development

From an international perspective, ESG principles have become an indispensable core issue for global enterprises and financial markets. In recent years, the International Sustainability Standards Board (ISSB) has successively issued *IFRS Sustainability Disclosure Standard 1: General Requirements for Sustainability-Related Financial Disclosures* (IFRS S1) and *IFRS Sustainability Disclosure Standard 2: Climate-Related Disclosures* (IFRS S2). The Global Reporting Initiative (GRI) has also completed the 2023–2024 updates to its Sustainability Reporting Standards, providing companies with a unified framework for ESG disclosure. These international initiatives have not only forged a global consensus, they also offer benchmarks for Shanghai in areas such as ESG information disclosure, green financial product design, and corporate governance norms.

Concurrently, major economies have moved swiftly on the regulatory and policy fronts, further expanding the scope of ESG. The European Union has issued implementation guidance for the *Corporate Sustainability Due Diligence Directive* (CSDDD) and the *European Sustainability Reporting Standards* (ESRS), thereby strengthening the shift from disclosure to concrete action. It has also put the *Carbon Border Adjustment Mechanism* (CBAM) into effect, creating spillover effects that extend carbon constraints across global supply chains. The United Kingdom and the European Union have raised compliance thresholds through anti-greenwashing rules and fund-naming guidelines. The U.S. Securities and Exchange Commission released climate-related disclosure rules which, although stayed by the courts, still indicate a clear regulatory orientation. In the Asia-Pacific region, markets such as Hong Kong, Singapore, and Australia have been early adopters of the ISSB standards, advancing mandatory or quasi-mandatory disclosures and setting transition requirements for financial institutions. In parallel, jurisdictions including Japan and the United Kingdom have issued taxonomies for low-carbon industries and transition activities. Singapore and South Korea are actively promoting circular-economy legislation and low-carbon industrial parks. Other international industry bodies continue to update initiatives on responsible investment and

sustainable supply-chain governance.

It is noteworthy that the concept of “ESG” itself has been re-examined in recent years within the international discourse. In the United States, ESG has at times been treated by certain political groups as an ideologically charged policy label, and some state governments have enacted “anti-ESG” legislation, prompting companies and asset managers to use the term more cautiously. In Europe, although sustainable finance and carbon-tariff mechanisms continue to deepen, regulators are recalibrating the pace of implementation, shifting emphasis from strict compliance to greater attention to practical feasibility and the affordability of transition. At the same time, many international conferences and organizations are adopting more inclusive formulations such as “sustainability disclosure” or “transition finance” in place of ESG. This re-examination does not negate the ESG concept. Rather, it reflects a broader evolution in which the sustainable development agenda is moving from advocacy toward a new phase centered on implementation and institutionalization.

Overall, these international rules and practices provide a common language and institutional architecture, while also creating substantive constraints and transition pathways at the industry and value-chain levels. For Shanghai, this implies not only the urgency of accelerating alignment with international standards in disclosure, governance, and green-finance product design, but also the availability of concrete reference points for driving industrial transformation and financial innovation. Although global usage of the term “ESG” is becoming more diverse, the three enterprise-centered pillars of environment, society, and governance remain critical levers for achieving sustainable development.

Section II: Evolution of ESG Policy and Governance Frameworks

As the global sustainable development agenda continues to advance, China has simultaneously strengthened ESG policy and governance systems across national, regional, and local levels. Since 2024, Shanghai's ESG development has increasingly exhibited a multi-tiered policy evolution pattern characterized by “top-level guidance—regional coordination—local implementation.” The relevant policy framework not only emphasizes regulatory guidance for market behavior but also focuses on establishing institutional foundations to support corporate

action. This section systematically reviews key national and Shanghai-level policy documents issued over the past two years, organized by the hierarchy of policy promulgation and by core thematic focus. It covers government directives, supervisory regulations, disclosure guidance, and capacity-building initiatives, and it synthesizes the emerging trends in standard harmonization, competency enhancement, and the translation of policies into practical application scenarios.

I. China: Emphasis on Both Regulatory Guidance and System Building to Promote ESG Information Disclosure and Standard Unification

At the national level, government ministries and agencies have continued to advance the top-level design of its ESG governance system, focusing on the synergistic effect of strengthening the information disclosure system and green finance policy tools (see Table 1.3).

In terms of ESG information disclosure, in November 2024, nine departments, including the Ministry of Finance, jointly issued the *Corporate Sustainability Disclosure Guidelines—Basic Guidelines (Trial)*. This establishes a comprehensive information disclosure system covering strategy disclosure, risk management, and key indicators, promoting the alignment of China's ESG standard system with mainstream international frameworks. The standard is currently encouraged for voluntary implementation, with expectations of future integration into a mandatory system. In March 2025, the China Securities Regulatory Commission (CSRC) revised and issued the Measures for the Administration of Information Disclosure of Listed Companies, explicitly requiring listed companies to publish sustainability reports in accordance with stock exchange regulations. This measure will take effect on July 1, 2025, enhancing the legal binding force and enforceability of ESG information disclosure.

In terms of green finance, in October 2024, four departments, including the People's Bank of China, jointly issued the *Opinions on Leveraging the Role of Green Finance to Serve the Construction of a Beautiful China*. This document proposes improving the green finance policy system and strengthening risk management and market-based resource allocation to support the construction of an ecological civilization. In June 2025, the People's Bank of China, the National Financial Regulatory Administration, and the CSRC jointly released *the Catalogue of Green Finance-Supported Projects (2025 Edition)*. This measure unifies the scope and

standards for green financial products and enhances green project identification and standards alignment. It will be implemented from October 1, 2025, aiming to improve the capacity and market standardization of green finance in supporting green industries.

Beyond the twin drivers of the disclosure regime and green finance, government departments are advancing in parallel across multiple domains, including the standardization of green and low-carbon industries, the expansion of the national carbon emissions trading market, and the development of zero-carbon industrial parks. These efforts are gradually forming a full-chain policy system that spans information disclosure, financial support, industrial transformation, and park-level implementation, thereby laying an institutional foundation for ESG practice and experimentation by local governments, enterprises, and financial institutions.

Table 1.3 Recent Years National ESG-Related Policies

Date of Release	Issuing Authority	Policy/Document Title	Summary of Key Points
Feb. 2024	National Development and Reform Commission (NDRC) and nine other departments	Guiding Catalogue for Green and Low-Carbon Transition Industries (2024 Edition)	Clarifies the scope and standards for supporting green and low-carbon industries and technologies; guides investment, project construction, and policy support; promotes the greening of the industrial structure and the low-carbon transition of energy.
Oct. 2024	People's Bank of China (PBOC) and three other departments	Opinions on Leveraging the Role of Green Finance to Serve the Construction of a Beautiful China	Emphasizes financial services for the construction of an ecological civilization; improves the green finance policy system; promotes risk management and market-based resource allocation.
Nov. 2024	Ministry of Finance and eight other departments	Corporate Sustainability Disclosure Standards—Basic Standards (Trial)	Establishes a disclosure structure for strategy, risks, and metrics; encourages voluntary implementation, with potential for future inclusion in a mandatory disclosure system.
Mar. 2025	China Securities Regulatory Commission (CSRC)	Measures for the Administration of Information Disclosure of Listed Companies (Revised Edition)	Clarifies that “listed companies may issue sustainability reports in accordance with stock exchange regulations”; effective from July 1, 2025, enhancing its legal force.
Mar. 2025	Ministry of Ecology and Environment	Work Plan for Expanding the Coverage of the National Carbon Emission Trading Market to the Steel, Cement, and Aluminum Smelting Industries	Enters the implementation phase; marks the first expansion of industry coverage for the national carbon emission trading market.
Jun. 2025	PBOC, National Financial Regulatory Administration (NFRA), CSRC	Catalogue of Green Finance-Supported Projects (2025 Edition)	Unifies standards applicable to all types of green financial products; strengthens project identification and standards alignment; effective from October 1, 2025.
Jul. 2025	NDRC, Ministry of Industry and Information Technology (MIIT), National Energy Administration (NEA)	Notice on Carrying Out the Construction of Zero-Carbon Industrial Parks	Promotes the comprehensive low-carbon transition of energy, industry, and operational models in industrial parks; aims to achieve "zero growth" in carbon emissions or near-zero emissions; demonstrates green development practices.
Aug. 2025	General Office of the CPC Central Committee, General Office of the State Council	Opinions on Promoting Green and Low-Carbon Transition and Strengthening the Construction of the National Carbon Market	Marks the first document issued by the General Offices of the CPC Central Committee and the State Council on this topic; promotes building a more effective, vibrant, and internationally influential national carbon market.
Sep. 2025	Ministry of Finance	Application Guidance for <Corporate Sustainability Disclosure Standard No. 1—Basic Standards (Trial)>	Provides clear operational guidance for corporate sustainability disclosure; marks the formal alignment of our country's disclosure system with international standards; accelerates the industry's standardization process.

Source: Compiled from publicly available information.

II. Shanghai: Continuously Improving ESG Policy Supply to Promote the Implementation of Standards and Application in Scenarios

In recent years, the city of Shanghai has systematically advanced the construction of its ESG policy framework. By focusing on standard-setting, capacity building, legal oversight, and application in practical scenarios, the city is promoting the comprehensive implementation of ESG principles into corporate governance practices (see Table 1.4). As a pioneering demonstration city for localized ESG governance, Shanghai's multi-layered and modular policy practices are providing replicable experience and pathways for other cities across the nation.

In the area of standard-setting, in April 2024 the Shanghai Stock Exchange (SSE) issued the *Guidelines No. 14 of Shanghai Stock Exchange for Self-Regulation of Listed Companies—Sustainability Report (Trial)*. The Guidelines stipulate that, beginning in 2026, constituents of the SSE 180 Index, the STAR 50 Index, and companies that are dually listed onshore and offshore must disclose a sustainability report. They specify 21 topics spanning the three pillars of governance, environment, and society, thereby advancing ESG disclosure toward unified application, operational practicality, and cross-company comparability, and providing both the informational foundation and an action framework for corporate ESG governance. In September 2025, under the guidance of the China Securities Regulatory Commission (CSRC), the Shanghai Stock Exchange released a draft revision of the *Guidelines for the Preparation of Sustainability Reports of Listed Companies* for public comment. The draft adds three new chapters—"Pollutant Emissions," "Energy Use," and "Water Resources Use." It provides explanatory notes and illustrative examples on key and challenging issues, including the identification and assessment of risks and opportunities in the relevant areas, accounting processes and methodologies, and core disclosure requirements, thereby promoting greater standardization in information disclosure.

In the area of capacity building, in March 2024, the Shanghai Municipal Commission of Commerce issued *the Three-Year Action Plan for Accelerating the Enhancement of Environmental, Social, and Governance (ESG) Capabilities of Foreign-Related Enterprises in the City (2024–2026)*. The plan proposes to create, by 2026, "a synergistic ESG ecosystem for foreign-related enterprises with collaborative development among the government, industry organizations, enterprises, and professional service institutions." Through specialized training,

case study promotion, and platform matchmaking, the initiative aims to enhance enterprises' understanding and implementation capabilities of ESG principles and strengthen their adaptability in the international market.

In the area of regulatory leadership, in July 2025, the Standing Committee of the Shanghai Municipal People's Congress passed *the Decision on Deepening the Advancement of Ecological Civilization Construction and Building a Shanghai Model for a Beautiful China*. The decision emphasizes "optimizing spatial planning and advancing green, low-carbon, high-quality development," and promotes the establishment of a dual-control system for total carbon emissions and emission intensity. These measures provide policy guidance and legal safeguards for the "environmental" pillar of ESG, and facilitate the integration of ESG development objectives into the city's overall governance framework.

In terms of financial support, Shanghai has in recent years successively introduced the *Shanghai Catalogue for Transition Finance (Trial)*, which explicitly encourages financial products and services related to green, low-carbon, and sustainable industries, thereby providing policy guidance and financing support for corporate transition. At the same time, the Shanghai Green Finance Service Platform has been launched, offering data-sharing, product matchmaking, and information services for financial institutions, enterprises, and third-party service providers, thereby advancing the practical application of ESG principles in capital markets and financial services.

In the area of application in scenarios, in August 2025, the Baoshan District Government introduced *the Implementation Guidelines for the Green and Low-Carbon Management of Government-Invested Projects in Baoshan District*. These guidelines embed green and low-carbon requirements into the entire lifecycle of government-invested projects—from "planning and design to construction and operation." Furthermore, they propose a "Government Investment Green Index" as a quantitative assessment tool. This explores the use of government projects as demonstrations to drive green technology innovation and the development of low-carbon supply chains, fostering the deep integration of ESG principles with industrial practices.

Table 1.4 Recent years Shanghai ESG-Related Policies

Date of Release	Issuing Authority	Policy/Document Title	Summary of Key Points
Dec. 2023	Shanghai Municipal Financial Regulatory Bureau and three other departments	Shanghai Catalogue for Transition Finance (Trial)	Guides the prudent and orderly transition of traditional carbon-intensive industries; promotes complementarity between transition finance and green finance; empowers high-quality economic and social development.
Jan. 2024	Shanghai Municipal Financial Regulatory Bureau and related authorities	Shanghai Green Finance Service Platform	Marks a solid step toward building an international green-finance hub in Shanghai and adds an important piece of infrastructure to the city’s international financial center.
Mar. 2024	Shanghai Municipal Commission of Commerce	Three-Year Action Plan for Accelerating the Enhancement of Environmental, Social, and Governance (ESG) Capabilities of Foreign-Related Enterprises in the City (2024–2026)	Aims to form “a synergistic ESG ecosystem for foreign-related enterprises with collaborative development among the government, industry organizations, enterprises, and professional service institutions” by 2026.
Apr. 2024	Shanghai Stock Exchange	Shanghai Stock Exchange Self-Regulatory Guidelines for Listed Companies No. 14 — Sustainability Report (Trial)	Requires companies not included in sample indices by the end of 2025 to disclose their first ESG report starting from 2026; sets out 21 specific issues.
Jul. 2025	Standing Committee of the Shanghai Municipal People's Congress	Decision on Deepening the Advancement of Ecological Civilization Construction and Building a Shanghai Model for a Beautiful China	Integrates green and low-carbon requirements throughout the entire lifecycle of government-invested projects; promotes technological innovation and the development of low-carbon supply chains through quantitative assessment and demonstrative guidance.
Aug. 2025	Baoshan District Government	Implementation Guidelines for the Green and Low-Carbon Management of Government-Invested Projects in Baoshan District	Integrates green and low-carbon requirements throughout the entire lifecycle of government-invested projects; promotes technological innovation and the development of low-carbon supply chains through quantitative assessment and demonstrative guidance.

Source: Compiled from publicly available information.

Section III: The Current State of ESG Development in Shanghai

Against the backdrop of a continuously improving global sustainability governance architecture and China's accelerated push toward the "carbon peaking and carbon neutrality" strategy, Shanghai—serving both as the nation's economic hub and an international financial center—has emerged as a pioneer region for ESG ecosystem development in China. In recent years, as ESG principles have been deeply integrated into investment, corporate governance, and risk management, Shanghai has progressively formed an ESG landscape characterized by broad stakeholder participation, complementary functions, and an emergent ecosystem. The city has thus become an important case for observing China's pathway to sustainable development and the local transition toward green governance.

The rise of Shanghai's ESG development reflects a structural response driven by national strategic orientation, global capital connectivity, and local resource endowments. Its development trajectory benefits from the top-level design of the central government's "dual carbon" goals and green finance strategy, while also being influenced by the growing international market demand for sustainable investment concepts. This progress is further supported by Shanghai's comprehensive advantages in its capital market system, digital infrastructure, and institutional innovation capabilities. On one hand, central policies such as the "dual carbon" strategy and "financial services for green transformation" have established a top-level institutional environment, providing direction for local ESG exploration. On the other hand, Shanghai possesses the practical conditions to pioneer the development of an ESG ecosystem through its integrated strengths in capital markets, information infrastructure, and institutional experimentation platforms.

According to *the 14th Five-Year Plan for the National Economic and Social Development of Shanghai and the Long-Range Objectives Through the Year 2035*, the Shanghai municipal government explicitly emphasizes "enhancing the city's sustainable development capabilities" and "promoting a green and low-carbon transition" to form an ecologically livable and environmentally resilient urban development model. This has provided a clear direction for integrating ESG into urban governance and industrial policy. Against this background, ESG has not only become a conceptual anchor for corporate strategic adjustments and financial

product innovation but has also progressively become a key dimension for measuring the effectiveness of urban governance, regional competitiveness, and soft power. Shanghai has already extended the ESG framework to areas such as green industry planning, major project evaluation, and the guidance of fiscal funds, demonstrating a local exploratory path of leading market practices through governance principles.

Overall, the current structural characteristics of Shanghai's ESG development are manifested in a multi-dimensional interaction of being "guided by top-level design, practiced by corporate entities, responded to by market mechanisms, coupled with ecological functions, and aligned with international standards." On one hand, the government continues to exert efforts in guiding corporate disclosure, promoting financial innovation, and standardizing intermediary services. Concurrently, enterprises, as the core entities of ESG practice, are continuously deepening their practices in information disclosure, governance innovation, and low-carbon transition, gradually forming a governance logic that shifts from external incentives to internal drive. Market mechanisms, in turn, play a crucial role in product supply, capital allocation, and enhancing information transparency, serving as a vital vehicle for resource allocation and risk identification. The agglomeration of third-party services and industry platforms is enhancing the degree of integration and the foundational resilience of the local ESG ecosystem.

Shanghai's ESG ecosystem is currently in a deepening and expansion phase, moving "from isolated points to a comprehensive network and from fragmentation to integration." The convergence of policy promotion and market demand is stimulating synergistic responses across multiple fields, including finance, technology, law, and education. However, issues such as insufficient systemic integration, inconsistent evaluation metrics, and fragmented data still constrain its further development. Breakthroughs in institutional design and long-term accumulation are particularly needed in areas such as the credibility and consistency of third-party rating results and the linkage mechanism between non-financial information and financial performance.

Despite persistent challenges, Shanghai possesses strong institutional coordination capacity and a clear orientation toward international benchmarking, leaving ample room for

ESG development. On the one hand, Shanghai can leverage the first-mover advantages of the Pilot Free Trade Zone and the Lingang New Area to build ESG pilot zones, and to develop localized exemplars for disclosure mechanisms, carbon account systems, and green standards frameworks. On the other hand, Shanghai can work in concert with cities across the Yangtze River Delta to establish a cross-regional ESG data-sharing platform and a mechanism for mutual recognition of ESG ratings, thereby enhancing the overall coherence and coordination of green governance. As international standards are progressively implemented and locally aligned, and as initiatives to build a global ESG data center and to attract and channel green capital take effect, Shanghai's strategic position as a leading locus of ESG practice in China will become even more secure. In doing so, the city can offer a "China sample" for ESG governance among global cities.

In the chapters that follow, and based on updated assessments of the overall ESG performance of each stakeholder group, the report will use practical case studies as a starting point for an in-depth analysis of the specific roles and contributions of various entities in promoting ESG development. It will reveal their practical experiences in strategic planning, governance innovation, investment and financing, information disclosure, and collaborative mechanisms. It will further explore the key issues and challenges they face, and distill actionable pathways and strategies to provide evidence-based references and decision-making support for all stakeholders.

Chapter 2: The Current State of ESG Practices of Shanghai Enterprises

This chapter focuses on the core players within the Shanghai ESG ecosystem—the enterprises. Based on data from the 2024 year, it systematically reviews the multi-dimensional progress of ESG practices among Shanghai enterprises and, through case studies, explores new models and pathways for promotion in corporate ESG implementation. Finally, it summarizes the bottleneck issues faced by Shanghai enterprises in deepening their ESG practices and proposes targeted optimization strategies.

Section I: Multi-dimensional Progress in the ESG Practices of Shanghai Enterprises

This section reviews the progress of Shanghai enterprises based on the latest statistical data, covering dimensions such as ESG information disclosure, characteristic ESG practices, and ESG rating results.

I. Status of ESG Information Disclosure by Shanghai Enterprises in 2024

(I) The ESG report issuance rate of Shanghai's Listed Enterprises is increasing annually, outpacing the overall national level.

The ESG report issuance rate for listed enterprises in Shanghai increased from 20.50% in 2017 to 56.76%[1] in 2024, exceeding 50% for the first time (see Figure 2.1). This rate has been consistently higher than the overall national average in every year, demonstrate that Shanghai enterprises exhibit a leading level of ESG awareness among enterprises nationwide.

[1] Data are sourced from the Wind database. Annual figures refer to the number of companies that issued an ESG report in the given year. “Shanghai enterprises” denotes companies whose registered domicile is in Shanghai. The same definitions apply to the subsequent data notes.

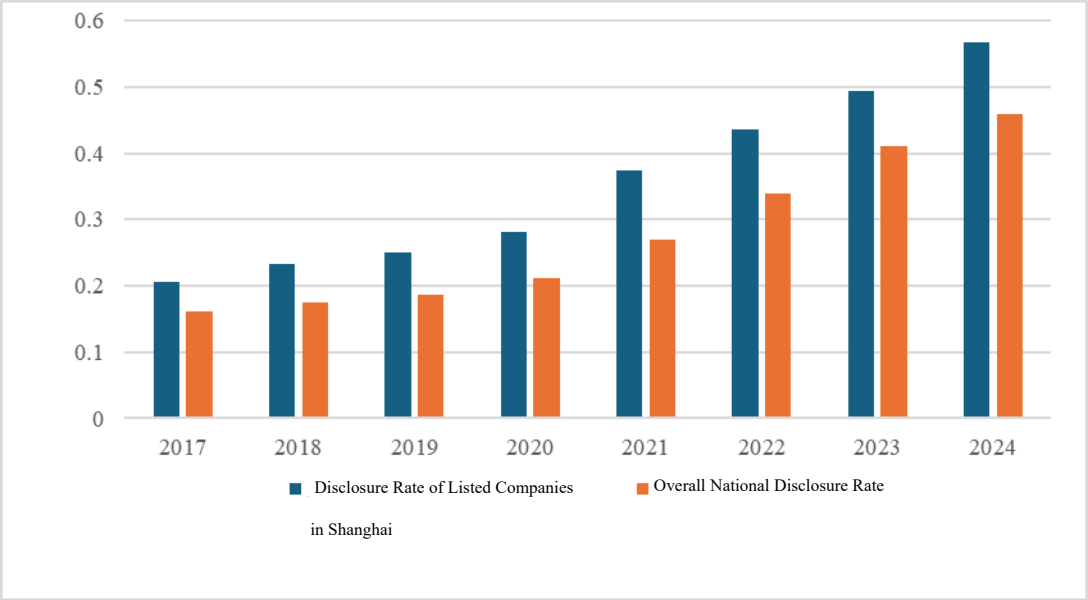


Figure 2.1: Comparison of the ESG Report Disclosure Rate of Shanghai's Listed Enterprises with the Overall Market

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

(II) Listed State-Owned Enterprises: Continuously Leading in ESG Information Disclosure as Practices Deepen

The ESG report issuance rate for listed state-owned enterprises (SOEs) increased from 47.90% in 2017 to 89.08% in 2024 (see Figure 2.2), far exceeding the average issuance rate for all local listed companies (56.76%). In terms of carbon information disclosure, the disclosure rate rose from 26.05% in 2017 to 47.90% in 2024 (see Figure 2.3). The rate of conducting climate risk assessments increased from 1.68% in 2021 to 23.53% in 2024 (see Figure 2.4).

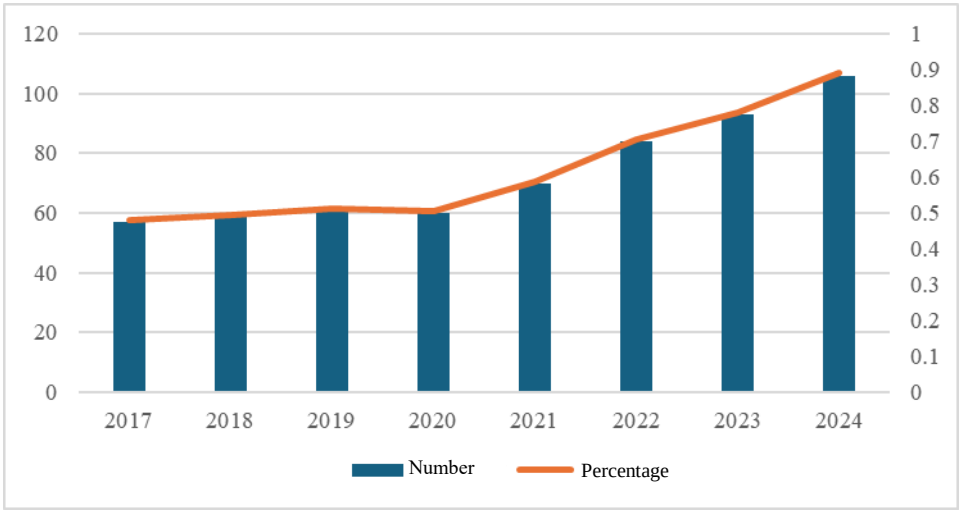


Figure 2.2: ESG Report Issuance by State-Owned Enterprises

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

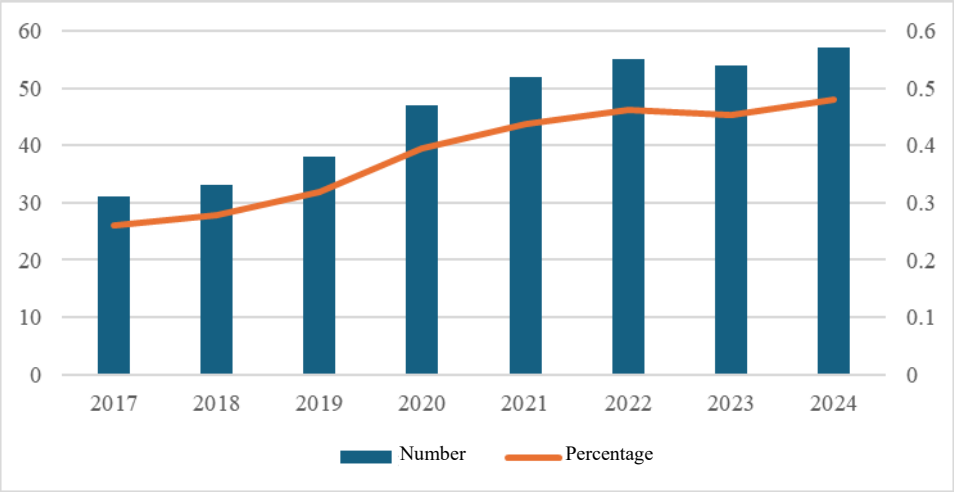


Figure 2.3: Carbon Emission Information Disclosure by State-Owned Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange

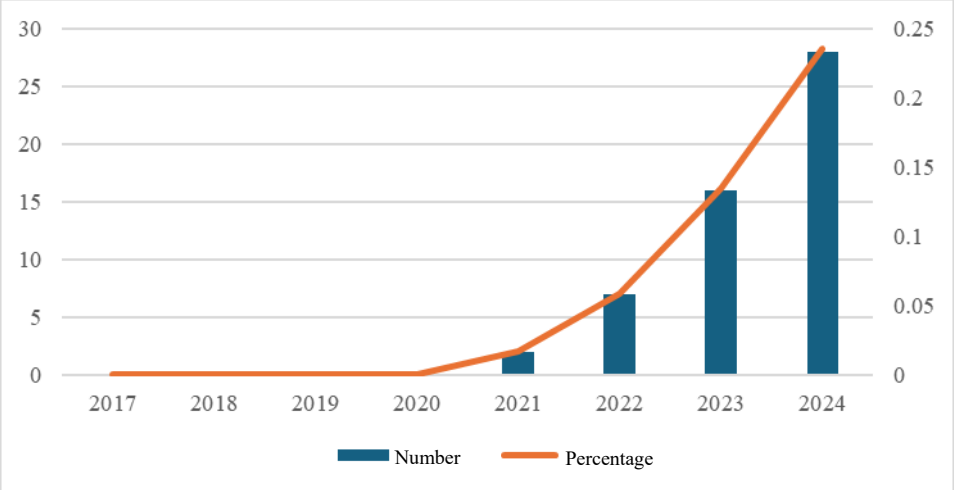


Figure 2.4: Implementation of Climate Risk Assessments by State-Owned Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange

(III) Listed Non-State-Owned Enterprises: Rapid Growth in ESG Reporting with Significant Development Potential

The ESG report issuance rate for listed non-state-owned enterprises increased from 10.46% in 2017 to 44.92% in 2024 (see Figure 2.5). The carbon information disclosure rate rose from 2.16% in 2017 to 20.37% in 2024 (see Figure 2.6). The rate of conducting climate risk assessments increased from 0.31% in 2021 to 6.48% in 2024 (see Figure 2.7), demonstrating a high-speed catch-up trend in the ESG practices of non-state-owned enterprises.

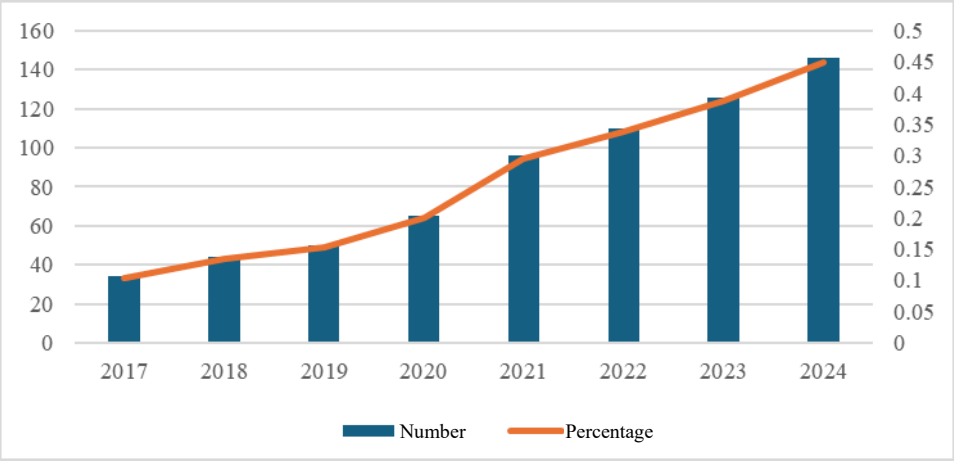


Figure 2.5: ESG Report Issuance by Non-State-Owned Enterprises

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

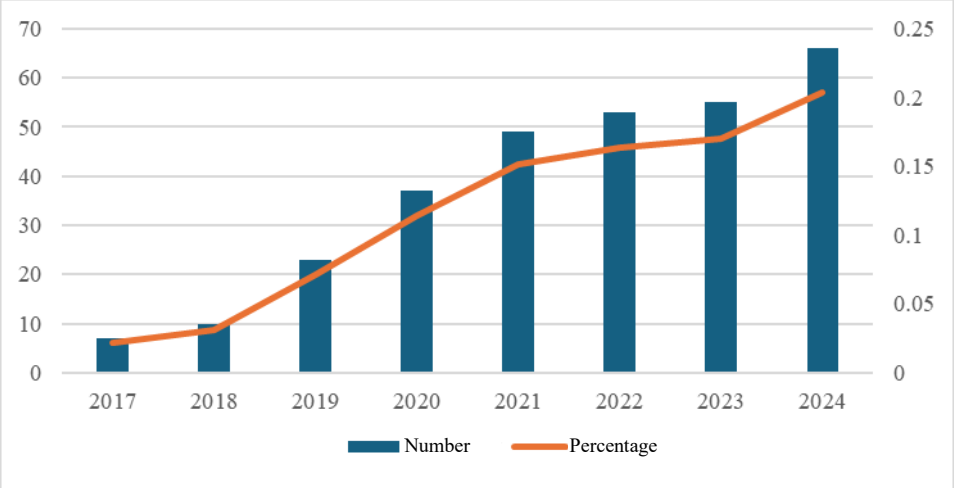


Figure 2.6: Carbon Emission Information Disclosure by Non-State-Owned Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange

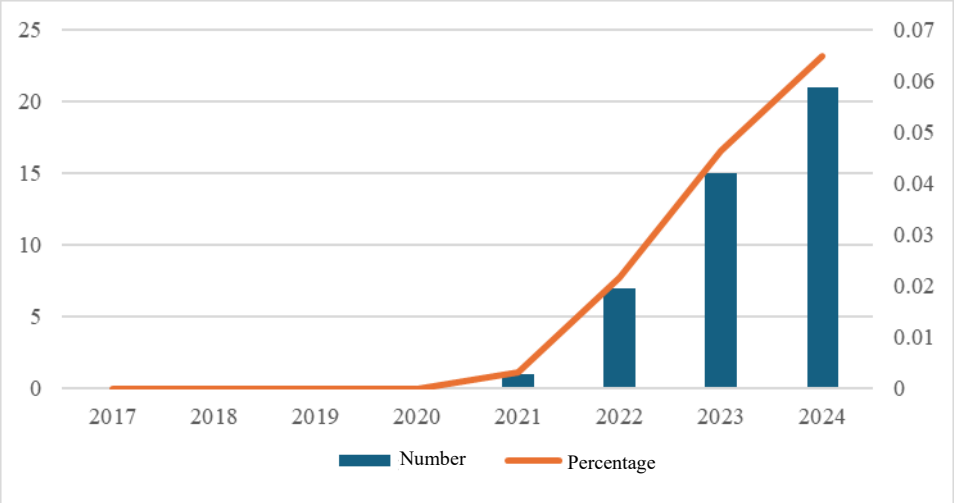


Figure 2.7: Implementation of Climate Risk Assessments by Non-State-Owned Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange

II. Status of ESG Practices Among Shanghai Enterprises in 2024

The industry distribution of Shanghai's listed enterprises is broad, covering a total of 11 sectors. The number of enterprises in the Industrials, Information Technology, Consumer Discretionary, and Health Care sectors ranks the highest (see Figure 2.8). Among these, the number of industrial enterprises is the largest, with 128 companies, accounting for 28.83%.

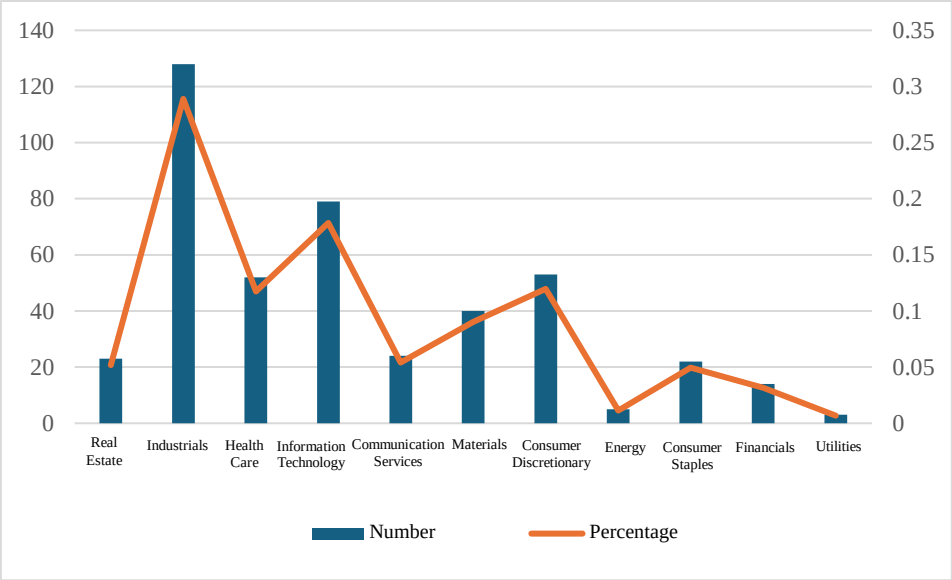


Figure 2.8: Industry Distribution of Listed Enterprises in Shanghai

Data Source: China Securities Index (CSI); Compiled and analyzed by the Shanghai Environment and Energy

(I) ESG Practice Characteristics by Sector: General Consistency with Specific Areas of Focus

Different sectors have different areas of emphasis in their ESG practices (see Table 2.1): Enterprises in the Industrials sector focus on the accounting and disclosure of carbon emission information, formulating policies to reduce resource consumption, and increasing investment in environmental protection. Enterprises in the Information Technology sector focus on establishing policies to improve energy efficiency, adopting measures to reduce waste, and conducting environmental management training. Enterprises in the Financials, Consumer Discretionary, and Health Care sectors focus on the accounting and disclosure of carbon emission information, formulating policies to reduce resource consumption, and establishing policies to improve energy efficiency.

Table 2.1: Key Focus Areas of ESG Practices in Major Industries of Shanghai's Listed Enterprises

Sector	Top Priority	Second Priority	Third Priority
Industrials	Accounting and disclosure of carbon emission information	Formulating policies to reduce resource consumption	Increasing investment in environmental protection
Financials	Accounting and disclosure of carbon emission information	Formulating policies to reduce resource consumption	Establishing policies to improve energy efficiency
Consumer Discretionary	Accounting and disclosure of carbon emission information	Formulating policies to reduce resource consumption	Establishing policies to improve energy efficiency
Information Technology	Establishing policies to improve energy efficiency	Adopting measures to reduce waste	Conducting internal environmental management training
Health Care	Formulating policies to reduce resource consumption	Establishing policies to improve energy efficiency	Disclosure of carbon emission information

Source: Compiled based on the ESG reports of listed companies.

1. The Industrials Sector: Leading in ESG Practices with Excellent Performance Across Dimensions

The ESG report issuance rate for industrial enterprises in Shanghai increased from 16.28% in 2017 to 56.59% in 2024, which is higher than in other regions (see Figure 2.9). The rates for carbon emission information disclosure, formulation of resource reduction policies, and investment in environmental protection all lead the nation (see Figures 2.10–2.12).

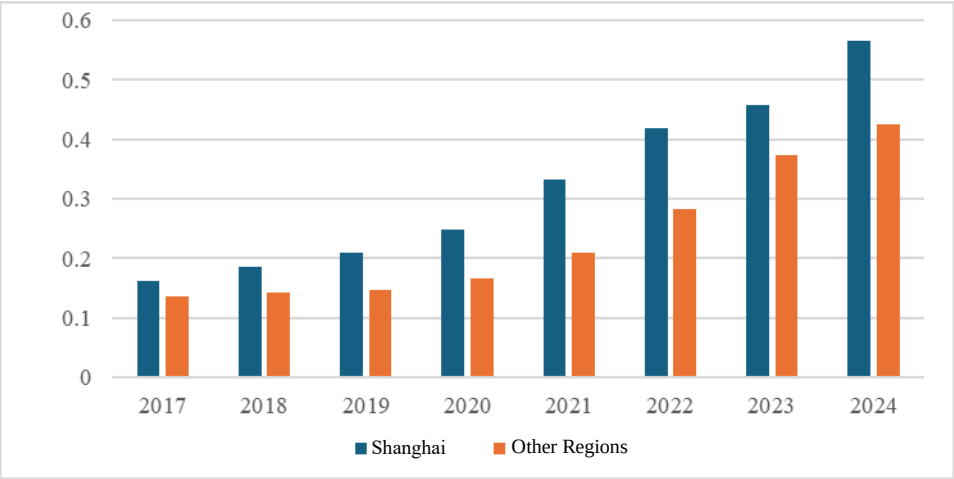


Figure 2.9: ESG Report Issuance Rate by Listed Industrial Enterprises—Shanghai vs Other Regions

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

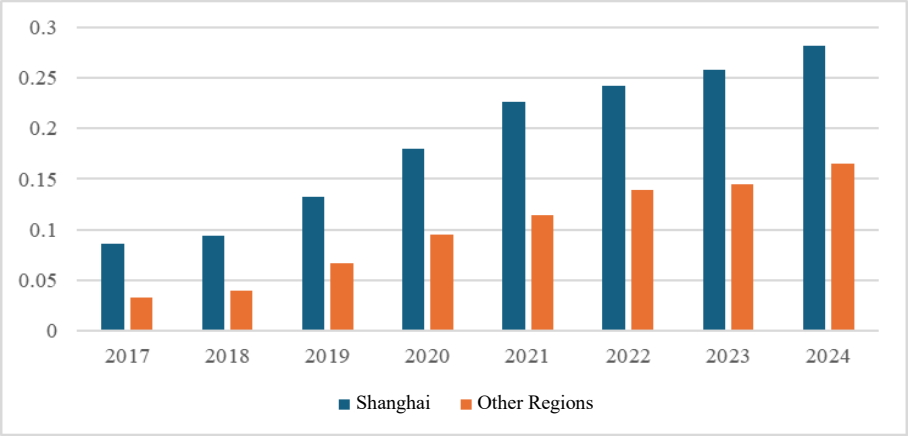


Figure 2.10: Carbon-Related Disclosure by Listed Industrial Enterprises—Shanghai vs Other Regions

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

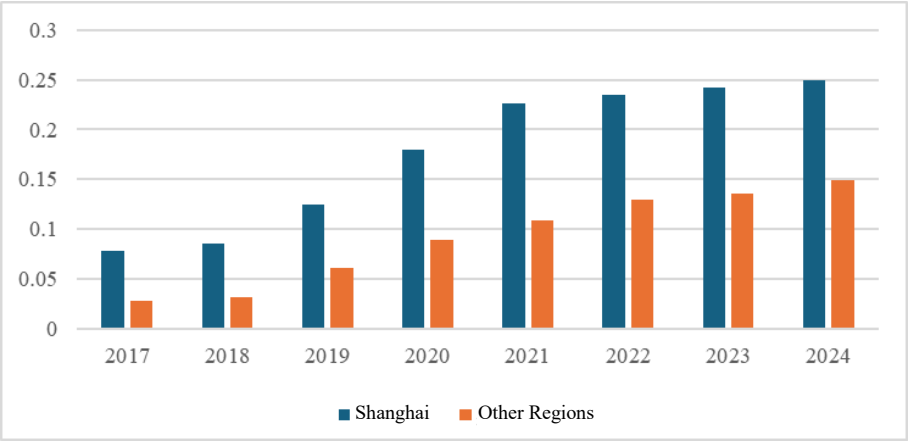


Figure 2.11: Disclosure of Resource-Reduction Policies by Listed Industrial Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

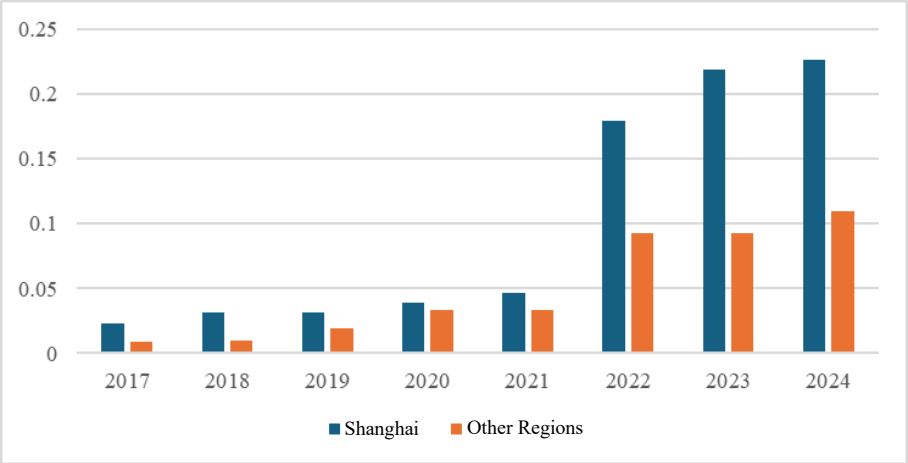


Figure 2.12: Disclosure of Environmental Expenditures by Listed Industrial Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

2. The Information Technology Sector: Rapid Development in ESG Practices with Swift Improvement Across Multiple Dimensions

The ESG report issuance rate for information technology enterprises in Shanghai increased from 17.72% in 2017 to 49.37% in 2024, which is higher than in other regions (see Figure 2.13). In 2024, the rates for establishing energy efficiency improvement policies, adopting waste reduction measures, and conducting environmental management training were significantly ahead of other regions (see Figures 2.14–2.16).

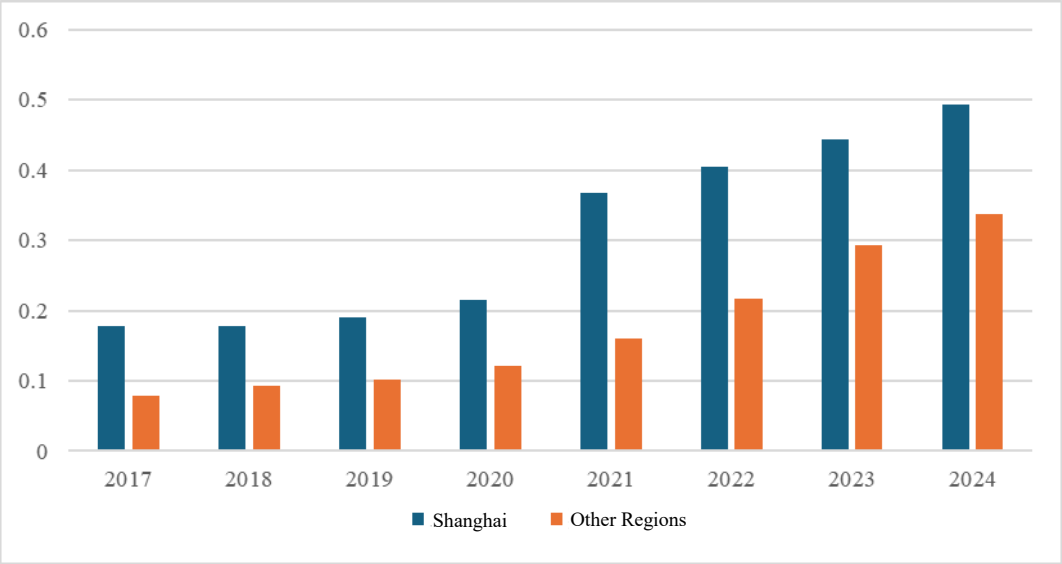


Figure 2.13: ESG Report Issuance Rate by Information Technology Enterprises—Shanghai vs Other Regions

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

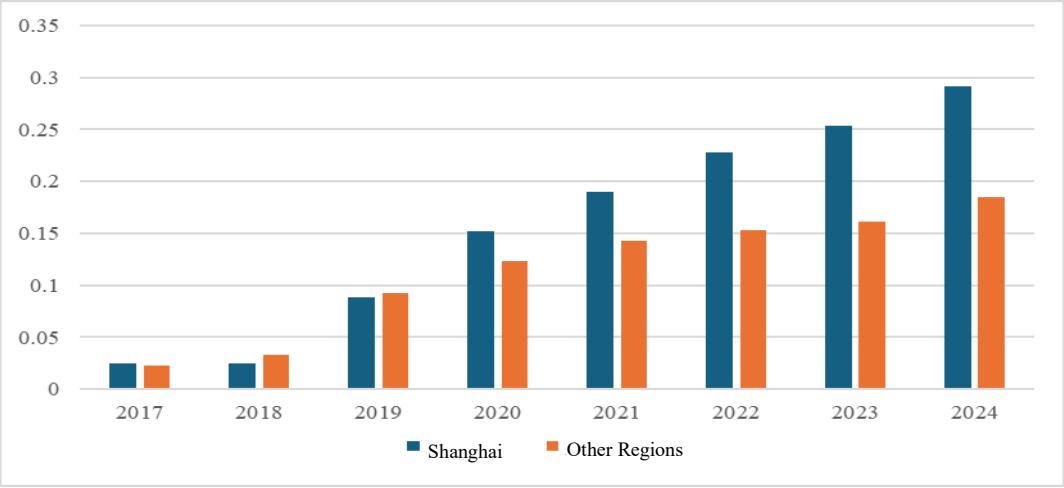


Figure 2.14: Disclosure of Energy-Efficiency Improvement Policies by Information Technology Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Eikon; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

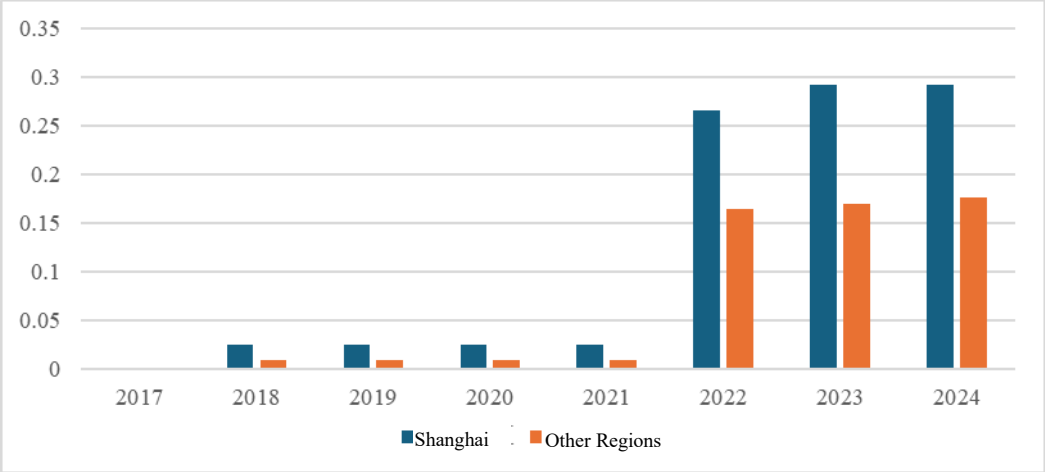


Figure 2.15: Disclosure of Waste-Reduction Measures by Information Technology Enterprises —Shanghai vs Other Regions

Data Source: Refinitiv Eikon; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

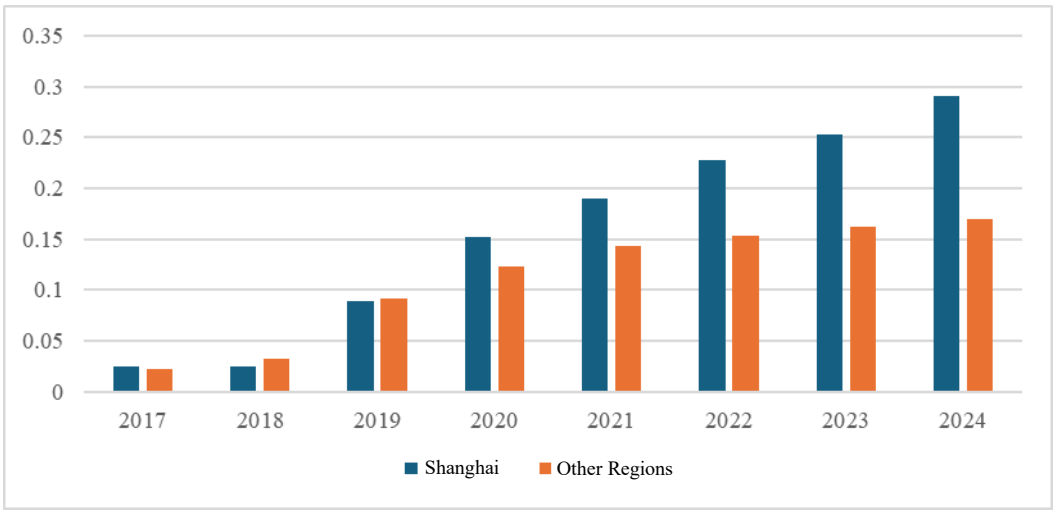


Figure 2.16: Disclosure of Environmental Management Training by Information Technology Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Eikon; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

3. The Financials Sector: Pioneering in ESG Practice and Maintaining a High-Level Development

The ESG report issuance rate for financial enterprises in Shanghai increased from 71.43% in 2017 to 100% in 2024, which is higher than the national average (see Figure 2.17). The rates for carbon emission information disclosure, formulation of resource reduction policies, and establishment of energy efficiency improvement policies all exceeded 90% (see Figures 2.18–2.20).

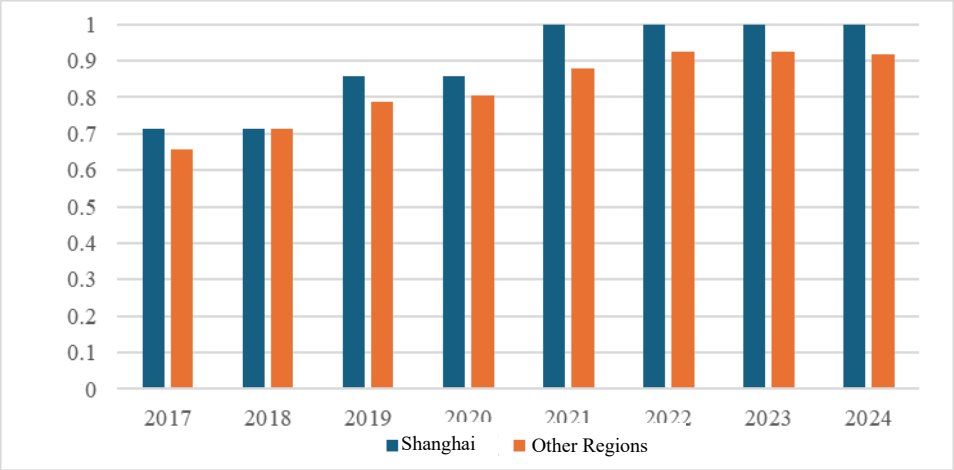


Figure 2.17: ESG Report Issuance Rate by Financial Enterprises—Shanghai vs Other Regions

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

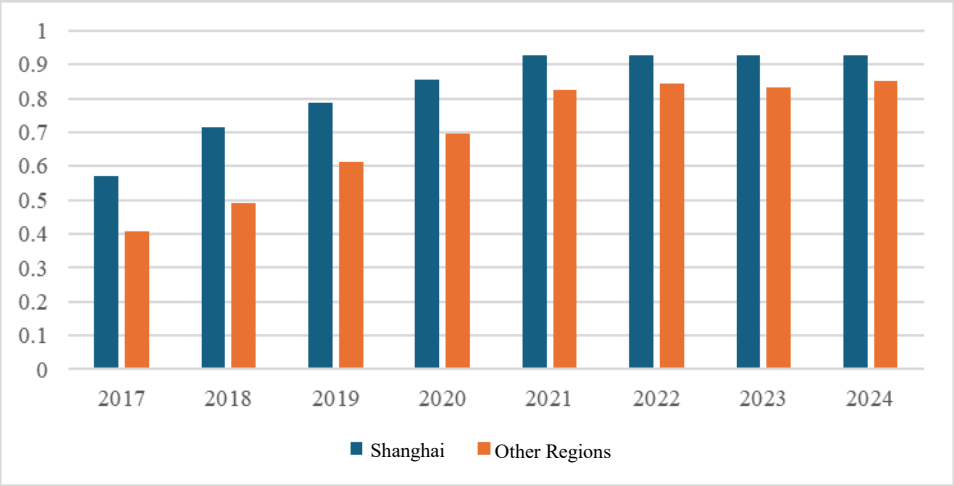


Figure 2.18: Carbon-Related Disclosure by Financial Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

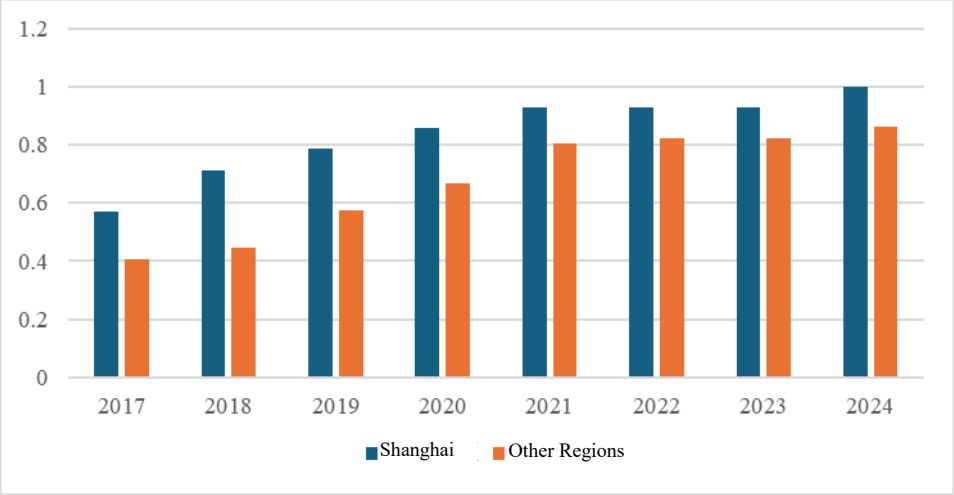


Figure 2.19: Disclosure of Resource-Reduction Policies by Financial Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

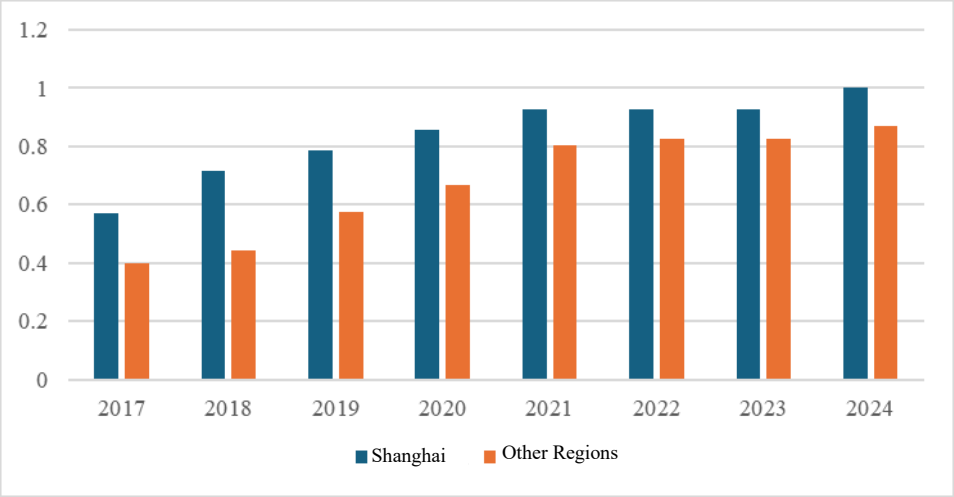


Figure 2.20: Disclosure of Formulating Energy Efficiency Policies by Financial Enterprises—Shanghai vs Other Regions

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

(II) A+H Dual-Listed Enterprises: Leading the Trend in ESG Practices

Among Shanghai's twenty A+H dual-listed companies, performance in ESG reporting, carbon-emissions disclosure, and climate-risk assessment has improved markedly over time. The ESG report issuance rate rose from 90% in 2017 to 100% in 2024 (Figure 2.21). The rate of high-quality carbon information disclosure increased from 45% in 2017 to 100% in 2024 (Figure 2.22). The proportion conducting climate-risk analyses expanded from 10% in 2017 to 90% in 2024 (Figure 2.23). The share with formal supply-chain environmental policies advanced from 45% in 2017 to 84% in 2024 (Figure 2.24).

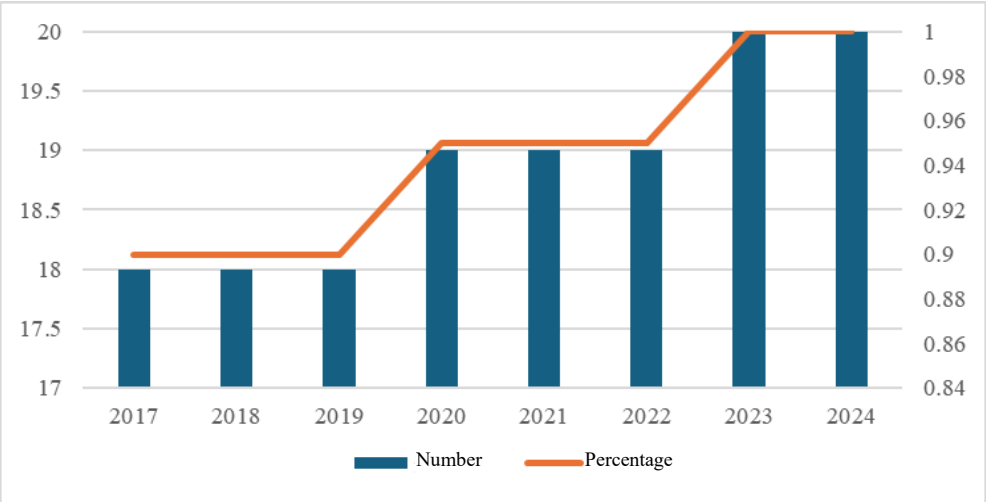


Figure 2.21: ESG Report Issuance Rate by Shanghai's A+H Dual-Listed Enterprises

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

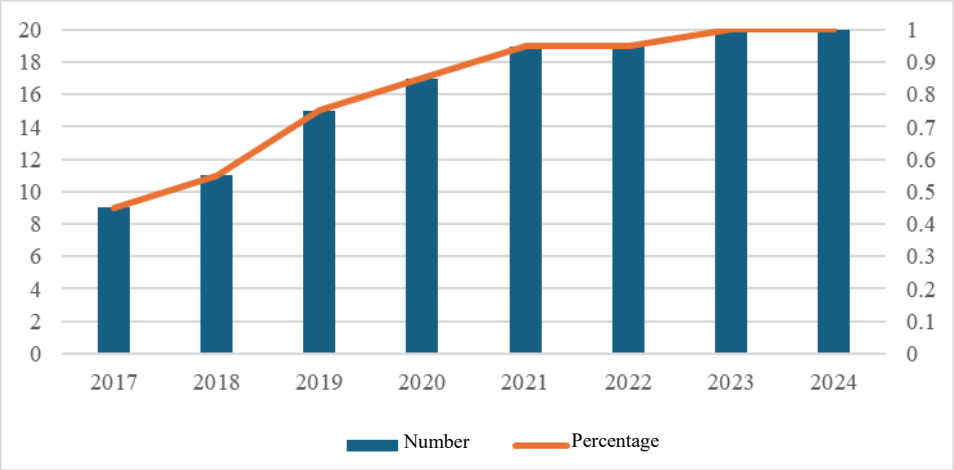
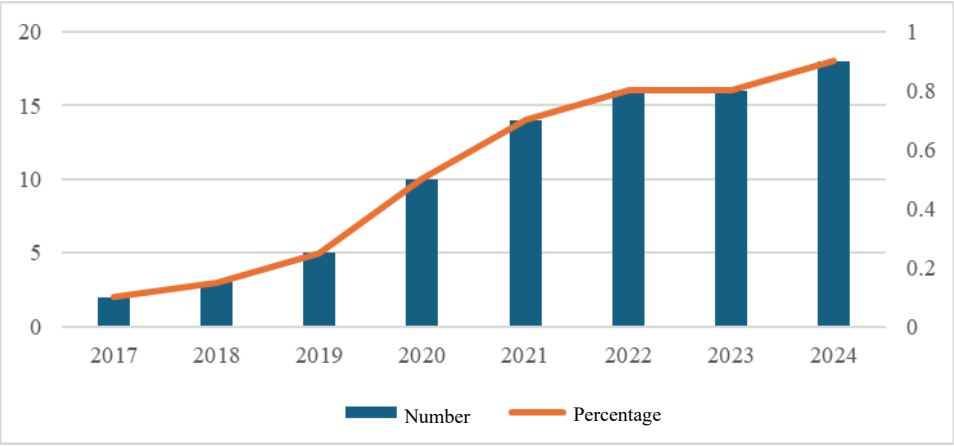


Figure 2.22: Carbon Emission Related Disclosure by Shanghai's A+H Dual-Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)



2.23: Disclosure of Climate Risk and Opportunity Analysis by Shanghai's A+H Dual-Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

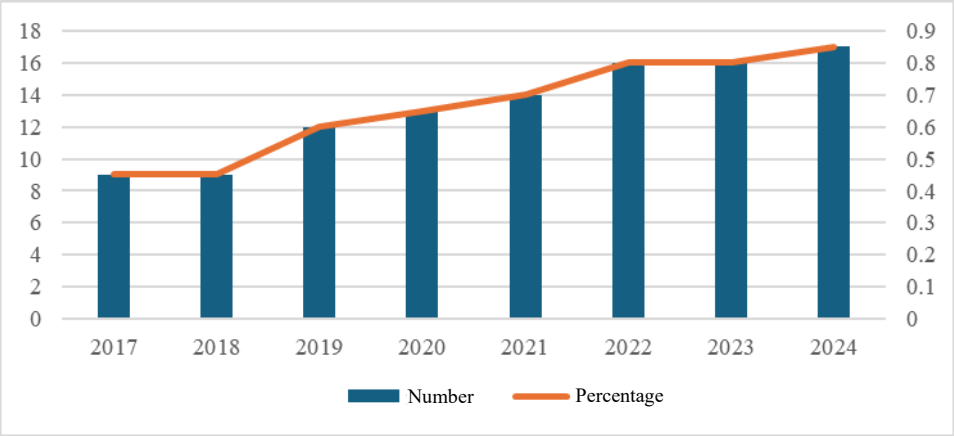


Figure 2.24: Disclosure of Formulating Supply Chain Environmental Policies by Shanghai's A+H Dual-Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

(III) Rapid Growth in the ESG Practice Dimensions of Shanghai Enterprises

The ESG practice dimensions of Shanghai enterprises are experiencing rapid growth. Specifically, practices related to reducing atmospheric pollutants grew from 1.13% in 2017 to 10.61% in 2024 (with an average annual growth rate of 37.73%, see Figure 2.25). Practices related to the use of clean energy grew from 0.90% in 2017 to 15.35% in 2024 (with an average annual growth rate of 49.89%, see Figure 2.26). Practices related to climate risk analysis grew from 0.45% in 2017 to 18.28% in 2024 (with an average annual growth rate of 69.68%, see Figure 2.27).

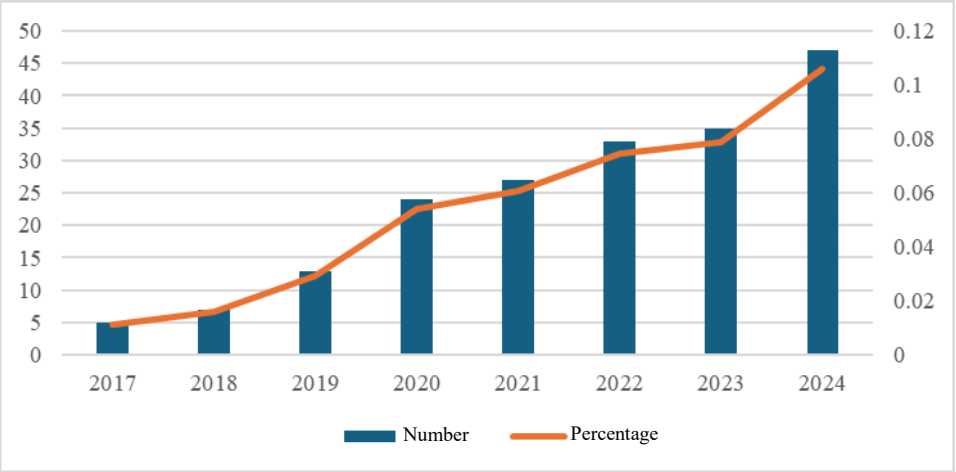


Figure 2.25: Disclosure of Reducing Atmospheric Pollutant Emissions by Shanghai's Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

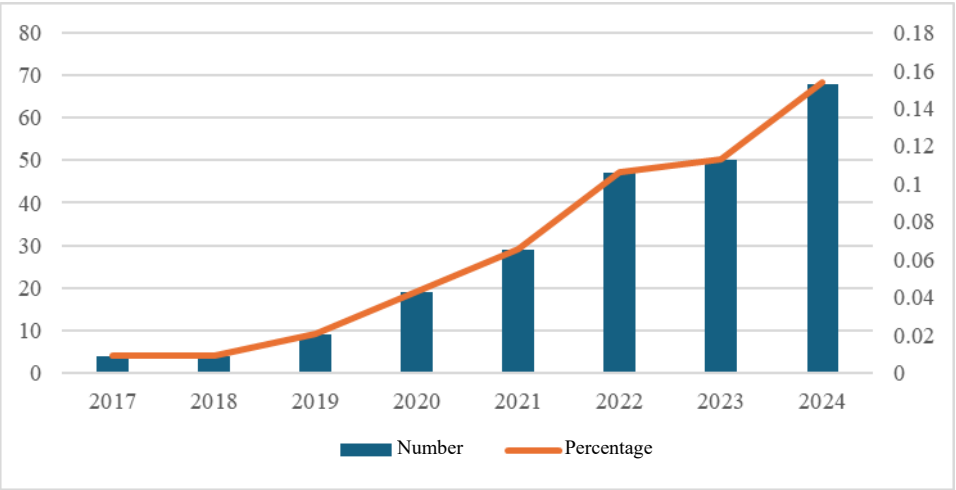


Figure 2.26: Disclosure of Clean Energy Use by Shanghai's Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

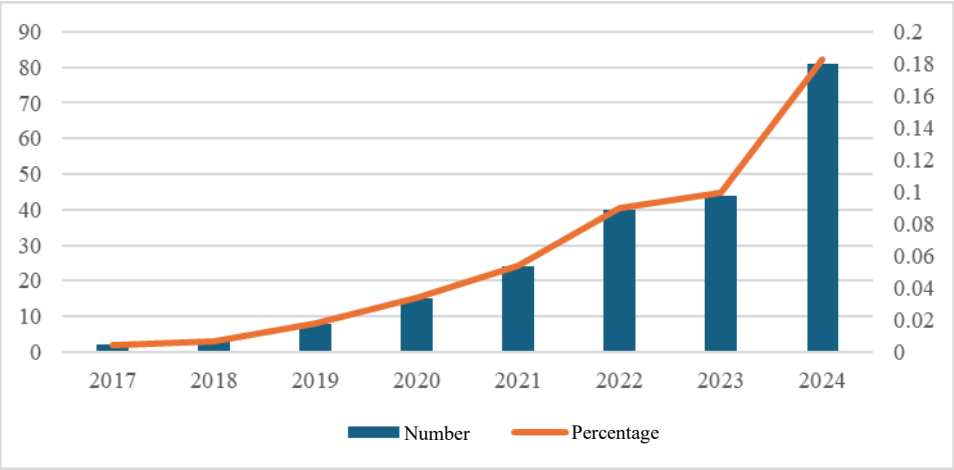


Figure 2.27: Disclosure of Climate Risk and Opportunity Analysis by Shanghai's Listed Enterprises

Data Source: Refinitiv Workspace; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

III. Status of ESG Ratings for Shanghai Enterprises in 2024

The ESG rating system is a critical component of corporate ESG development. Rating results provide a quantitative demonstration of the outcomes of a company's ESG practices, while also offering a standardized and comparable frame of reference for investors and research institutions to measure corporate ESG development. In 2006, the Principles for Responsible Investment (PRI) were jointly launched by the United Nations Environment Programme Finance Initiative (UNEP FI) and the UN Global Compact, establishing environmental, social, and governance factors as key indicators for measuring sustainable development, with ESG investing becoming a major investment strategy. International rating agencies have already been conducting ESG ratings on a global scale for listed companies and have gained investor recognition. Concurrently, a growing number of domestic institutions in China are emerging to conduct ESG rating services, continuously enriching and refining localized ESG rating systems.

(I) Corporate ESG Rating Standards Are Continuously Advancing in Depth

The CSI (China Securities Index) ESG Rating is an important and authoritative assessment system for corporate sustainable development within China's financial market. It comprehensively measures the ability of listed companies to manage risks and opportunities related to sustainable development across the three dimensions of E, S, and G. It provides a standardized assessment tool to offer investors comprehensive, comparable, and transparent ESG evaluation results, assisting them in investment decision-making and risk management. It

also helps guide corporate sustainable development: through the guidance of long-term capital via ESG evaluations and ESG indices, it incentivizes enterprises to place greater emphasis on ESG factors, improve their ESG performance, and achieve long-term sustainable development.

The Wind ESG Rating aligns with China's policies, regulations, and supervisory requirements, translating policy mandates into specific, quantifiable evaluation metrics. It is based on the actual ESG information disclosure situation of domestic enterprises and leverages its data integration capabilities to acquire key information that companies have not proactively disclosed but is recorded in official channels, thereby supplementing deficiencies in publicly available information and achieving comprehensive coverage of A-share listed companies. Therefore, this chapter utilizes the Wind ESG rating to compare the evaluation results of Shanghai enterprises with national enterprises for the year 2024.

(II) Performance of Shanghai Enterprises in ESG Rating

The composite ESG score of Shanghai enterprises has risen steadily since 2017, reaching 6.2974 in 2024—a new historical high and above the national average (5.9379 in 2024). The correlation coefficient between the scores of the two locations is R^2=0.853 (see Figure 2.28).

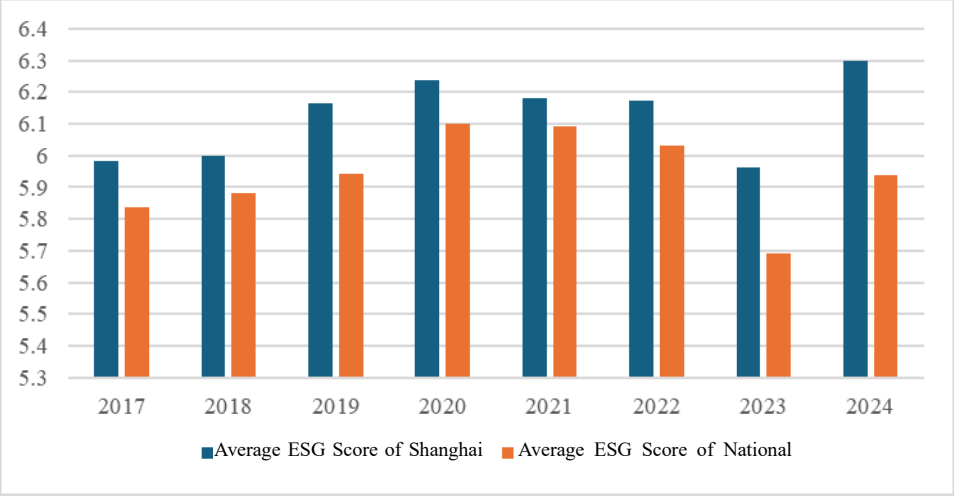


Figure 2.28: Composite ESG Scores of Listed Enterprises in Shanghai and Nationwide

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

The environmental dimension score of Shanghai-based enterprises rose from 1.36 in 2017 to 3.42 in 2024, reflecting an average annual growth rate of 13.8% and exceeding the national average of 2.77 in 2024. The performance gap has widened year by year, with a coefficient of determination R^2 = 0.997 (see Figure 2.29).

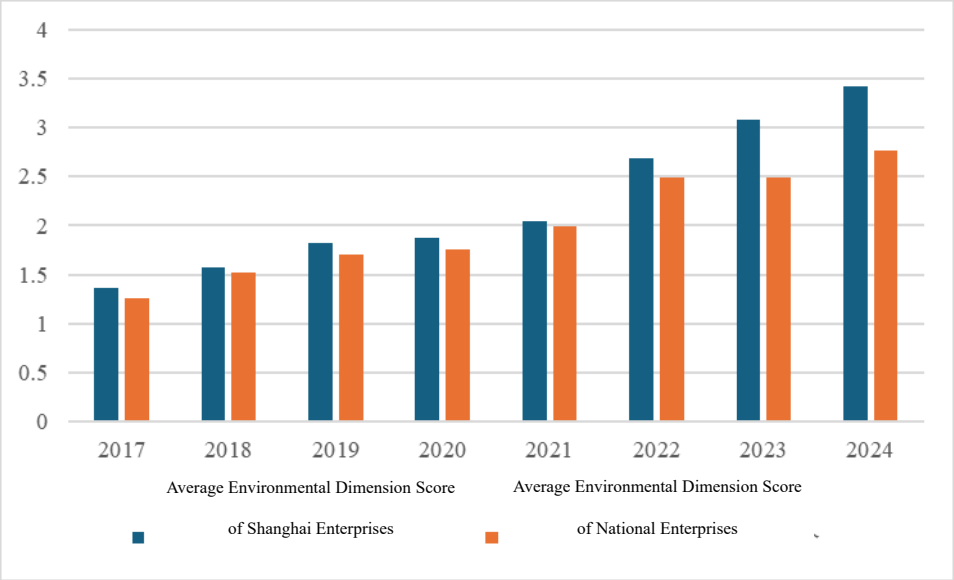


Figure 2.29: Environmental Dimension Scores of Listed Enterprises in Shanghai and Nationwide

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

The Social dimension score for Shanghai enterprises reached 4.5051 in 2024 (a historical high), which is higher than the national level (4.0159 in 2024). The correlation coefficient is R^2=0.762 (see Figure 2.30).

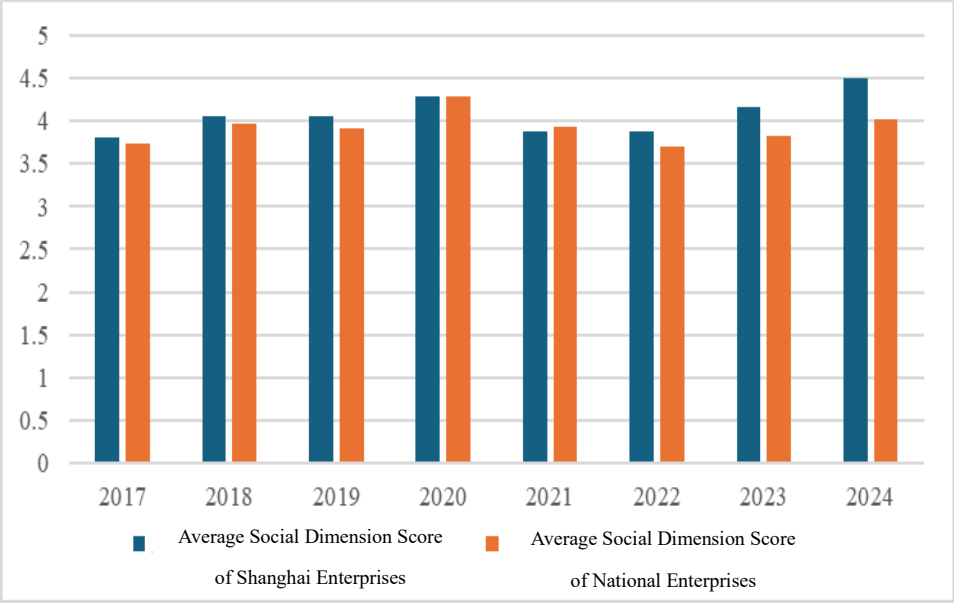


Figure 2.30: Social Dimension Scores of Listed Enterprises in Shanghai and Nationwide

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

The Governance dimension score for Shanghai enterprises peaked in 2021 at 6.9857 and, after a slight rebound in 2024, remains higher than the national level. The correlation coefficient is R^2=0.984 (see Figure 2.31).

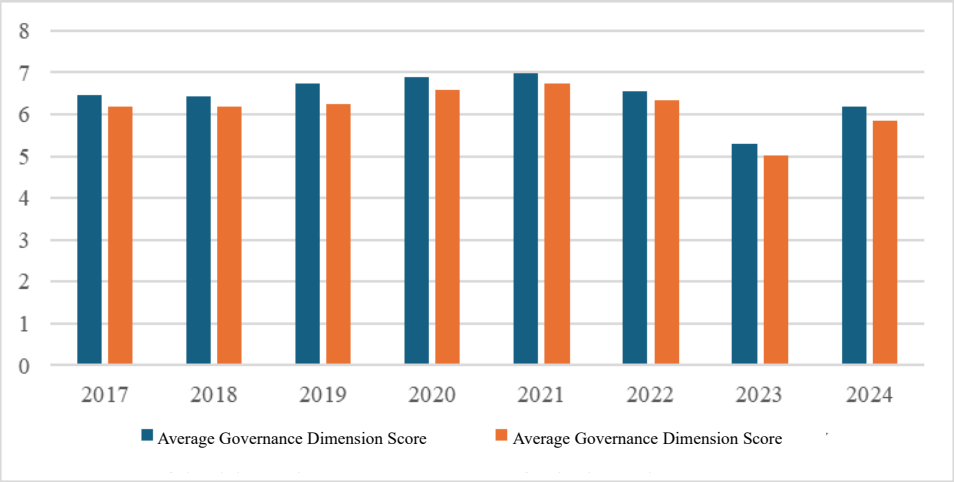


Figure 2.31: Governance Dimension Scores of Listed Enterprises in Shanghai and Nationwide

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

The distribution of ESG scores for Shanghai enterprises shows a polarization: the number of enterprises in the 7.5–10 score range increased from 12 in 2017 to 62 in 2024 (with an average annual growth rate of 26.2%), while the proportion of enterprises in the 2.5–5 score range also increased (see Figure 2.32).

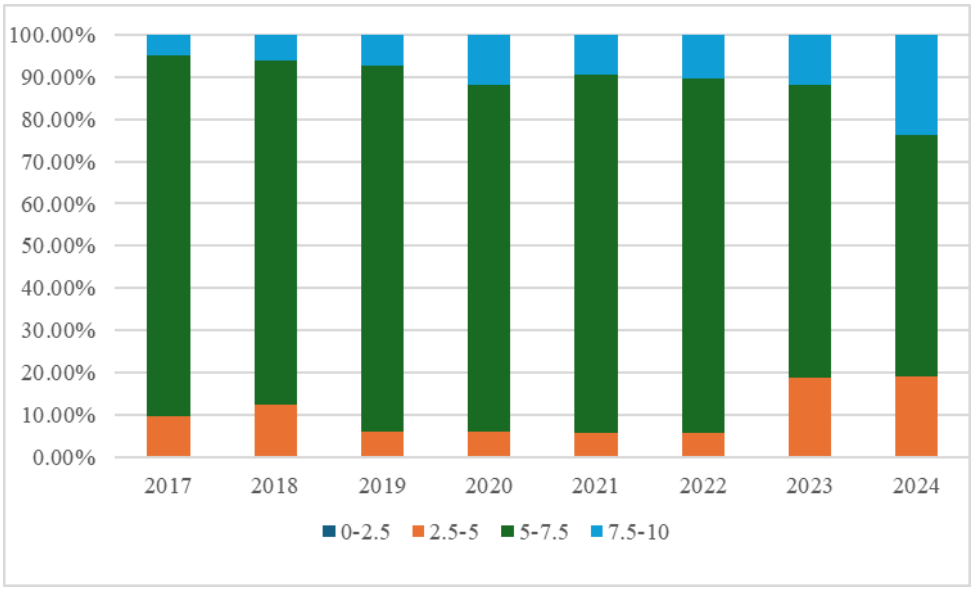


Figure 2.32: Distribution of Composite ESG Scores for Shanghai's Listed Enterprises

Data Source: Wind; Compiled and analyzed by the Shanghai Environment and Energy Exchange (SEEE)

Section II: Innovative Cases of ESG Practices Among Shanghai Enterprises

This section, drawing on the innovative ESG practices of Shanghai-based enterprises, catalogs representative cases and selects a set of large and mid-to-large enterprises—including Shanghai Chengtou Holdings, Juss Sports, SAIC Motor, China Baowu Steel Group, Shanghai Jin Jiang International Hotels Group, Lingang Group, Shenergy Group, COSCO Shipping Holdings, Shanghai Real Estate Group, and State Grid Shanghai Electric Power—together with a number of small and micro enterprises. Through case analysis, it distills innovative models and transferrable lessons that arise during the internalization of ESG within corporate practice.

I. Innovative Practices of Shanghai Enterprises on Environmental (E)-related issues

(I) Leveraging Low-Carbon Technology Innovations to Advance the Upgrading of Green Buildings

Shanghai Chengtou Holding Co., Ltd. is the publicly listed real estate entity of Shanghai Chengtou Group. It is a comprehensive real estate group with primary operations in property development, operations, and financial investment, with a business layout covering the entire real estate industry chain. In 2024, it was featured in *the Shanghai State-Controlled Listed Companies Environmental, Social and Governance (ESG) Blue Paper*, receiving honors such as "Excellent Practice Case for Listed Company Boards of Directors," "Excellent Practice Case for Listed Company Governance and Internal Control," and the "ESG Pioneer Brand" award from the China Housing Leasing Leadership Awards.

In the real estate development sector, the company actively promotes the innovation and application of low-carbon technologies. To address carbon emissions in the construction sector, the company has developed a technical system for near-zero energy residential buildings, advanced the large-scale construction of green and ultra-low energy consumption buildings, and promoted the development of a "waste-free group." In 2024, the company increased its investment in environmental projects, including photovoltaic construction, solar water heating system installation, and waste-free car wash renovations. Through its Low-Carbon Butler Digital Intelligence Platform, the company achieves dynamic monitoring of environmental data, constructing a closed-loop management system of "institutional design, standards

execution, and intelligent supervision." In project development, the company actively applies cutting-edge energy-saving technologies, has compiled *the Technical Guidelines for Near-Zero Energy Commercial Housing*, and is advancing the large-scale construction of green and ultra-low energy consumption buildings. As of 2024, the scale of green buildings under construction reached 760,000 square meters. The company is also promoting the "waste-free group" initiative, building a "waste-free" chain from source reduction to waste recycling across the three major scenarios of "waste-free construction sites," "waste-free offices," and "waste-free rental communities."

In parallel with the city-development segment, within the realm of public culture and sports venues, the Juss International Equestrian Center—operated by **Juss Sports** and located in the Expo Cultural Park along the Huangpu River—constitutes the country’s first permanent, purpose-built facility that meets the standards for top-tier international equestrian competitions. Its construction is centered on the core concept of the "coexistence of humans, animals, and nature." The overall design extends the ecological forms of the park's valleys and rivers, with the roof's greening rate increased by 35% to a green area of nearly 8,000 m². It has preserved 126 existing trees and added 28 native plant species to form a complete ecological corridor. The venue uses light-colored interior decorations to reduce energy consumption and is equipped with female-friendly viewing stands and accessible facilities, balancing environmental protection with humanistic care.

The Juss International Equestrian Centre, with sustainability at its core, systematically integrates multiple green technologies in site construction, resource utilization, and operational management, creating a highly efficient, low-carbon demonstration venue. The center uses a fiber-sand footing, which not only effectively protects horses' hooves, suppresses dust, and saves water, but also extends its service life to five years while significantly reducing carbon emissions. The venue's construction strictly adheres to the LEED Gold standard, with overall energy consumption reduced by over 30% compared to conventional designs. Through the installation of 12,000 square meters of vertical greening, the annual carbon sequestration reaches 15 tons. An intelligent rainwater harvesting system collects and reuses approximately 25,000 tons of rainwater annually, meeting 80% of the irrigation needs for landscaping.

Furthermore, through anaerobic digestion of horse manure and biomass energy conversion, over 90% of waste is recycled. Combined with rooftop photovoltaic and geothermal heat pump systems, renewable energy accounts for over 40% of the venue's total energy consumption. Operationally, the center relies on a digital event management system to make 90% of its processes paperless, reducing single-use items by over 5,000 pieces per event and avoiding the high costs and low utilization rates of traditional temporary venues. The experience from this project has been incorporated into municipal building energy conservation guidelines, becoming a replicable model for the industry. The center adopts a "6+2" operating model: during the competition season, it primarily hosts two core events, the Longines Global Champions Tour of Shanghai and the Shanghai International Equine Culture Festival; during the off-season, it expands into six other scenarios, including horse trading, art exhibitions, and club experiences, comprehensively enhancing resource utilization efficiency and economic benefits.

Overall, enterprises like Shanghai Chengtou Holding and Shanghai Juss Group have established systematic practices in the innovation of low-carbon technologies and their application in buildings. The technical and operational experience they have accumulated in fields such as low-carbon communities, near-zero energy buildings, and professional venues holds significant industry demonstration value and potential for promotion.

(II) Building "Waste-Free Factory" to Drive Green Manufacturing

SAIC Motor Corporation Limited's business primarily covers vehicles, auto parts, mobility and services, finance, international operations, and innovative technology. Through comprehensively deepening reforms and advancing innovative transformation, SAIC's "new three driving forces"—its own brands, new energy vehicles, and overseas markets—are continuously accelerating. SAIC Motor has integrated ESG into the core of its corporate strategy, positioning green development as a key path to achieving strategic transformation. In 2024, SAIC Motor was successfully selected for the "Top Ten Cases" of Social Responsibility (ESG) for 2023–2024 within the Shanghai SASAC system. The group and its subsidiaries, in coordination with the national strategic transition from "dual control of energy consumption" to "dual control of carbon emissions," have formulated a clear green development plan,

advancing their green transition from multiple dimensions including product structure, smart manufacturing, and energy efficiency improvement.

Through continuous investment in innovative technologies, the development of energy-saving and carbon-reduction technologies and digital management systems, the group is advancing the implementation of various green, energy-saving, and emission-reduction measures. Through a digital energy metering system, it understands the energy consumption of its own production and manufacturing, gradually increasing the proportion of green electricity in its purchased energy to fully promote the realization of energy-saving goals. The SAIC Volkswagen Anting base has already achieved 100% use of green electricity and is striving to build a zero-carbon vehicle production base. The group's various production bases are focusing on the construction of distributed photovoltaic systems. As these systems are gradually completed and put into use, the installed photovoltaic capacity reached 301 MW by the end of 2024, with photovoltaic power generation reaching 210 million kWh. The group's various enterprises have formulated periodic, quantitative energy-saving targets or energy consumption targets per product. Through industry exchanges and management empowerment, combined with refined daily management, optimized process parameters, and the application of intelligent technologies, the carbon reduction plan covers the core of production and operations to minimize carbon emissions during the manufacturing process. At the same time, by promoting the renewal of energy-consuming equipment, high-energy-consumption equipment is gradually being replaced with equipment that meets advanced energy efficiency standards.

SAIC Motor encourages qualified enterprises to build "waste-free factories" to reduce resource demand and environmental impact, promoting the reduction, recycling, and harmless treatment of solid waste, and leveraging the synergistic effects of pollution reduction and carbon reduction to contribute SAIC's strength to the construction of a zero-carbon automotive industry chain. As of the end of 2024, SAIC and its subsidiaries had accumulated 41 national or provincial/municipal level certifications, including for green factories, green products, green supply chains, and China Environmental Labelling. During the 14th Five-Year Plan period, the established goal of reducing energy consumption per unit of output value by 3% annually is being achieved, and the overall reduction in energy consumption per unit of production during

this period is expected to exceed 15%. Similar manufacturing enterprises can refer to its planning path, formulate suitable green transition plans based on their own factory's actual conditions, increase investment in technology R&D, establish a complete green management system, and gradually realize the green upgrading of their factories.

China Baowu Group comprehensively implements the spirit of the 20th National Congress of the CPC and the requirements of *the Opinions of the CPC Central Committee and the State Council on Comprehensively Promoting the Construction of a Beautiful China*, adhering to a path that is high-end, intelligent, green, and efficient, and pursuing technological innovation, smart manufacturing, green and low-carbon development, and high-efficiency intensification. Following the release of *the Work Plan for the Construction of 'Waste-Free Cities' during the '14th Five-Year Plan' Period*, Baowu Group initiated research on a pilot program for the construction of a "waste-free group." In 2024, after the Ministry of Ecology and Environment formally approved *the China Baowu 'Waste-Free Group' Construction Pilot Work Plan*, Baowu Group strengthened its top-level design at the corporate level, systematically planned the program, and established a collaborative mechanism. Focusing on the six main objectives of maximizing source reduction of solid waste, minimizing off-site disposal, standardizing collection and storage, optimizing utilization and disposal, productizing recycled resources, and smartening supervision and monitoring, the group adheres to precise, scientific, and law-based pollution control. While continuously advancing the "zero off-site disposal of solid waste" initiative, it further leverages the synergistic effect of using metallurgical furnaces to utilize and dispose of solid waste for pollution and carbon reduction. It actively practices the "waste-free" concept and carries out pilot work based on a "one-factory, one-policy" approach to explore the construction of a "waste-free group" pilot at a large-scale integrated steel enterprise, thereby supporting "waste-free cities" and the construction of a Beautiful China. In 2024, all pilot units fully completed their pilot task objectives.

In source reduction, the group achieved its reduction targets by promoting reduction technologies and strengthening source control to optimize processes; among these, the Baoshan base of Baosteel Co., Ltd. saw a decrease in the generation intensity of general industrial solid waste by 0.02 tons per ton of steel in 2024. In minimizing off-site disposal, the group deeply

tapped the potential for reusing materials in facilities like sintering machines and rotary hearth furnaces, maintaining a comprehensive solid waste utilization rate of over 99%; Baosteel Co., Ltd. reused 14,300 tons of waste such as emulsified oil and chromium-containing sludge in its sintering process, and the amount of self-produced hazardous waste disposed of off-site dropped to 9,600 tons, breaking the 10,000-ton barrier for the first time. In standardizing collection and storage, Baowu Environmental Science and Technology established a micro-enterprise platform in Baoshan District, solving the hazardous waste collection and disposal challenges for over 1,000 small and medium-sized enterprises. In optimizing utilization and disposal, Baowu Environmental Science and Technology collaborated with the Baoshan base to promote the "point-to-point" disposal of activated sludge from Baowu Carbon Materials, which is processed into batch material and returned to the sintering process, and also coordinated with automotive manufacturers and other metal scrap collection units for the "point-to-point" utilization of oily metal scrap in converters. In productizing recycled resources, the group promoted the application of metallurgical slag and other solid waste in industries such as construction materials, municipal engineering, transportation infrastructure, and environmental remediation, and explored its technical pathways in fields like soil improvement and underground backfilling. In smartening supervision and monitoring, the China Baowu Smart Platform for Solid and Hazardous Waste Resources was officially launched, achieving digital management of the entire lifecycle of cross-industry solid and hazardous waste resources. By the end of 2024, it had achieved cross-platform data exchange and sharing with the hazardous waste off-site information database of Baosteel Co., Ltd.

Through mechanism innovation, Baowu Group has constructed a vertical promotion mechanism of "Group—Secondary Company—Pilot Unit" and a horizontal collaboration mechanism among relevant departments, advancing the "waste-free group" construction pilot through top-down and bottom-up linkage. It has established an external technical support team and an internal expert database mechanism, improving effective management mechanisms to guarantee the efficient advancement of the pilot work. In terms of model innovation, the group has established regional centers for the utilization and disposal of solid and hazardous waste, exploring models of facility sharing, "point-to-point" utilization, and a "whitelist" system. This

standardizes hazardous waste management, reduces environmental risks, and enhances the efficiency of solid waste utilization, contributing to the construction of “waste-free cities.” In terms of standard innovation, the group has taken the lead in formulating construction guidelines and supporting evaluation indicator systems for a "waste-free group," a green "waste-free city" steel plant, and a "waste-free mine" in the steel industry. It has also compiled a recommended technology catalogue for the comprehensive utilization of solid waste resources, solidifying pilot achievements and forming a long-term mechanism. These innovations not only lead the green, high-quality development of the industry but also provide practical corporate support for the formulation of relevant national policies.

Similar manufacturing enterprises can refer to the planning paths of the above enterprises cases, formulate suitable green transition plans based on their own factory's actual conditions, increase investment in technology R&D, improve their green management systems, and gradually realize the green upgrading of their factories.

(III) Collaborating Green Supply Chain to Catalyze Industrial Value Chain Upgrading

As one of the first pilot enterprises for extended producer responsibility for automotive products, **SAIC Motor Passenger Vehicle Company** actively played its role as a chain leader in the vehicle industry during the pilot period. It conscientiously implemented the requirements for green, low-carbon, and circular development. With the core goal of "full lifecycle green, low-carbon circulation," it established a green supply chain by considering the reduction and recycling of resources from the source, driving the upstream and downstream of the industrial chain to accelerate their green transition. By taking the lead in building a recycling system for end-of-life vehicles, it has achieved green collaborative development of the industry, improved the comprehensive competitiveness and resource and environmental benefits of automotive products, and cultivated the energy for the company's sustainable and healthy development.

The key practice of SAIC Group's green supply chain lies in the establishment of a recycling consortium with a clear division of labor and strong professional capabilities, achieving deep collaboration among enterprises upstream and downstream of the industrial chain. Through clear responsibility allocation and goal setting, each enterprise has a defined task and emission reduction target in the green transition. An effective communication

mechanism has been established, with regular consortium meetings to share low-carbon technologies and experiences. An incentive mechanism has also been established to identify and reward enterprises that perform outstandingly in areas like green process innovation and resource recycling, promoting active participation across the entire chain. This provides a reference model for peer enterprises to build a green supply chain, achieving resource sharing, risk sharing, and mutual benefits through collaboration, and promoting the green upgrading of the entire industry.

As a state-owned enterprise and a leader in the hotel industry, **Shanghai Jin Jiang Hotel** continuously explores the path of green transition and actively carries out sustainable supply chain pilot work. In Jin Jiang Hotel's procurement decisions, the Jin Jiang Global Procurement Platform (hereinafter referred to as GPP) plays a central role and is a key vehicle for promoting the construction of a green supply chain. The practical experience of this platform can be distilled into the following four areas.

Building a green product procurement system and prioritizing green suppliers. In 2024, GPP, in close cooperation with a professional third-party assessment agency, successfully constructed *the Jin Jiang GPP Sustainable Development Framework 1.0*. This framework is based on international standards and industry trends and is combined with Jin Jiang Hotel's long-term green goals to provide a comprehensive and systematic guidance plan for the sustainable development of the supply chain. It covers key dimensions such as green supplier assessment and supply chain improvement plans, clarifying construction standards and directions. As an important measure for implementing the framework, GPP has carried out special work to build a "Sustainable Supplier Database." It has formulated strict audit rules for 10 core categories, including televisions and hotel amenities, to ensure that suppliers meet ESG and sustainable development requirements. As of December 31, 2024, a total of 28 suppliers across various categories have passed the audit and have been formally included in the GPP Sustainable Supplier Database.

Cultivating suppliers' ESG awareness and creating a collaborative, win-win sustainable ecosystem. GPP organizes a series of activities such as the "Industrial Chain Entrepreneur Seminar," the "Supply Chain Enterprise Growth Camp," and the "Preferred Procurement Club

ESG Salon." Through training, it enhances the ESG awareness and management capabilities of upstream and downstream suppliers, encouraging them to pay more attention to ESG practices, thereby jointly building a high-quality supply system with environmental friendliness and social value.

Enhancing the visibility of green procurement and creating an efficient green product identification mechanism. To promote the implementation of green procurement from concept to execution, GPP has launched an "ESG Product Zone" on its B2B platform. It displays products from audited sustainable suppliers with an "ESG" label, helping purchasers to conveniently identify products and partners that meet green standards, and improving the visibility and efficiency of green product procurement. This initiative not only provides an intuitive path for Jin Jiang Hotel's internal green procurement but also offers efficient and reliable sustainable procurement support for its franchisees.

Deepening green product selection innovation and promoting material upgrades and plastic reduction goals. In its green procurement practices, GPP continuously promotes product material innovation and environmentally friendly alternatives. For single-use guest amenities, hotel has gradually phased out all-plastic materials (such as PP, PS) in products like toothbrushes and combs and has widely introduced renewable materials such as wheat straw, increasing the proportion of degradable materials in packaging and effectively promoting the transition of guest amenities toward being low-carbon and environmentally friendly. At the same time, it has launched a "small bottles to large bottles" project for bath and shower products, uniformly promoting reusable large-capacity packaging, which is expected to reduce plastic use by about 685 tons annually, providing substantial support for the hotel's plastic reduction goals.

(IV) Accelerating Green Industrial Parks to Power Enterprises Green Transition

Shanghai Lingang Economic Development (Group) Co., Ltd. is a large state-owned enterprise group under the direct administration of the Shanghai municipal government, with its main business in park development, enterprise services, and industrial investment. It is listed among China's Top 500 Service Enterprises. In 2024, Lingang Group remained on the Pioneer 100 Index for SOE Social Responsibility, ranking 14th, the highest among the selected SOEs

in Shanghai. Its listed subsidiary, "Shanghai Lingang," also remained on the Pioneer 100 Index for SOE-Listed Company ESG, ranking 10th. By the end of 2024, the first phase of the Dripshui Lake Financial Bay project, developed by a subsidiary of the group, was fully delivered. Among its buildings, the "Dripshui Lake Financial Bay C1 Tower" was certified and awarded as one of the first "Zero-Carbon Building Evaluation Projects" by the China Association of Building Energy Efficiency. By the end of 2024, the Lin-gang Special Area had implemented 4.9 million square meters of ultra-low energy consumption building area, accounting for about 36% of the total in Shanghai.

Shanghai Carbon Valley Green Bay Industrial Park (formerly Jinshan Second Industrial Zone), established in 1995, is a provincial-level industrial park approved by the National Development and Reform Commission. In 2024, it was identified as a national Class D safety risk chemical park. Relying on the Shanghai Chemical Industry Park and Sinopec Shanghai Petrochemical, it focuses on a “3+1” industrial positioning (three major industries: energy conservation and environmental protection, green materials, and biomedicine, plus producer services), forming four leading industries and their supporting systems. It is home to 12 "National Green Factories" and 13 "Shanghai Municipal Green Factories," ranking first in Shanghai in the number of green certifications.

The Shanghai Carbon Valley Green Bay Industrial Park, through a “dual transformation” process, has constructed a “modular, clustered” development model and introduced platforms like the Carbon Valley Green Bay Branch of the Shanghai Institute of Quality and Technical Supervision to promote the construction of an innovative ecosystem in the new materials field. It has innovated its industrial chain investment promotion model, focusing on areas such as clean raw material substitution, process technology upgrades, and waste heat sharing to support the green transition of enterprises and promote synergistic efficiency in pollution and carbon reduction. It formulated *the Pilot Program for Synergistic Innovation in Pollution and Carbon Reduction*, promoted chemical recycling technology for waste plastics, and established a green technology innovation platform to drive corporate green transition through measures such as raw material substitution, process upgrading, and waste recycling, while also promoting collaborative emission reduction across the industrial chain. It innovated an “energy diagnosis

+ equipment retrofitting" service and established a cross-departmental energy consumption monitoring mechanism to reduce the overall energy consumption level of the park. At the same time, the park has strengthened the construction of its safety and environmental protection systems. A cumulative total of 525 million yuan has been invested in safety and environmental renovations, revitalizing 41 plots of existing land. Three rounds of comprehensive environmental governance led to the closure of 86 enterprises with high pollution, high energy consumption, and low efficiency, freeing up 1,888 mu of land. After two rounds of safety enhancement actions, it was rated as a national Class D chemical park. The park has established a policy of rewards and subsidies for technological upgrades, incubated industrial chain services such as innovation and waste recycling, and promoted "strengthening and supplementing the chain" through customized investment attraction, achieving a transformation from "extensive investment attraction" to "green merchant selection."

At the municipal development zone level, the **Shanghai Minhang Economic and Technological Development Zone** (a subsidiary of Shanghai Land Group) was rated as a national "Green Industrial Park," the only industrial park in Shanghai to receive this honor in 2024. It also released the nation's first annual carbon emissions report for an industrial park, *the Shanghai Minhang Economic and Technological Development Zone Carbon Emissions Report (2024)*. Through the establishment of a "Green Co-construction Alliance," the park has promoted the implementation of 908 low-carbon projects by enterprises and has built photovoltaic power stations at 19 enterprises. It also released *the Action Plan for Creating a Zero-Carbon Demonstration Park*. Since the plan's release, over 95% of the tasks have been implemented, and the creation of the zero-carbon park is steadily advancing.

Shanghai enterprises are establishing a demonstrative and leading role in the field of green park construction. Their experience in the construction of low-carbon green buildings can be referenced and applied to similar park enterprises at home and abroad in the future.

(V) Adopting a Multi-Sector Approach to Promote Low-Carbon Transition in Energy and Shipping Industries

Shenergy Group is the energy supplier serving over 24 million citizens in Shanghai and a pioneer leading innovation and development in the energy industry. It bears the significant

responsibility of ensuring the city's energy security and promoting the optimization and adjustment of the city's energy structure. In recent years, the group has adhered to high-quality promotion of the deepening and upgrading action for state-owned enterprise reform, striving to be the main force in safeguarding the energy security of the people's city, the vanguard in the construction of a new energy system for a megacity, and a new force in building a green, low-carbon industrial and financial ecosystem.

On one hand, Shenergy Group is accelerating its low-carbon transition, focusing on building a pioneering landscape for green electricity. Shenergy Group is steadfastly promoting the optimal combination of new energy and coal power, expanding its industrial footprint in new energy sources such as wind and photovoltaics, leveraging the role of coal power for basic security and flexible regulation, and accelerating the creation of a pioneering green electricity landscape to serve the construction of the nation’s new power system.

Shenergy Group has proposed a “sea and land” strategy to vigorously develop the new energy industry. Shenergy is promoting the construction of large-scale new energy project bases outside of Shanghai, in places like Hainan and Xinjiang, exploring demonstration pilots for deep-sea and far-shore wind power, and actively integrating into Shanghai's "Photovoltaics+" special projects. By the end of 2024, Shenergy's new energy projects were spread across 24 provinces, municipalities, and autonomous regions nationwide, with a total installed new energy capacity of 6.13 million kilowatts, accounting for over 34% of its total installed capacity. The first phase of the Shenergy Hainan CZ2 demonstration project became the first offshore wind power project in Hainan Province to be connected to the grid at full capacity. Substantial progress was made on the Shenergy Xinjiang Tacheng 3.35-million-kilowatt wind and solar base project.

Shenergy Group is steadily advancing the clean transition of coal power. Shenergy is accelerating the low-carbon retrofitting of coal-fired power units, promoting the application of multiple pathways such as CCUS, biomass co-firing, and green ammonia co-combustion, and enhancing the flexible peak-shaving capabilities of coal-fired units to better play their role in basic security and flexible regulation. In 2024, the average coal consumption for power supply at Shenergy's controlled power plants was about 15 g/kWh lower than the national average.

The No. 8 unit of Shenergy Waigaoqiao No. 3 Power Generation Co., Ltd. became the first unit in Shanghai to achieve deep peak shaving at 20% of its rated load while meeting dry operation requirements after retrofitting. The Shenergy Waigaoqiao No. 3 CCUS demonstration project also became the nation's first demonstration project to achieve a closed-loop process of flue gas capture to methanol production, providing a demonstration model for the low-carbon transition of coal power.

On the other hand, Shenergy Group is also actively expanding its layout, focusing on stimulating new momentum for green development. In recent years, the group has been seizing the commanding heights of the green energy industry, exploring multiple paths in a number of clean energy sources such as green methanol and hydrogen energy, accelerating the cultivation of future energy, and continuing to lead on the new track of green and low-carbon transition.

Shenergy Group is actively exploring and cultivating the green methanol business. In accordance with the unified deployment of the municipal party committee and government, it has joined hands with several Shanghai state-owned enterprises to sign a 100,000-ton level green methanol project, promoting a "zero breakthrough" for Shanghai's local green methanol production capacity. The Shenergy Songlin Biogas project received the nation's first ISCC EU and PLUS double certification for biogas, turning the certification of Shanghai's green methanol raw material end from theory into reality and helping to enhance the level of the Shanghai International Shipping Center.

Shenergy Group is steadily advancing its hydrogen energy strategy. In accordance with its "three vertical and three horizontal" hydrogen energy development strategy, Shenergy is focusing on breaking through the bottlenecks in the key links of the hydrogen energy industry chain—“production-storage-transportation-refueling-application.” It has invested in several "specialized, refined, distinctive, and innovative" 'little giant' enterprises in Shanghai, Zhejiang, and other places, actively promoting the application of products in multiple scenarios. In 2024, the national research project "Offshore Wind Power for Hydrogen Production and Comprehensive Utilization," led by the group, was successfully launched. The first phase of the Shanghai Hydrogen Energy Security Base project, the nation's first 300-bar Type II cylinder hydrogen filling center, was officially put into operation. The wind power portion of the

Shenergy Baiyun Ebo Mining Area 14 MW distributed wind power and hydrogen energy integrated project was connected to the grid and put into operation, achieving breakthroughs at multiple points in the hydrogen energy industry chain.

The shipping industry is also a key sector for low-carbon transition. In July 2023, the International Maritime Organization (IMO), at the 80th session of its Marine Environment Protection Committee, adopted the 2023 IMO Strategy on Reduction of GHG Emissions from Ships. It sets a clear emission reduction target of "reaching peak GHG emissions from international shipping as soon as possible and to reach net-zero GHG emissions by or around, i.e., close to 2050, taking into account different national circumstances," demonstrating the IMO's ambition to actively address global climate challenges.

At the policy level related to emission reduction in maritime transportation, Chinese government, by formulating strict environmental regulations and standards, such as carbon emission intensity standards and reward-and-penalty mechanisms, is incentivizing domestic shipping enterprises to transition toward being green and low-carbon. The carbon reduction goals of China's shipping industry are focused on improving the energy efficiency of ships, reducing carbon emissions per unit of transport activity by adopting innovative ship designs and operational technologies. Technological innovation is the core to achieving carbon reduction goals, including research and application of alternative fuels (such as LNG, methanol, ammonia, etc.) and the promotion of energy-saving technologies.

As a leading enterprise in the shipping industry, **COSCO Shipping Holdings Co., Ltd.** is actively responding to climate action, identifying climate change risks, and formulating response strategies. It is committed to creating a climate-friendly shipping business with green fuels, green shipping, and green terminals, and is dedicated to reducing the environmental impact of its business operations. It has proposed to achieve carbon neutrality by 2060 at the latest and strives to meet the IMO's net-zero carbon emission standard for ships by or around 2050. Its container transport business reduces greenhouse gas emissions generated during operations by promoting clean fuels, ship maintenance, and route optimization. In its port business, it continues to optimize port energy consumption and further implement the use of shore power to reduce fuel emissions from ships, achieving a harmonious coexistence between

the company's sustainable development and the ecological environment.

COSCO Shipping Holdings is advancing its green transformation primarily through four initiatives: green fuel utilization, green fleet development, green terminal construction, and fuel-saving navigation measures. Regarding green fuel adoption, COSCO Shipping Lines has launched pilot biofuel projects on the vessels COSCO Golden Star and COSCO Centaurus, utilizing biofuels to reduce greenhouse gas emissions from ships. OOCL has also actively pursued biofuel substitution initiatives, successfully securing supply of customized B24 biofuel. This fuel blend, composed of methyl ester derived from recycled cooking oil and low-sulfur fuel oil, is delivered via barges to OOCL's container vessels.

In terms of green fleet development, all newly built vessels of COSCO Shipping Lines meet the requirements of the International Maritime Organization's Energy Efficiency Design Index Phase III (IMO EEDI Phase III). In green terminal development, COSCO Shipping Ports has achieved full shore power coverage at container berths across its domestically controlled terminals. This provides vessels with shore-based power, helping ships effectively reduce carbon emissions, exhaust emissions, and noise pollution during port calls. Beyond shore power access, COSCO Shipping Ports is actively developing distributed photovoltaic systems at its controlled terminals. By installing solar power stations on terminal building rooftops, the company generates clean electricity for port operations. For fuel-saving navigation initiatives, COSCO Shipping Lines has implemented a speed reduction plan. By strengthening coordination with vessels, domestic and international ports, terminals, and other stakeholders, it scientifically schedules shipping itineraries to minimize vessel dwell times at ports, avoiding accelerated schedules that lead to excessive fuel consumption.

In terms of fuel-saving navigation measures, COSCO SHIPPING Lines has formulated a speed reduction plan. By strengthening coordination with ships and various parties such as domestic and foreign ports and terminals, it scientifically and rationally arranges shipping schedules to minimize the berthing time of ships in port and avoid excessive fuel consumption from speeding up to meet schedules.

Through multiple measures such as the use of green energy, the construction of a green fleet, the construction of green terminals, and shipping energy conservation, COSCO

SHIPPING Holdings has effectively reduced greenhouse gas emissions and energy consumption. The company's carbon reduction performance continues to improve, and it is moving toward its goals of achieving IMO net-zero emissions by 2050 and carbon neutrality by 2060.

(VI) Advancing the Circular Economy and Promoting Extended Producer Responsibility

SAIC Motor Group actively responds to national policies by developing a circular economy. It promotes practical innovation in the extended producer responsibility system, constructing a closed-loop system that covers recycling, comprehensive resource utilization, green supply chain management, and information disclosure. By taking the lead in forming the "SAIC Passenger Vehicle ‘Automotive Product Producer Responsibility Extension Consortium’," it integrates industrial chain resources to achieve efficient recycling. In production and manufacturing, it increases the proportion of recycled raw materials and optimizes processes to reduce consumption. In packaging, it adheres to the principle of reduction, promoting circular sharing, light-weighting, and increased volume efficiency. It uses 100% recyclable/reusable/degradable materials, reducing annual packaging material usage by about 6,000 tons. The proportion of recyclable packaging at SAIC Passenger Vehicle and SAIC Volkswagen exceeds 95%, demonstrating an industry-leading level.

Shanghai Jin Jiang Hotel actively advocates for and practices circular development within the hotel industry, developing a distinctive circular economy for Jin Jiang. The company is actively promoting de-plasticization efforts, incorporating environmentally friendly "six small items" made from straw materials into its brand standards, and gradually promoting the use of eco-friendly single-use guest amenities such as toothbrushes, combs, towels, and shower curtains across all its hotels. In 2024, all brands under Jin Jiang Hotel's limited-service segment completed the 100% incorporation of eco-friendly single-use guest amenities into their brand standards. Jin Jiang Hotel has also further "greenly upgraded" its single-use items through initiatives such as replacing small plastic bottles of bath products in guest rooms with more environmentally friendly large-format dispensers, eliminating the plastic film packaging for slippers, and using eco-friendly straw materials and paper bags for single-use amenities. These measures have effectively reduced the generation of plastic waste and lessened environmental

impact.

Furthermore, various brands under Jin Jiang Hotel have implemented and promoted multiple circular economy projects, such as the recycling of used linens and the recycling and reuse of soap. The hotel, in collaboration with the Environmental Protection and Resource Conservation Promotion Committee of the China National Textile and Apparel Council, jointly launched the "Hotel Used Linen Recycling and Resource Utilization Initiative", pioneering a forward-looking exploration of linen recycling. The project has now completed the technical analysis for the recycling and remanufacturing pathways for used linens and has established a closed-loop management model of “collection—regeneration—redemption—reporting.” In 2024, the limited-service segment of Jin Jiang Hotel launched a forum on the innovation and practice of recycling and resource utilization of used hotel linens, themed "Driving and Co-shaping New Quality Productive Forces through Circulation." Together with partners, it built a linen recycling mini-program called "Circular Settlement," launching large-scale used linen collection work through this platform. Brands such as Jin Jiang Inn and Magnolia have 832 hotels online, having collected a total of 2,253.8 kg of used hotel linens for comprehensive resource utilization. Of this, 714.8 kg were used towels, which were used to manufacture recyclable fibers, and 1,539 kg were used bed linens, used to manufacture recycled polyester-cotton yarn. In 2024, this project resulted in an overall energy consumption reduction of 125,000 megajoules and a reduction in greenhouse gas emissions of 10,900 kg of carbon dioxide equivalent. In the future, the company will, through the continuous optimization and iteration of its digital platform, establish internal standard systems to regulate the management of used linens and achieve efficient, large-scale collection. Externally, it will leverage the multi-party cooperative strength of the project to jointly explore a market-oriented operational model suitable for long-term operation.

In 2024, Jin Jiang's full-service segment became the first hotel management company to join the "Soap for Hope™" charity program, initiated by Diversey, and announced that 18 of its hotels would officially launch this project starting from March 1st. The "Soap for Hope™" project helps partner hotels collect leftover soap from guest check-outs and, in collaboration with local communities and non-profit organizations, reprocesses it into new bars of soap using

an innovative and refined cold-press method. The production process is environmentally friendly and simple, requiring no additional electricity or tap water. While contributing to the reduction of landfill waste, it also creates more employment opportunities. The new soap is then distributed to communities in need, providing free soap to areas lacking sufficient hygiene resources and effectively reducing the spread of viruses. In 2024, the hotels under Jin Jiang's full-service segment participating in this project collected a total of 1,739.1 kg of used soap and produced 9,661 new bars of soap. This initiative demonstrates Jin Jiang Hotel's determination and action in promoting circular economy practices in innovative ways, while also actively guiding the Chinese hotel industry's transition toward green development.

Various benchmark enterprises in Shanghai, while reducing waste generation and improving resource utilization efficiency, have innovatively promoted the in-depth development and practice of the circular economy in industries such as manufacturing and hospitality, contributing to the sustainable development of these sectors.

II. Innovative Practices of Shanghai Enterprises on Social (S)-related issues

(I) Undertaking Green Renovation of Historical Buildings to Enhance Shanghai's City Image

Shanghai Land (Group) Co., Ltd. is a state-owned real estate development enterprise supervised by the Shanghai Municipal State-owned Assets Supervision and Administration Commission. It focuses on various major special tasks concerning the long-term development of Shanghai, including regional renewal, the renovation of old districts, old housing, and urban villages ("two olds, one village"), ecological environment construction, the construction and operational management of affordable and rental housing, beautiful countryside construction, development zone construction, and public elderly care.

Shanghai has proposed that historical building renovation projects should balance architectural style preservation with low-carbon emission reduction, and that the renovation of old districts should balance the interests of the people with the green and low-carbon requirements for buildings, placing higher demands on renovation enterprises. In the renovation project of the former Municipal Council Building on the Bund, completed in October 2024, Shanghai Land Group innovatively combined historical building preservation

with green, low-carbon technologies. Through DNA-style digital preservation technology, detailed information on the architectural heritage was collected. Measures such as custom metal-framed, thermally broken, insulated glass doors and windows mimicking the historical style, and an internal insulation layer for the fair-faced red brick exterior walls were adopted to enhance the thermal performance of the building envelope. This achieved low-carbon goals with low cost and high efficiency, allowing the century-old building to be functionally repurposed while becoming a benchmark for green renewal in the Bund area. In the future, the preservation of urban cultural heritage can be further integrated with green technology to form a replicable model for urban renewal.

As a major sports landmark in Shanghai's urban core, the Xujiahui Sports Park, operated by **Juss Sports**, faced issues such as aging facilities prior to its renovation. The upgrade proceeded with a focus on functional integration, green and smart technologies, and human-centered design, creating a modern complex that combines elite sporting events, mass fitness, and urban ecology. The most notable feature of the project is the spatial synergy of "one stadium and two arenas" (a stadium, an indoor arena, and an aquatics center). In addition, the construction of a new two-level underground complex and an intelligent parking facility significantly improves space utilization. The park also introduced, for the first time, open-access smart-lit basketball and football pitches as well as fitness trails, all supported by online reservation and energy-consumption monitoring systems, enabling residents to enjoy convenient, on-demand exercise.

In terms of technology application, the stadium has been upgraded to FIFA Grade A standards, with over 1,600 HD cameras installed and 1,300 direct connection channels opened to solve the communication bottlenecks for events and performances with tens of thousands of attendees. Smart catering and navigation systems further allow spectators to order food online, pick it up at designated times, and receive intelligent guidance. At the community level, fitness equipment is managed via QR codes, with repair and inspection data aggregated in real-time on a municipal platform, enhancing service efficiency.

In terms of environmental protection, the venues have comprehensively incorporated low-carbon concepts: photovoltaic power generation, rainwater harvesting, and sponge city design

have reduced energy consumption by 30%. During the renovation, a large amount of the original steel and stadium seating was reused, reducing construction waste by over 500 tons. All building materials are either recyclable or environmentally friendly. A 12,000-square-meter rooftop garden and native plant communities have turned the sport park into an “ecological green lung” in the city center. Furthermore, the underground space is seamlessly connected to Metro Lines 1 and 4, equipped with 200 electric vehicle charging stations and an intelligent waste sorting station, promoting green travel and resource recycling.

Today's Xujiahui Sports Park is a "city's reception hall" for hosting international events, a "public sports ground" for tens of thousands of people to exercise daily, and an "urban ecological corridor" integrating green pathways and aerobic parks. Through green renewal, it has achieved intensive land use and maximized public value, becoming a model for the sustainable development of sports facilities in a central urban area.

(II) Advancing Smart Transportation Infrastructure for the Benefit of Public Livelihood

Shanghai Chengtou Highway Investment (Group) Co., Ltd. is the core enterprise under Shanghai Chengtou Group, specializing in the investment, construction, and operation of major transportation infrastructure such as expressways and river-crossing bridges and tunnels. The company has undertaken landmark projects like the Beiheng Passage, the S3 Highway, and the major overhaul of the Outer Ring Tunnel. It is a backbone force in enhancing Shanghai's urban transport capacity, promoting the green and low-carbon development of transport infrastructure, ensuring the city's operational safety, and benefiting public livelihood. Chengtou Highway is accelerating the infrastructure industry's shift from an engineering orientation to comprehensive value creation, strengthening the social resilience of infrastructure under the "dual carbon" targets, accelerating the integrated development of southeastern Shanghai with the Yangtze River Delta, and demonstrating the dual empowerment of sustainable transport infrastructure for both the regional economy and public welfare.

The new construction of the Shanghai S3 Highway (ZhouDeng Highway–G1503 section) utilized core technologies such as prefabricated assembly (with an application rate of 95%) and BIM full-lifecycle management, significantly reducing construction waste and lowering carbon emissions. The Outer Ring Tunnel underwent a "full-structure renewal," upgrading it to the

nation's first "pre-maintenance" smart tunnel, thereby significantly enhancing energy efficiency. The Beiheng Passage, a landmark project completed by Chengtou Highway in 2024, centrally embodies the technological innovation of a state-owned enterprise in the infrastructure sector in both environmental and social aspects. The project, using a "three-dimensional expansion model," moved nearly 80% of the entire route underground, saving over 320,000 square meters of urban land that would have been used for roadways. This significantly reduced the noise impact of elevated highway construction on residents and its effect on historical buildings, echoing the “waste-free highway” concept.

On the technological innovation front, the project made a breakthrough by applying long-distance micro-disturbance control technology, achieving “zero damage” in 13 crossings of metro lines, 11 crossings over and under the Suzhou Creek, and tunneling beneath 108 buildings (including century-old protected structures) at 89 locations, creating a “technical encyclopedia” for shield tunneling. At the same time, for the first time in the country, a new process of unmanned paving and compaction was applied in a long, low-clearance urban tunnel. By monitoring asphalt construction parameters in real-time, it significantly reduced later maintenance costs, providing a green and smart construction model for the industry. Its social benefits are even more groundbreaking: after the passage was opened, the commute time for citizens across six districts, including Changning and Yangpu, was reduced to 30 minutes (at 60 km/h), diverting 5-10% of the traffic from the Yan'an Elevated Road and activating economic linkage in the area north of the Suzhou Creek. For example, the increased logistics efficiency from Zhoujiazui Road to the Hongqiao Hub directly empowers the integrated development strategy of the Yangtze River Delta.

(III) Leveraging Innovative REITs Financing for Affordable Rental Housing

Shanghai Chengtou Holding participates in comprehensive regional development and urban renewal construction, particularly in the development and operation of affordable rental housing projects. Affordable rental housing is directly related to the vital interests of the people and carries significant social responsibility, helping to better meet the housing needs of city builders and frontline workers in urban operations. Through smart community construction, green operations, and financial innovation, Shanghai Chengtou achieves sustainable

development with a win-win for both social and economic benefits. To address urban housing pressure and the insufficient supply of affordable housing, Shanghai Chengtou has been actively promoting the construction of Chengtou Home rental communities. It has already opened and is operating ten communities in six major areas of Shanghai, exceeding the task set in the “2024 Shanghai Municipal Program of Practical Services for the People” to supply 7,000 beds in homes for new-era city builders and managers. This further perfect the multi-tiered rental housing supply system of “a bed, a room, a suite,” meeting the diverse housing needs of the people. It has served over 25,000 residents in total and has collaborated with over 260 organizations to provide housing for talent.

While fulfilling its social responsibilities, Shanghai Chengtou is also actively innovating and broadening its financing channels. It has issued affordable rental housing Real Estate Investment Trusts (REITs) based on its projects to raise funds, achieving the revitalization of existing assets and the comprehensive optimization of its financing system. In 2024, it successfully issued the first public REIT for affordable rental housing by a Shanghai state-owned enterprise and released its first REIT sustainability report.

(IV) Establishing a ‘Green Development Base’ to Highlight Rural Revitalization Achievements

In response to the directives of Shanghai Municipality and Jinshan District, **Caojing Town in Jinshan District** took the opportunity of constructing a model village for rural revitalization to implement water conservancy projects, land consolidation, and wetland restoration. In 2021, it was officially recognized by the national Ministry of Ecology and Environment, becoming Shanghai's first "Practice and Innovation Base for 'Lucid Waters and Lush Mountains are Invaluable Assets'".

In ecological space management, Caojing Town, based on its positioning as a "coastal green corridor," has constructed an ecological pattern of "one park, two areas, three vertical axes, and multiple belts," and has completed environmental remediation along the Shenhai Expressway and G228 highway, as well as the re-greening of homesteads. It has coordinated a "point-line-area" ecological network across the entire town, with a forest area of 1,260 hectares (92.3% of which is protective forest) and a forest coverage rate of 20.36%. The villages of

Donghai and Hutang have been rated as “National Forest Villages.” By constructing a "south forest, north water" ecological network across the town, it has consolidated fragmented green spaces into systematic assets, providing a "high-value" foundation for industrial introduction. In ecological product supply, Caojing Town established Shanghai's first village-level "river chief" system work station, promoting river channel remediation and actively managing the water environment. In pollution control, the town's PM2.5 concentration remains at a low level within the district, with an excellent air quality rate of over 85%. In soil remediation, it has implemented scientific fertilization, deep plowing of green manure, and soil testing and remediation for low-efficiency land, controlling the risks of non-point source pollution.

Caojing Town is actively promoting industrial upgrading and green, high-quality development. By developing eco-agriculture, it has advanced projects such as recirculating aquaculture and quality improvement farming of northern snakehead, forming a "production + processing + cultural tourism" model and creating the “Cao Hai Yi Su” landmark product. It is actively developing specialty industries, building 5-billion-yuan level industrial clusters in biomedicine and new materials, and promoting the construction of the “Innovation Medicine Valley” and “Urban Beauty” projects. It is also innovatively developing eco-tourism. The Digital Nomad International Village connects over 1,700 talents globally. The Shanghai division of the national "Village Super League" soccer tournament attracted over 8.5 million views, and special projects like camping and kayaking have been developed. It promotes a "three-level jump" model of "ecological single product—processing upgrade—composite business formats," focusing on the progression from characteristic farming/breeding → primary and deep processing → experience economy → multi-format integration. As a "Two Mountains Base," Caojing Town is extending its high-quality development model through an "Ecology + Agriculture/Industry/Cultural Tourism" approach, forming a distinctive "Caojing" brand.

(V) Deepening Public-Private Partnership to Enhance Enterprises’ Social Responsibility

Guided by major national strategies, **Shanghai Shenergy Group** continues to optimize its layout and steadily advance the construction of major energy infrastructure, better integrating into the broader picture of building Shanghai's new energy system. It is orderly advancing the

construction of key national oil and gas projects and the Shanghai LNG station and pipeline expansion project, a major undertaking for both Shanghai and Zhejiang Province. It is solidly pushing forward the construction of the Yancang pressure regulating station project for the Wusongkou LNG Station–Lin-gang Natural Gas Pipeline, a major project for Shanghai, promoting the further improvement of the natural gas production, supply, storage, and sales system in Shanghai and the wider Yangtze River Delta region.

Shenergy Group steadfastly upholds the bottom line of energy security, holistically considering factors such as supply-demand balance, extreme weather, and emergencies. It coordinates development with security, leverages its advantage in "gas-power coordinated dispatch," and ensures a strong and guaranteed supply of electricity and gas for the city. In 2024, the group's power supply and natural gas supply volumes reached new highs. The cumulative controlled power generation for the year was 58.62 billion kWh, with the controlled generation from local units accounting for about one-third of the total power generation in the Shanghai region, effectively guaranteeing the city's stable power supply. The natural gas business volume reached 11.41 billion cubic meters, providing a stable gas supply to over 7 million gas users across the city.

Shenergy Group proactively integrates into the refined management of Shanghai city. It continues to deepen the investigation and rectification of hidden gas hazards, solidly promotes the renewal of aging gas pipelines and the renovation of old residential risers, and actively advances the municipal government's program of practical services for the people. In coordination with the Social Work Department of the CPC Shanghai Municipal Committee, it is advancing the "Gas Safety into the Community Volunteer Service Special Action" to solve the difficulty of conducting home safety checks in old residential communities, striving to secure the "last meter" of gas safety. In 2024, the group advanced the renovation of 719 kilometers of underground aging gas pipelines and the renovation of nearly 118,000 household vertical risers. It jointly launched the "Gas Safety into the Community Volunteer Service Special Action" with the Social Work Department of the CPC Shanghai Municipal Committee, completing on-site inspections and hazard rectification for 62,000 pipeline natural gas users in old residential communities across 6 pilot districts. It exceeded its target ahead of schedule for

"replacing the connection hoses and regulators for 500,000 bottled LPG residential users," benefiting 847,000 residents. It improved the online service channels and the entire service system for non-residential access, with the "one-stop government service" approval rate rising to 99.6%, continuously enhancing the level of gas safety guarantee services for citizens.

Small and medium-sized enterprises in Shanghai are also proactively practicing ESG, integrating ESG principles into their corporate operations and governance decisions. **Shanghai Xinyue Logistics Enterprise Management Co., Ltd.** is an industrial internet company that uses industrial data as a factor of production, "humans + robots" as innovative laborers, and artificial intelligence algorithms as its technological driver, realizing a new model of "digital industrialization and industrial digitization." The company uses enterprise services as its entry point into the industry and supply chain collaboration as its core value. It provides lifecycle service products for various links in the logistics industry chain (such as cross-border, warehousing, railway, air freight, etc.), including credit services, big data services, financial services, information services, and public services, providing the various tools needed by small and medium-sized logistics enterprises for digital transformation. The company uses ESG principles to drive the construction of new quality productive forces. At the end of 2024, it upgraded its concentric diversification strategy and launched human resource services for small and medium-sized logistics enterprises, actively promoting government-enterprise collaboration to deepen social responsibility. It jointly built the "South Shanghai Service and Guarantee Center for New Employment Groups" with the Jinshan District Human Resources and Social Security department. Through the joint efforts of its Party branch and labor union with functional departments like the district committee's social work department and the district general labor union, it provides services for labor dispute mediation, vocational training, and employment promotion, enhancing awareness of labor compliance. By establishing a "one-call response" service team and using the "i-Circular" application software, it provides 24-hour labor compliance support and rights protection for logistics enterprises and drivers, embedding ESG principles and tools into the company's business scenarios.

III. Innovative Practices of Shanghai Enterprises on Governance (G)-related issues

(I) Innovating Corporate Governance Through Business Integration

Orient Securities integrates ESG governance into its business processes, creating a three-tiered institutional architecture to address challenges in the financial industry such as anti-corruption and data security, thereby building a Shanghai model of institutional innovation and compliance management. At the top level of design, a Sustainability Committee has been established under the Board of Directors. At the executive level, a Green Finance Working Group has been formed, and the company has formulated the *ESG Risk Management Measures* and *ESG Due Diligence Guidelines*, explicitly incorporating ESG risks into its comprehensive risk management system. In compliance practice, the company achieved 100% anti-corruption coverage in its supply chain in 2024, requiring suppliers to sign *a Letter of Commitment to Integrity*. It developed customized, sector-specific scorecards for high-ESG-risk industries like coal and chemicals, completed due diligence on 124 clients, and rejected 10 projects that exceeded standards. It also established a three-tiered "Data Governance Committee-Data Security Working Group" architecture to ensure data security. On the innovation front, the company developed a digital management platform for professional integrity named "Qing Feng Wei Ban" (Clear Wind as a Companion), conducted 8 anti-corruption training sessions covering 6,727 participants, and increased its green procurement ratio to 35% in 2024, prioritizing energy-saving and environmentally friendly products. Orient Securities' governance effectiveness has been recognized by the market: it has been included in the Hang Seng A-share Sustainability Index for four consecutive years, with both its compliance review and supplier anti-corruption coverage rates reaching 100%, and customer satisfaction at 90.3%. In 2024, Orient Securities hosted the first stop of the Shanghai Federation of Financial Associations' "ESG Best Practice Enterprise Visit" event, highlighting its status as an industry benchmark.

Shanghai Yangpu Tongji Science & Technology Park Co., Ltd. is a national-level science and technology park for technology enterprises, relying on Tongji University. The company is committed to incubating sci-tech innovations, promoting the commercialization of university research, incubating enterprises, and cultivating talent. Through a “three-district linkage, three-city integration” model, it is building the “Circum-Tongji Knowledge Economy Circle” and has become a sci-tech partner for enterprise growth by deeply empowering

businesses through the stock option tools of the Shanghai Equity Exchange. By leveraging this mechanism, technology park has elevated its role from a space provider to a value co-creator, forming a closed loop of “university achievements — incubation — value-add — giving back.”

(II) Leveraging Technology to Promote Governance Capabilities

In accordance with the SOE reform work plans of the Municipal Party Committee and the Municipal SASAC, **Shanghai Shenergy Group** is advancing the action plan for deepening and upgrading SOE reform with high quality. It is thoroughly advancing management reform and institutional innovation, focusing on enhancing the company's development vitality and internal driving force. It has formulated and is implementing a phased work plan for the SOE reform action to ensure the efficient implementation of reform measures. Shenergy Group is actively promoting digital transformation and accelerating technological innovation centered on its main business to enhance governance effectiveness and development momentum.

In 2024, construction began on Shenergy Group's Digital Industry Innovation Base, which will promote the integration of the group's data resources and improve the efficiency of business collaboration. The group became one of the first enterprises in the Shanghai SASAC system to be onboarded onto the blockchain. The group's Energy Panorama Industrial Internet Digital Management Platform passed the acceptance inspection by the Municipal Commission of Economy and Informatization. The "Shen Xiang Tong" (Shenergy Connect) platform, created by Shenergy, has achieved the digital collaborative transformation of businesses such as human resources, finance, and supply chain. Shenergy Group is accelerating its empowerment through digital transformation, continuously driving high-quality development. Shenergy group is gradually forming a collaborative innovation pattern where system enterprises break down industrial sector boundaries and jointly undertake major project research in key provincial and ministerial-level sci-tech innovation programs, achieving positive results. In 2024, the National Key Laboratory for High-Performance Special Cables was approved for reorganization by the Ministry of Science and Technology. Shenergy's system enterprises respectively won accolades such as the Shanghai Science and Technology Progress Award and the Machinery Industry Science and Technology Progress Award, reflecting Shenergy's practical innovation in leading the enhancement of corporate governance

capabilities and supporting the development of new quality productive forces through digital transformation and technological innovation.

Shanghai Huanshangda Technology Development Co., Ltd. is a platform company jointly established by the Baoshan District Government and Shanghai University, responsible for the overall planning, construction, and operation of the Huan Shangda Science and Technology Park. Leveraging Shanghai University's resources and the support of the Shanghai Equity Exchange's warrant platform, the Park's Proof-of-Concept Center delivers a paradigm for early-stage university ventures characterized by "light-capital equity stakes and service-heavy enablement," achieved through low-cost prototyping and market exposure. The platform actively promotes the embedding of an ESG governance framework into project companies' corporate action plans. By using technology to optimize governance structures, it helps accelerate the commercialization of research outputs, thereby advancing project companies' governance capacity and business development in tandem.

IV. Innovative Practices of Shanghai Enterprises on ESG Governance Systems

(I) Embedding ESG Principles into Enterprise's Operations

Jin Jiang International Hotels Group actively advances ESG principles and is committed to building a management system with distinctive Jin Jiang characteristics. The company implements ESG development across its operations, deeply integrating the ESG governance framework into business growth and treating it as a key lever for enhancing core competitiveness. In August 2023, the company formally established a Strategy, Investment and ESG Committee composed of Jin Jiang Group leadership and incorporated the committee's mandate into the company's articles of association. The company has created a "three-tier ESG management architecture." Strategic oversight is exercised by the Strategy, Investment and ESG Committee. Overall coordination and supervision are led by an ESG Working Group chaired by the Chief Executive Officer. Execution is carried out by ESG implementation units embedded within each business segment. This architecture marks the beginning of a new stage in Jin Jiang's governance of sustainable development and lays the foundation for a long-term, durable mechanism.

In June 2024, under the supervision of the Board's Strategy, Investment & ESG Committee

and in line with its ESG strategic planning, Jin Jiang Hotel refined and deepened its ESG governance by structuring the ESG working group and execution teams as functional task forces. It required the nine functional departments with strong relevance to core ESG issues—such as Party building, finance, audit and risk control, human resources, legal affairs, and safety management—to form a long-term communication mechanism between the ESG working group and the execution level. Concurrently, in 2024, the company's ESG execution level (i.e., the frontline business segments) has, in compliance with the group's requirements, formed its own practical and efficient ESG functional task force structures based on their respective operational status and aligned with the company's ESG strategic plan.

In 2024, Jin Jiang Hotel further clarified its overall strategic path for sustainable development by releasing its ESG strategic blueprint, "Journey to a Shared Future" ("Gong Fu Jin Cheng"). This strategy is centered on three ESG pillars: "Splendid Color - Green Courtesy" ("Jin Se"), "Sincere Heart - People-centric Care" ("Jin Xin"), and "Utmost Integrity - Responsible Governance" ("Jin Cheng"). The company conducted a comprehensive double materiality assessment of ESG issues. Through interviews with the board of directors, functional departments, and stakeholders, as well as surveys and face-to-face meetings, it conducted its first double materiality assessment, identifying a total of 17 key issues across the three dimensions of environment, social, and governance. Based on this, it created an ESG materiality matrix, comprehensively outlining a development path that is innovative, sustainable, and value-oriented. In the future, Jin Jiang Hotels will advance ESG management practices around these priority topics and, on this basis, will continue to refine its ESG governance system and enhance the quality of information disclosure. The company will ensure that its actions align with stakeholder expectations, thereby achieving genuine two-way consistency between management practice and disclosure.

(II) Integrating ESG Principles Across Enterprise's Investment Ecosystem

Guotai Haitong Securities continuously strengthens the development of its ESG investment research team, having built a comprehensive ESG investment research system for various asset classes such as fixed income and equities. It comprehensively applies ESG investment strategies including negative screening, positive screening, norms-based screening,

ESG integration, thematic investing, impact investing, and active ownership. Furthermore, Guotai Haitong Securities actively leads the construction of the industry's ESG investment ecosystem. In December 2023, the company, as a group and in the capacity of an “investment manager,” formally became a signatory to the PRI. In accordance with PRI regulations, its subsidiaries simultaneously obtained signatory status. Prior to this, its subsidiary, Hua’an Funds, had already signed the PRI as a founding signatory and joined the China Climate Engagement Platform, demonstrating a firm commitment to aligning with international ESG standards.

In its specific business practices, Guotai Haitong Securities has independently developed an ESG evaluation system that covers 14,000 market entities in China. Through multi-source data integration, it achieves intelligent identification and dynamic monitoring of ESG characteristics, providing support for investment decisions. In the fixed-income investment field, the company has established a full-process bond ESG investment research system, deeply embedding ESG standards into all stages of bond investment. In the equity investment field, it has formulated an equity ESG investment research framework and established an ESG evaluation system for individual stocks and industries, making ESG factors an important basis for decision-making and post-investment management in its equity investment business, providing professional investment research services to clients.

Guotai Haitong Securities utilizes a unified strategic deployment and top-down resource allocation to ensure efficient internal collaboration on its sustainable business. It has made forward-looking layouts in data and IT systems, laying a solid foundation for carbon finance and ESG investing. It also continuously launches innovative products and services, expanding its business boundaries and amplifying its influence, which helps it to seize opportunities in international rule-setting and multilateral cooperation.

V. Innovative Practices of Shanghai Enterprises on ESG Disclosures

(I) Advancing the development of Sector-Specific ESG Disclosure Standards

Shanghai Lingang Group actively promotes the construction of industry-specific ESG information disclosure standards. The Shanghai Institute of Quality and Technical Supervision, in cooperation with Shanghai Pharmaceuticals Holding Co., Ltd., created the nation's first ESG

information disclosure standard for the pharmaceutical industry. By building a service platform, its subsidiary, the Shanghai Institute of Quality and Technical Supervision, together with the China Association of Small and Medium Enterprises, has created the first ESG information disclosure and green finance platform for SMEs. It hosted the Lingang session of the Shanghai Social Responsibility Report Release Conference, promoting the practice of sustainable development among the parks and enterprises under Lingang Group. In December 2024, the first batch of enterprises released their relevant reports at the conference, and the first compilation of Corporate Social Responsibility (CSR)/ESG/Sustainability reports from the Lingang Group system was also released, showcasing the explorations and practices of the group and its subsidiaries in promoting green development, social welfare, employee rights, and corporate governance.

(II) Implementing Global Climate Standards to Build a Shanghai Climate-related Disclosure Model

Against the backdrop of accelerated global climate governance and the in-depth implementation of Chinese "dual carbon" strategy, **State Grid Shanghai Municipal Electric Power Company** has actively responded to the new requirements of *the Ministry of Finance's Enterprise Sustainability Disclosure Standard No. 1 - Climate (Trial) (Exposure Draft)*, taking the lead in carrying out practices of climate risk financial accounting and disclosure. State Grid Shanghai Electric Power selected its Pudong Power Supply Company as a pilot unit, focusing on the quantitative impact of climate risks on power grid assets and operating results, filling a gap in the domestic power transmission and distribution industry in sustainable financial accounting and information disclosure. On the basis of strict adherence to the standards, State Grid Shanghai Electric Power, combined with its industry characteristics and corporate realities, has explored and established a sustainable information accounting and disclosure model that aligns with the features of the power industry, systematically constructing a sustainable accounting and disclosure system that is normative, innovative, and replicable.

State Grid Shanghai Electric Power adopts a "one statement and one report" model for sustainable accounting and disclosure as its foundation, and implements a three-step breakthrough strategy. On sustainable accounting, the company has developed an innovative

six-step technical pathway that includes risk and opportunity identification, field research and scoping, data collection and consolidation, specification of accounting treatments, quantification of financial impacts, and report drafting and analysis. Drawing on the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) as well as the climate scenario frameworks and related technical papers developed and periodically updated by the Central Banks and Supervisors Network for Greening the Financial System (NGFS), the company assesses and quantifies both the current and expected effects of climate risks and opportunities on the grid's financial position, operating results, and cash flows. This provides a truthful, comprehensive, and precise data foundation for disclosure. On sustainable disclosure, grounded in rigorous accounting and analysis, the company follows a climate disclosure standards framework, systematizes key indicators, and, taking into account the characteristics of the electric utilities industry, the corporate attributes of State Grid, and the regional features of the Pudong Power Supply Company, presents a full picture of climate resilience actions in its disclosure report. In doing so, it demonstrates the grid enterprise's technological capabilities and social responsibility in addressing climate change, achieving outcomes where data are verifiable, actions are traceable, and value is quantifiable. On standardizing technical solutions, the company actively implements international standards and has been among the first central state-owned enterprises to promote sustainable accounting and disclosure practice. Focusing on the two pillars of accounting and disclosure, it reports progress in corporate sustainability through climate-indicator accounting statements and sustainability action reports. In parallel, it has developed data tools and indicator systems suitable for grid-related sustainability disclosures, thereby supporting the formulation of relevant applications and evaluation guidelines and enabling effective execution of the company's strategy.

The practices of State Grid Shanghai Electric Power in climate risk financial accounting and disclosure have not only proposed high-quality solutions for industry pain points but have also, through the innovative "three-in-one" approach of quantitative financial accounting, standards-compliant disclosure, and technical standardization, constructed an innovative solution for ESG management. Through its "six-in-one" achievement system—including accounting statements, action reports, and data tools—the company has provided

implementable and replicable practical experience and technical pathways for the electric power and energy sector, and indeed for the entire public utility domain.

Section III: Bottlenecks and Optimization Strategies for ESG Practices Among Shanghai Enterprises

I. Potential Challenges and Structural Bottlenecks

(I) SMEs Facing Cognitive Barriers in Implementing ESG Governance Systems

Implementing ESG governance systems is challenging. On one hand, the multi-tiered structure and routine ESG processes require significant executive time and investment, presenting a high threshold. On the other hand, some companies have imperfect internal governance and a superficial understanding of ESG principles, causing their established ESG governance systems to often become a mere formality, unable to genuinely guide practical implementation. Therefore, for enterprises without mandatory disclosure requirements, their ESG practices primarily depend on the vision and leadership of the decision-making level. Some micro and small enterprise's view ESG as a "foreign import," overlooking its domestic context and missing opportunities for transformation.

As seen in the data from the first section of this chapter, the ESG report issuance rate for non-state-owned enterprises in Shanghai (44.92%) is significantly lower than that of state-owned enterprises (89.08%), reflecting the conceptual and capacity constraints faced by SMEs (Figure 2.5). For instance, regarding the financial and technical thresholds for promoting low-carbon buildings, SMEs generally face limited financing channels and high procurement costs for energy-saving technologies.

(II) High Technical and Financial Thresholds for Enterprises' ESG initiatives, Highlighting the Conflict Between Long-term Sustainable Benefits and Short-term Financial Costs

ESG project development entails high technical and financial thresholds, and investment payback periods can extend to three to five years, which may conflict with shareholders' expectations for short-term financial returns. For example, green buildings require specialized capabilities and substantial upfront capital. Near-zero-energy buildings depend on customized technologies such as insulated exterior walls, photovoltaic systems, and low-carbon

infrastructure. Small and medium-sized real estate developers often lack in-house R&D capacity, and the high costs of technology and talent make these investments difficult to bear. When enterprises build ESG data platforms, the large annual capital outlays create significant cost pressures that slow both development and rollout. Although Shanghai's industrial and information-technology sectors are relatively advanced in environmental investment, the high cost of R&D—typically accounting for 10 to 30 percent of revenue for small and medium-sized enterprises—hampers the diffusion of environmental technologies. Only 6.48 percent of non-state-owned enterprises in Shanghai conduct climate risk assessments, indicating that management may delay ESG objectives due to short-term financial targets.

(III) Lack of Technological Resources and Interest Coordination Mechanisms for Enterprises' ESG Initiatives

Building green factories requires substantial capital investment in energy retrofits, equipment upgrades, and technological R&D. Some enterprises, constrained by limited financing capacity, find it difficult to absorb the high costs of green transition, which hampers the adoption of low-carbon processes and participation in recycling network construction. Data show that in 2024 the share of clean energy use among Shanghai-based enterprises was only 15.35 percent (Figure 2.26). At the same time, a shortage of green-technology talent poses a significant challenge. Companies face bottlenecks in recruiting and training personnel with expertise in new energy, intelligent manufacturing, and energy conservation and emissions reduction, thereby slowing progress in green factory development.

The process of building a green supply chain also faces challenges in coordinating interests among enterprises. Issues of security and trust in data sharing between different companies limit the efficiency of supply chain collaboration. For example, some parts suppliers worry that sharing production data could lead to the leakage of business secrets, resulting in slow progress in green supply chain data interoperability. Some SMEs, due to financial and technical limitations, find it difficult to quickly keep pace with the green transformation of the chain-leading enterprises.

In the process of developing green industrial parks, the specific characteristics of industrial chain structures have resulted in a current pattern of point-by-point breakthroughs rather than

broad-based adoption. For example, the Lingang Park has a high concentration of enterprises and a cluster of exporters, which facilitates unified promotion of green and low-carbon practices. By contrast, other parks organized around different segments of the industrial chain encounter greater difficulty in scaling such initiatives.

(IV) Difficulty in Quantifying and Realization of ESG Value

As seen in the data from the first section of this chapter, although the social dimension score of Shanghai enterprises (4.5051) is higher than the national average, the reduction in carbon emissions is difficult to translate directly into economic benefits. The distribution of ESG scores shows a polarization, with an increasing proportion of companies in the 7.5–10 score range, yet their premium in the capital market is limited.

II. Optimization and Breakthrough Strategies

In response to the aforementioned bottlenecks and drawing upon the replicable experiences summarized from the case studies in this chapter, the following optimization countermeasures are proposed from the two dimensions of optimizing enterprises' own actions and addressing external collaborative needs:

(I) Optimization of Enterprises' Internal Actions

1. Building Internal ESG Governance and Coordination Mechanisms

From the perspective of optimizing corporate action, the following recommendations concern the construction of an ESG governance architecture. Enterprises with sufficient capacity are advised to establish a dedicated ESG committee or to incorporate ESG considerations into the mandate of the strategy committee, thereby elevating decision-making to the board level, strengthening awareness, and securing resource support to put ESG principles into practice. Enterprises may appoint senior executives to lead a cross-departmental ESG task force (for example, coordinating the technology, production, and human resources functions) and integrate ESG-related key performance indicators (KPIs), such as emissions reductions and employee safety metrics, into the performance evaluations of core departments. These steps can help shift ESG from a cost center to a driver of operational efficiency and, through the dual engines of technology and management, convert ESG into a source of

competitive advantage. Finally, companies may redesign responsibility-allocation mechanisms and use equity-based innovations to align long-term interests, achieve shared responsibility and benefit sharing, and resolve the tension between sustained ESG investment and a short-term focus on financial returns.

2. Leveraging All Available Resources for Costs and Quality Efficiency

It is recommended to advance in phases for enterprises: reducing costs through a university technology network, accelerating progress through an industrial channel network, and empowering through an ESG certification network. Enterprises can choose their entry point based on their own stage of development. (1) Start-ups: Prioritize accessing university technology validation networks to reduce R&D costs. (2) Growth-stage enterprises: Use stock options to bind with industrial resource partners to accelerate market validation. (3) Mature enterprises: Take the lead in building an ESG certification network and guide the formulation of industry standards.

For industrial parks and zone operators seeking to learn from Lingang Group's experience, it is advisable to build a park-level ESG ecosystem. By establishing service platforms for ESG disclosure and implementation, parks can help resident enterprises carry out ESG practices and reduce the burden on small and medium-sized enterprises. Strengthening Park platforms, scaling demonstration projects, and providing targeted green financing support to high-quality enterprises can furnish concrete templates and foster collective momentum for green development. At the same time, enhancing green-park infrastructure and low-carbon facilities will lay the groundwork for park-wide green supply chains. Actively seeking local pilot status, tax incentives, and dedicated funds will further improve enterprises' willingness to pursue sustainable development.

3. Adopting Phased Investments to Reduce Upfront Costs

For example, in advancing ESG practices for real estate enterprises through green building, it is advisable to implement renovations in phases and to prioritize upgrades in high energy-consumption areas, such as building façades and HVAC systems. Enterprises can seek relevant government subsidies—such as local grants for the renovation of historic buildings—to deploy low-carbon building technologies at lower cost. Likewise, in pollution-control practices,

companies may first implement process optimizations such as “pre-treatment of harmful gases,” thereby reducing downstream purification expenses.

4. Tailoring Incentive Structures for Key Stakeholders

For example, in the area of green supply chains, a tiered incentive mechanism can be established. Enterprises may create a supplier green rating system, for instance grades A through E, and offer advantages to highly rated suppliers, including preferential order allocation such as priority procurement rights and preferential access to joint research and development resources such as entry to a patent pool. In parallel, a blockchain-based supply chain data platform can be developed. Adopting a model in which original data do not leave their domain and data are usable without being directly visible enables the secure sharing of sensitive information such as carbon emissions and energy consumption. For high-cost equipment, such as hydrogen fuel cell production lines, acquisition through finance leasing can be considered in order to reduce initial capital expenditure.

(II) Optimization of External Collaborative Actions

From the perspective of external collaborative needs, it is recommended to build a systematic support network by leveraging policy, financial, and industry platforms.

1. Securing Strategic Financial Backing

It is advisable to innovate ESG financing in line with the characteristics of specific ESG projects. For example, construction enterprises can actively seek to issue green bonds or apply for carbon-emission-reduction support instruments in order to lower financing costs. Industrial Park operators can issue green bonds or social responsibility bonds to accelerate the implementation of projects such as green park development. Public utilities can make proactive use of financial instruments such as REITs to optimize their financing structures. At the same time, relevant enterprises should strengthen investor relations management and communicate the tangible benefits of their ESG practices, thereby realizing the external value of ESG implementation.

2. Developing Resource Collaboration Platforms

By implementing a “three-network integration” model—university technology networks,

industry channel networks, and ESG certification networks—an integrated ecosystem can be built to break down “resource islands,” consolidate fragmented resources, and lower the barriers to ESG transition for small and medium-sized enterprises. For example, as noted above, the Huan Shangda Proof-of-Concept Center leverages Shanghai University’s resources to reduce R&D costs. Industrial parks can establish ESG innovation alliances and adopt green procurement standards to catalyze green transformation across the supply chain. In terms of industry-standard development, relevant associations can formulate quantitative criteria for the Social and Governance dimensions, such as indicators for the protection of flexible workers, and work to enhance market acceptance.

3. Fostering Technology Incubation and Knowledge Sharing

In terms of technological development pathways, it is advisable to establish industry ESG innovation funds and encourage leading enterprises to co-invest in common, pre-competitive technologies. A representative example is Lingang Group’s collaboration with Shanghai Pharmaceuticals to formulate China’s first ESG standard for the pharmaceutical sector. In addition, appropriate mechanisms should be created to promote the sharing of university laboratory resources and the transfer of scientific and technological achievements, thereby reducing the costs of technology incubation and adoption.

Chapter 3: The Current State of ESG Financial Services at Shanghai's Financial Institutions

Section I: Multi-dimensional Progress in ESG Financial Services at Shanghai's Financial Institutions

Against the backdrop of the continuous deepening of the "dual carbon" strategy and the accelerated advancement of global climate governance, Shanghai, leveraging the resource endowments of an international financial center and its comprehensive advantages—including a high concentration of financial institutions, a well-developed market system, and a high degree of internationalization—has become a forefront for innovation and practice in ESG financial services. Financial institutions in Shanghai are deeply implementing the ESG development philosophy, making concerted efforts and achieving breakthroughs on multiple fronts in fields such as banking, securities, funds, and insurance. This has resulted in a positive trend of deepening policy coordination, steady expansion of scale, active product innovation, and continuous enhancement of international influence. From the industry-leading growth rate of green credit within its jurisdiction, to the doubling of green bond underwriting scale; from its ESG fund scale accounting for nearly half of the nation's total, to its green insurance product innovation leading industry development, Shanghai's financial institutions have not only provided strong support for the low-carbon transition of the real economy but have also been at the forefront of exploring pathways for ESG financial services, contributing a "Shanghai solution" to the participation of an international financial center in sustainable development.

I. Multi-dimensional Progress in the Banking Sector's ESG Financial Services

As a pioneering city for China's green finance development, Shanghai's banking sector is accelerating its development in the green finance domain, achieving multi-dimensional breakthroughs in policy coordination, scale growth, product innovation, and tool application. In the process of exploring ESG financial services, Shanghai's banking industry has continuously strengthened its cross-departmental coordination mechanisms. Through the release of multiple plans and guidelines, it has clarified the development path for green finance.

At the end of 2024, Shanghai’s green credit scale has surpassed ¥1.4 trillion. The green and transition finance product system has achieved diversified development, covering the needs of multiple sectors. Significant results have also been achieved in the expansion and innovative application of carbon finance tools. These various measures comprehensively demonstrate the leading position of Shanghai's banking sector in the field of green finance.

The policy coordination mechanism and institutional guarantees for green finance are increasingly being strengthened. The Shanghai Head Office of the People's Bank of China (PBOC) led twelve municipal departments to jointly issue *the Action Plan for Excelling in the 'Five Major Areas' of Finance in Shanghai*, which clarifies the action goals and tasks for green finance and establishes a cross-departmental collaborative promotion mechanism. The Shanghai Branch of the PBOC issued the Shanghai Credit Policy Guidelines, guiding financial institutions to increase their support for green and low-carbon development. The Shanghai Branch of the PBOC also took the lead in issuing *the Implementation Plan for Environmental Information Disclosure of Small and Medium-sized Enterprises in Shanghai (Trial)* to explore the implementation of environmental information disclosure for SMEs.

The scale and growth rate of green credit continue to lead the industry. Shanghai's banking sector has shown strong development momentum in both the business scale and growth rate of its green credit domain. According to data released by the PBOC Shanghai Head Office, as of the end of 2024, the balance of green credit in Shanghai had exceed ¥1.4 trillion, a year-on-year increase of over 20%, far exceeding the average growth rate of all other loans during the same period. Among these, Shanghai Pudong Development (SPD) Bank, as a representative of local incorporated banks, has shown particularly outstanding performance in its green credit business. As of the end of 2024, SPD Bank's green credit balance reached ¥625.6 billion, an increase of ¥101 billion from the previous year-end, representing a year-on-year growth of 19.25%.

The green and transition finance product system is accelerating its diversified development. In enriching green credit products, the PBOC Shanghai Head Office has guided banking and financial institutions to diversify their green finance products to meet the varied financing needs of enterprises. It has also encouraged the development of financing products

collateralized by environmental rights, promoting the inclusion of environmental rights such as carbon emission rights, pollution rights, and water use rights within the scope of recognized collateral for bank credit. At the same time, Shanghai's banking sector is actively exploring a “Shanghai solution” for transition finance. Institutions such as the Bank of Communications, SPD Bank, Agricultural Bank of China, China Minsheng Bank, and Shanghai Rural Commercial Bank have launched products like transition finance loans, covering multiple industries including shipping, aviation, and chemicals. As of the end of 2024, financial institutions within the jurisdiction had issued nearly ¥5 billion in transition loans. Furthermore, through multi-party collaboration, Shanghai’s banking sector is continuously strengthening its empowerment of supply chain carbon neutrality. In line with the continuous extension of the green and low-carbon industrial chain and the enrichment of application scenarios, it supports financial institutions in exploring the development needs of core enterprises and their upstream and downstream suppliers, providing services such as "finance + carbon assessment" to businesses.

Breakthroughs have been achieved in the expansion and innovative application of the Carbon Emission Reduction Facility (CERF). The PBOC Shanghai Head Office launched a pilot program to expand the supported areas of the CERF, guiding financial institutions to innovatively develop "Carbon Reduction+" loan products. It issued *the Notice on Expanding the Supported Areas of the Carbon Emission Reduction Facility on a Pilot Basis in Shanghai*, which included 17 sub-sectors from *the Guiding Catalogue for Green and Low-Carbon Transition Industries (2024 Edition)* in the pilot, and expanded the scope of support to include six foreign-funded financial institutions in Shanghai. For the full year of 2024, a total of ¥594 million in CERF funds was disbursed to Chinese and foreign-funded local incorporated banks, with ¥632 million in rollovers, supporting banks in issuing ¥2.04 billion in new carbon reduction loans. This is expected to drive an annual reduction in carbon dioxide emissions equivalent to 364,000 tons.

II. Multi-dimensional Progress in the Securities Sector's ESG Financial Services

Driven by the national "dual carbon" strategy and the global sustainable development philosophy, Shanghai's securities industry is making a significant contribution to the

development of green finance and the low-carbon transition of the economy. Specifically, the scale of green bond underwriting within the jurisdiction is accelerating its growth, the ESG governance system is becoming increasingly mature with several institutions achieving excellent ratings and each having its own expertise, and the scenarios for ESG services are continuously expanding with numerous highlights. After years of development, Shanghai's securities industry has formed a strong competitive advantage in the ESG field and is empowering the green development process with diverse practices.

Green bond underwriting has grown rapidly. In 2024, the total amount of green bonds primarily underwritten by securities firms in Shanghai reached ¥14.3 billion, a significant increase from the ¥6.7 billion underwritten in 2023. This reflects market recognition for green financing needs and demonstrates the active role of securities firms in promoting the development of green finance.

Governance systems have become more mature. Shanghai's securities industry has shown outstanding performance in the construction and practice of ESG governance systems. According to rating data from sources such as China Securities Index, Wind, and SynTao Green Finance, institutions like Guotai Haitong Securities, Orient Securities, and East Money Information have received excellent ratings across multiple systems (see Table 3.1). Wind ESG scores further show that Guotai Haitong Securities leads in its composite and governance dimension scores, while Orient Securities has a distinct advantage in the environmental dimension (see Table 3.2)

Table 3.1: ESG Ratings of Major Securities Firms in Shanghai

Securities Name	CSI Index ESG Rating	Wind ESG Rating	SynTao Green Finance ESG Rating
Guotai Haitong Securities	A	AA	A
Orient Securities	BBB	AA	A
East Money Information	BB	A	A
Everbright Securities	BB	BBB	B+
China Fortune	B	BBB	A-
BOC International (China)	B	BB	B+

Data Source: Wind, Guotai Haitong Securities Research

Table 3.2: Indicator Breakdown of Wind ESG Ratings for Major Securities Firms in Shanghai

Securities Name	Composite ESG Score	Environmental Dimension Score	Social Dimension Score	Governance Dimension Score
Guotai Haitong Securities	8.43	8.40	7.48	8.89
Orient Securities	8.01	9.75	6.69	6.60
East Money Information	7.54	4.53	5.76	8.12
China Fortune	6.91	3.30	6.45	5.75
Everbright Securities	6.55	3.70	4.52	6.56
BOC International (China)	5.35	0.52	3.11	5.18

Data Source: Wind, Guotai Haitong Securities Research

Service scenarios continue to expand. Shanghai's securities industry has achieved significant results in areas such as ESG products, green investment and financing, and cross-border carbon trading. Guotai Haitong Securities continues to make efforts in ESG asset management and green industry investment. In ESG asset management, relying on a comprehensive ESG investment research system and a proprietary evaluation system, Guotai Haitong Securities covers approximately 14,000 market entities in China. It has fully embedded ESG processes into its fixed-income and equity investments, with the scale of ESG investments accounting for 82.26% of its total investment scale in 2024. In green industry investment, its subsidiary Guotai Junan Innovation Investment invested in three green development track projects in 2024—Xi'an Huasheng Composite Technology, Suzhou Newmat NanoTechnology, and Hainan BeyondPoly Technology—and completed its investment in the Green Momentum New Materials Fund. Its subsidiary Guotai Junan Zhengyu Investment maintained a growth trajectory, with its green equity investment scale reaching ¥344 million and its green finance business revenue reaching ¥68 million in 2024. Orient Securities continues to advance in product and tool innovation as well as industry and market empowerment. In product and tool innovation, Orient Securities launched the "Xinhua Carbon Technology Index," issued a ¥2 billion sustainability-linked bond, and underwrote the nation's first green bond for sustainable aviation fuel. In industry and market empowerment, Orient Securities is exploring an "electricity-carbon-finance" collaborative model, promoting green electricity procurement, and has achieved a scale of ¥1.2 billion in cross-border carbon trading. At the same time, Orient Securities focuses on new energy and technological innovation, having provided financing support to 150 sci-tech enterprises, which in turn has driven the collaborative development of over 1,000 upstream and downstream enterprises, forming a multi-layered green financial

service system.

The futures industry's emphasis on ESG has continued to strengthen. In risk management, Shanghai's futures sector—anchored in serving the real economy and fulfilling its risk-mitigation function—has begun to embed sustainability principles into core business activities, fostering a prudent culture of compliance and internal control and executing risk and compliance work in a disciplined manner. In support of rural revitalization, the industry has actively responded to national priorities by deepening "insurance + futures" programs, advancing targeted professional assistance initiatives, and delivering solid protection outcomes for agricultural producers. On ESG capacity-building, a number of firms have organized dedicated training programs to enhance market participants' understanding of environmental and social responsibility issues and to improve their ability to respond. Collectively, these efforts underscore the important role Shanghai's futures industry plays in supporting the green, low-carbon transition and advancing responsible investment.

III. Multi-dimensional Progress in the Fund Management Sector's ESG Financial Services

In recent years, Shanghai's fund management industry has shown a trend of comprehensive advancement in the ESG field. The imapct of Shanghai's fund industry in the ESG field continues to take the lead, with the number of signatories to the UN PRI accounting for nearly forty percent of the country's total. At the same time, the number and scale of ESG funds continue to grow, accounting for nearly half of the national total. Various types of ESG funds have demonstrated strong performance in both the short and long term, and the sector is expected to play a more significant role in the global ESG fund industry in the future.

The international influence and industry leadership of institutions continue to rise. Shanghai's fund management industry continues to lead in terms of its influence in the ESG field, deeply integrating into the global sustainable development cooperation network. Regarding the data on UN PRI signatories, the proportion of Shanghai-based signatories to the national total has increased year by year. As of August 2025, there were a total of 132 signatories in China, with as many as 48 based in Shanghai (see Figure 3.1). This not only highlights fund management sector's leading position in the domestic ESG field but also

underscores its core role as an international financial center in the setting of global sustainable investment standards and in various forms of international ESG cooperation.

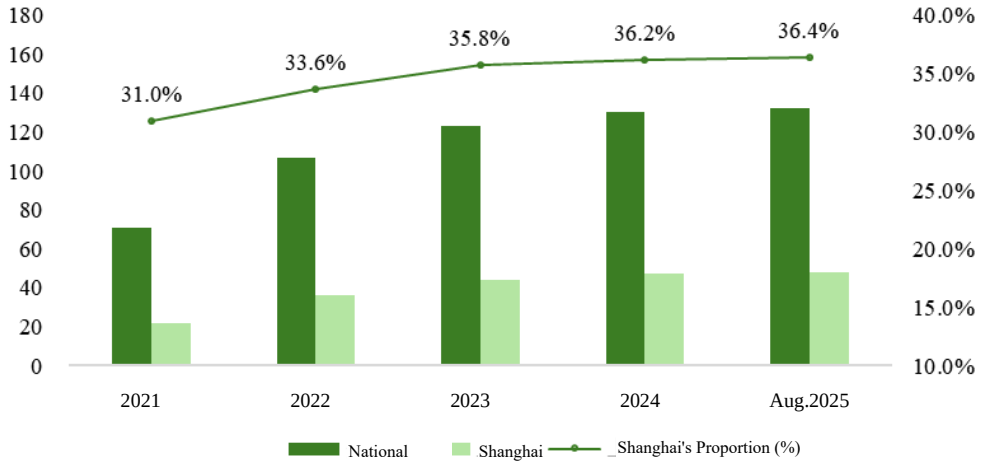


Figure 3.1: Number of UN PRI Signatories Nationwide and in Shanghai

Data Source: UN PRI; Compiled by Fullgoal Fund, as of August 2025

The number and scale of ESG funds show a growing trend, maintaining a leading position. The number and scale of ESG funds within the Shanghai jurisdiction[2] have shown significant overall growth. As of June 2025, the number of ESG funds in Shanghai reached 340, an increase of 15.3% from the end of 2024 (see Figure 3.2). The scale of ESG funds in Shanghai reached ¥414.9 billion, an increase of 2.7% from the end of 2024 (see Figure 3.3). Furthermore, the number and scale of ESG funds in Shanghai have consistently maintained a leading position, accounting for approximately 45% of the national total, which reflects the significant advantages of Shanghai's fund management industry in the ESG field.

[2]The roster references the China Securities Regulatory Commission's list of public fund management institutions (as of June 2025) and includes fund companies under Shanghai's jurisdiction, counted by their office location.

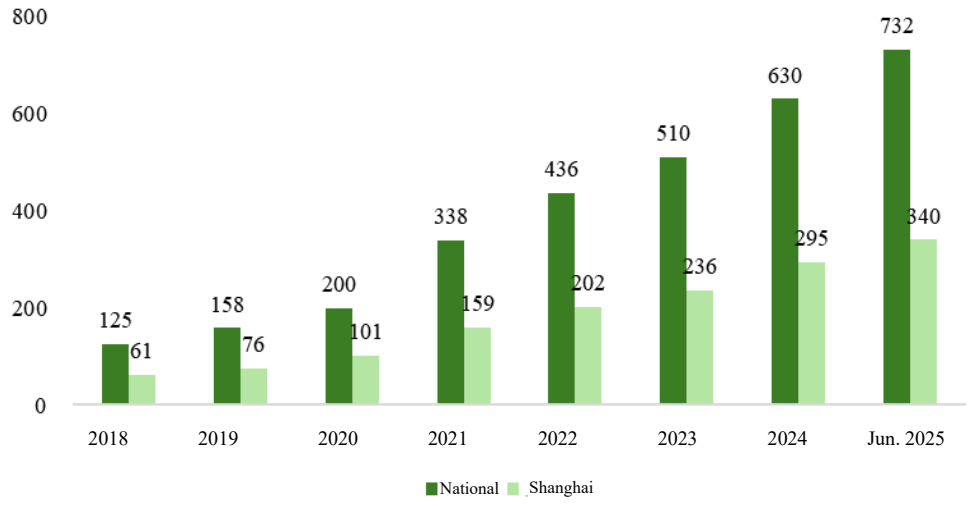


Figure 3.2: Number of ESG Funds Nationwide and in Shanghai (units)

Data Source: Wind Information; Compiled by Harvest Fund, as of June 2025

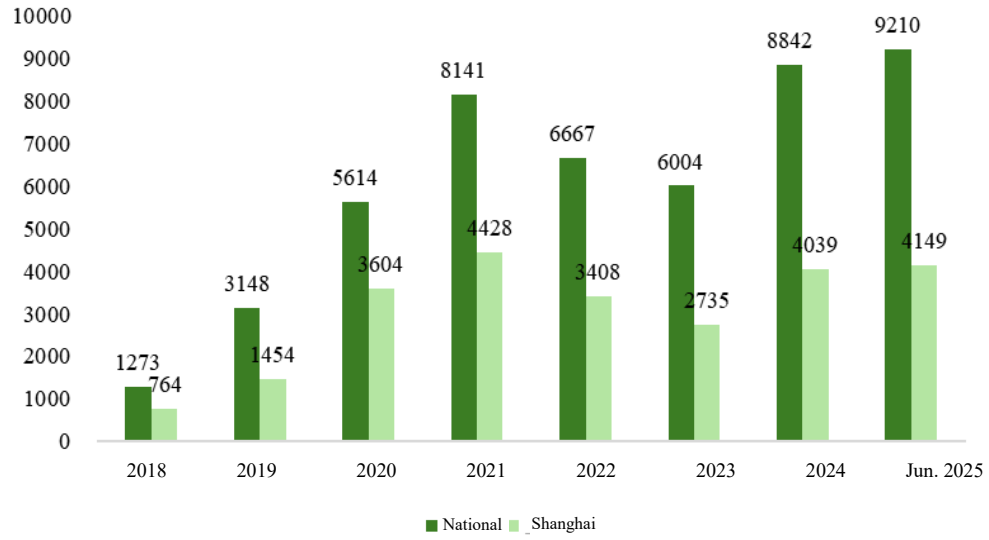


Figure 3.3: Scale of ESG Funds Nationwide and in Shanghai (100 million RMB)

Data Source: Wind Information; Compiled by Harvest Fund, as of June 2025

ESG funds demonstrate advantages in both the short and long term, with distinct characteristics across different sub-types. According to data provided by Harvest Fund, nationwide ESG funds show significant excess returns over the long term, with 70% of ESG funds outperforming their benchmarks over the last 5 years. In the short term, ESG funds also hold certain advantages over comparable public funds, with the proportion of ESG funds outperforming their benchmarks in the last year and year-to-date reaching as high as 65% and

81%, respectively. Looking at sub-categories, the performance of equity ESG funds has recovered in the last year. The average annualized return for equity ESG funds nationwide reached as high as 11.6%, with the year-to-date annualized return at 10%. Equity ESG funds managed by fund companies in the Shanghai jurisdiction slightly outperformed the national average, with annualized returns of 12.1% and 11.5% for the last year and year-to-date, respectively. In both the long and short term, equity ESG funds have shown significant excess returns relative to their benchmarks, with long-term excess returns being more pronounced. Within Shanghai, ESG funds have outperformed their benchmarks by an average of 2.0% over the last 5 years (see Table 3.3). Compared to the CSI 300 Index, the cumulative returns of equity ESG funds over 5-year and 3-year periods were 7.8% and 3.1% higher than the index, respectively, demonstrating good long-term investment value. Bond ESG funds have shown relatively stable performance. Nationwide, the average annualized return for bond ESG funds over the last year was 2.8%, with a year-to-date annualized return of 2.0%. Bond ESG funds managed by fund companies in the Shanghai jurisdiction slightly outperformed the national average, with a year-to-date annualized return of 2.2%. Bond ESG funds have shown significant excess returns relative to their benchmarks in both the long and short term, with long-term excess returns being more pronounced. Within Shanghai, bond ESG funds have outperformed their benchmarks by an average of 1.8% over the last 5 years. Hybrid ESG funds have shown impressive year-to-date performance. Nationwide, ESG funds outperformed their benchmarks by 4.1%, while within Shanghai, ESG funds outperformed their benchmarks by 3.7%.

Table 3.3: Excess Return Rate of ESG Funds Over Benchmarks by Period

Type	Region	Last 5 Years	Last 3 Years	Last 1 Years	Year-to-Date
Equity Funds	**Nationwide**	3.1%	1.2%	1.8%	1.4%
	Shanghai	2.0%	0.6%	1.1%	1.3%
Bond Funds	**Nationwide**	1.6%	1.4%	0.6%	0.5%
	Shanghai	1.8%	1.8%	0.3%	0.6%
Hybrid Funds	**Nationwide**	1.5%	-6.0%	1.4%	4.1%
	Shanghai	1.3%	-5.9%	0.6%	3.7%

Data Source: Wind Information; Compiled by Harvest Fund, as of June 2025

IV. Multi-dimensional Progress in the Insurance Sector's ESG Financial Services

Shanghai's insurance industry is actively exploring the integration of ESG into its

corporate business development and governance. The sector has pioneered the implementation of disclosures aligned with the Task Force on Climate-related Financial Disclosures (TCFD). The introduction of green demonstration clauses has further perfected the multi-dimensional, systematic development of ESG financial services. Green building performance insurance and carbon asset loss insurance, in conjunction with the Shanghai carbon market, are enriching risk management and asset allocation tools. Together, these efforts are upgrading the Shanghai International Financial Center into a green finance rule-setting and risk management center with global influence.

The green insurance policy system is continuously being improved. Since 2024, the introduction of targeted policies has made the direction of green finance development more focused and its rules clearer. With documents such as *the Implementation Plan for the High-Quality Development of Green Finance in the Banking and Insurance Industries* at its core, the top-level design has been strengthened, deeply embedding green finance indicators into institutional assessment and regulatory rating systems. The industry is focusing on core areas such as energy transition, industrial carbon reduction, green transportation, and building energy efficiency to construct a differentiated service system that covers both purely green industries and the transition of high-carbon industries. Concurrently, policies are being supported by institutional tools, requiring insurance institutions to integrate ESG into the entire process of underwriting, investment, and risk control. This is driving green finance to shift from a policy response to a deep strategic cultivation, forming a systematic solution for serving the low-carbon transition of the real economy.

Innovation in green insurance products is becoming more active. Shanghai's insurance industry leads the sector in product innovation across multiple green industry domains. In the clean energy sector, institutions like China Pacific Insurance and Ping An of China are deeply involved in providing insurance for both the construction and operational phases of projects such as the Huaneng and Shenergy photovoltaic projects, and the Lingang, Donghai Bridge, and Fengxian Haiwan offshore wind power projects, extending the lifecycle of risk protection. The Shanghai branch of Yingda Property Insurance launched the "Distributed Photovoltaic Power Station Generation Output Loss Compensation Insurance," providing a cumulative total

of ¥14.67 million in risk protection for new energy enterprises. In the green transportation sector, the insurance industry is providing comprehensive risk solutions for the entire new energy vehicle industry chain, new-fuel ship construction, and large cruise ships, actively meeting the development needs of the industry. In the low-carbon and environmental protection sector, the industry has innovated products such as carbon reduction and emission reduction loss insurance and carbon trading loss insurance for low-carbon project machinery damage, helping enterprises hedge against related loss risks. Furthermore, Shanghai's insurance industry has developed several first-of-their-kind products, leading industry development. The Shanghai branch of Ping An P&C Insurance developed the nation's first "Global Energy Storage System Loss Compensation Liability Insurance," providing protection for a leading energy storage company's overseas expansion. The Shanghai branch of China Pacific P&C Insurance pioneered the "Major Event Carbon Neutrality + Comprehensive Insurance Guarantee" model and issued the first policy under the Pudong New Area's "Environmental Pollution Liability Demonstration Clauses," exploring a new paradigm of "insurance + services' green risk management."

Integrated green insurance services in the Yangtze River Delta continue to expand. Green insurance in the Yangtze River Delta region is showing a trend of diversified product supply. The region has seen innovative green insurance product offerings, with new types of insurance such as wetland protection insurance and public liability insurance for incidents involving wild animals. The scope of coverage is gradually expanding into more specialized sub-fields like comprehensive water resource management, ecosystem restoration, and biodiversity protection. Since the governments of Qingpu (Shanghai), Wujiang (Jiangsu), and Jiashan (Zhejiang) signed *the Taipu River Water Quality Worry-Free Insurance Project Agreement* with China Pacific Insurance, the company has provided water quality guarantees for the Taipu River for four consecutive years. This has ensured the continuous effectiveness of the demonstration zone's first cross-administrative water quality insurance, opening up a new market-based risk management path for coordinated watershed governance.

Climate disclosure has formed demonstration cases. Whether in its pioneering response to *the Shanghai Green Finance Action Plan* or its proactive alignment with listing rules such

as IFRS S2, climate disclosure in Shanghai's insurance industry has leaped from "pioneering trials" to a "demonstration benchmark." China Pacific Insurance has disclosed its report on addressing climate change for many consecutive years and is the first in the insurance industry to conduct research projects on liability-side climate scenario analysis and stress testing. The China Life Shanghai Data Center has been selected as a "National Green Data Center," driving its low-carbon transition through the dual drivers of operational carbon neutrality and green investment. Shanghai's insurance industry has gradually explored and formed a "three-in-one" climate disclosure paradigm of "regulatory guidance—international standards—corporate practice," providing a replicable "Shanghai model" for the national insurance industry.

Section II: Innovative Cases of ESG Financial Services at Shanghai's Financial Institutions

I. Innovative Practices of Shanghai's Financial Institutions on Environmental (E)-related Issues

(I) Continuously Innovating Green Financial Products and Services to Empower Corporate Low-Carbon Transition Practices

China Pacific Insurance has deeply cultivated the green insurance track in Shanghai, creating several "national firsts." In 2024, China Pacific Insurance pioneered the shipping industry's EU carbon emission cost price index insurance and launched the nation's first policy, supporting shipping companies with vessels on European routes in managing the risks of price fluctuations in the EU carbon market. In recent years, international shipping emission reduction rules have become increasingly stringent, with strengthening low-carbon management requirements from the International Maritime Organization and the international shipping industry. The European Union Emission Trading System (EU ETS) officially included the shipping industry within its scope starting from January 1, 2024. The "shipping decarbonization insurance" launched by a property and casualty subsidiary of China Pacific Insurance is the first financial product in our Chinese financial industry to address the decarbonization risks in shipping under international climate change. It targets the focal issue of the mismatch between current and future carbon emission costs for international voyages. Through insurance, it

smooths out the operational uncertainties caused by inter-temporal cost fluctuations, effectively mitigating the risks brought by the inclusion of Chinese shipping industry into the EU carbon market management and further enhancing the industry's ability to cope with international climate change risks.

A property and casualty subsidiary of China Pacific Insurance pioneered a repurchase credit insurance focusing on "carbon asset security" and launched the nation's first business of this kind in the Shanghai pilot carbon market. It provides carbon asset security insurance protection for the first batch of participants in carbon repurchase transactions, including Shenergy Carbon Technology, CITIC Securities, and CICC. This product is an exclusive green insurance for the carbon market, effectively safeguarding the carbon assets of their holders, especially for enterprises included in carbon emission allowance management, thereby further stimulating the efficiency of the carbon market. At the beginning of 2024, the Shanghai Environment and Energy Exchange officially launched the Shanghai carbon market repurchase transaction business. The insurance service provided by China Pacific Property Insurance to the first batch of participating enterprises provides a "critical link" to ensure the smooth progress of carbon asset repurchase transactions.

Shanghai Pudong Development Bank launched the industry's first industrial low-carbon transition loan. It designed the product based on the latest national-level standards for green and low-carbon transition, creating tailor-made financial support solutions for enterprises undergoing green transition in the industrial sector. This is a practical action to implement the national dual carbon strategy and promote the comprehensive green transformation of economic and social development. This loan product features the following five points: first, it implements the call of national policies, meets the reasonable financing needs of high-carbon industries, and ensures that the policy requirements of providing support or imposing constraints based on specific circumstances and categories are implemented, preventing "one-size-fits-all" approaches and "campaign-style carbon reduction". Second, it enriches the transition finance toolbox for commercial banks, providing practical evidence for financial regulators to issue transition finance incentive policies. Third, it provides a project reserve for the expansion of the Carbon Emission Reduction Facility to transition finance. Fourth, it

effectively guides enterprises in high-carbon industries to formulate dual carbon strategies and accelerate their low-carbon transition. Fifth, it provides replicable experience for commercial banks in serving the low-carbon transition needs of their high-carbon industry clients.

Using this loan product, SPD Bank, through differentiated credit policies, a professional certification and assessment system, and a green approval channel, has successively supported the implementation of a number of projects in high-emission industries such as steel, coal power, and papermaking, exploring a new path for financially empowering the low-carbon transition.

(II) Actively Exploring the Frontiers of Climate Risk Research to Enhance Quantitative Climate Risk Management Capabilities

Harvest Fund's practices in the field of climate investment are both forward-looking and innovative. Its core value lies in breaking through the industry's data bottlenecks with its proprietary systems and quantitative tools, constructing an integrated climate investment framework that covers the entire investment research process, product strategies, and the transition of real economy entities. It extends the value of data to the practical low-carbon transition of the real economy, providing a full-chain solution for financial institutions participating in climate investment. With "systematically integrating climate factors into the entire investment research process" at core, and relying on its independently developed climate quantitative database and localized climate assessment framework and models, Harvest Fund comprehensively reflects the relevant response mechanisms and subjective initiative of the companies it invests in regarding climate change mitigation and adaptation. Harvest Fund has effectively solved the problems of data scarcity and insufficient quantitative analysis capabilities faced by fund companies in climate investing. At the same time, Harvest Fund deeply integrates climate data applications, fundamental research, and service models. It carries out product innovation centered on being "in-depth and diversified," forming an innovative closed-loop service model of "data-driven investment decisions, products guiding capital flows, and stewardship promoting transition."

China Pacific Insurance places strong emphasis on climate risk management and has been among the first in the insurance industry to conduct liability-side climate scenario

analyses and stress-testing projects. Drawing on international experience and the frontier of industry research, CPIC established a dedicated working group together with academic institutes, specialized climate-services providers, and catastrophe-modeling firms. The group leverages complementary strengths in data resources, model construction, and analytical research to develop a climate risk assessment methodology suited to Chinese insurance institutions. This methodology integrates international climate scenarios, including those of the Intergovernmental Panel on Climate Change (IPCC), with Chinese meteorological data to produce high-resolution, localized climate-scenario models covering cities and counties nationwide, thereby improving the capacity to project medium- and long-term climate trends. The project also builds and refines catastrophe risk assessment models under varying climate scenarios to evaluate the impacts of typhoons, floods, and other perils on multiple lines of business, including commercial property, engineering, agricultural, and motor insurance. These efforts lay a solid foundation for enhancing the quantification and management of climate risk.

(III) Innovating Carbon Finance Service Models by Integrating Transaction Brokerage, Product Innovation, and Consulting Services

Guotai Haitong Securities considers carbon finance an important component of green finance and has been an early mover in laying out and continuously deepening its related business. Since establishing its carbon finance business team in 2014, the company obtained a carbon trading license from the CSRC in 2015, became the first domestic securities firm to join the International Emission Trading Association (IETA) in 2016, and completed the securities industry's first China Certified Emission Reduction (CCER) transaction and its first carbon inclusion transaction. In 2022, the company reached a strategic cooperation in carbon finance with Shouhang High-Tech. After the competent authorities restarted the voluntary emission reduction program, it took only half a year to complete the registration, issuance, and trading of the Dunhuang Shouhang solar thermal power generation project, making it the first solar thermal power project to be registered and traded in the CCER market.

Entering 2024, Guotai Haitong Securities further enhanced its carbon finance service system, providing comprehensive support to enterprises through three business lines: trading, products, and advisory. On the asset-trading side, carbon trading volumes continued to grow,

reaching 13 million tonnes in 2024, with a historical cumulative total of approximately 88 million tonnes. The firm also improved matchmaking efficiency, executed transactions in overseas carbon allowances, and was repeatedly recognized by carbon exchanges as an outstanding member and investment institution. In product innovation, the company partnered with the Shanghai Branch of China Construction Bank to launch the “Jian Carbon Loan,” which uses pledged carbon allowances to support financing for key emitting enterprises, and it participated in the Guangdong online carbon-allowance pledge pilot, opening new channels for carbon-asset financing. In advisory services, the company provides ESG management consulting and report preparation, helping clients build ESG management systems tailored to their industry characteristics. Through this integrated “trading–product–advisory” carbon finance service system, Guotai Haitong Securities is not only advancing the improvement of carbon-market mechanisms and financial instruments, but also effectively supporting enterprises in achieving China’s dual-carbon objectives.

II. Innovative Practices of Shanghai's Financial Institutions on Social (S)-related Issues

(I) Continuously Extending the Radius of Inclusive Financial Services to Effectively Solve Common Problems

Shanghai Pudong Development Bank is continuously innovating its service models and extending its service radius, creating an efficient operational model that organically integrates online and offline channels. Its mobile banking app has innovated customer acquisition and activation models, effectively matching demand and rapidly iterating products. During the reporting period, it added 366,300 new online loan customers; online loan disbursements exceeded ¥23 billion. The online account opening process has been continuously optimized, with the efficiency of corporate account opening at the counter increasing by 30% compared to the previous year. The manual service level of its remote intelligent banking center ranks among the top of joint-stock banks, effectively solving common problems in ESG financial services.

In continuously improving the hardware and software quality of its branches, SPD Bank has created the “Neighborhood Home” branch space, with 580 designated "Neighborhood Home" locations. It offers caring services, convenience services, and special services, now

covering 26 provinces (including municipalities) and 109 cities. In 2024, it served 4.799 million people.

In actively promoting the construction of an "accessible" financial service environment, SPD Bank has built accessible ramps, opened service windows for special groups, and provides wheelchairs, sign language communication, and "help buttons." The number of business outlets equipped with wheelchair ramps or equivalent service facilities is 1,530, a coverage rate of 88%. The "Senior-Friendly Edition" of its mobile banking app has served 8.533 million customers. All of the bank's branches are equipped with age-friendly service facilities and are continuously expanding their service radius.

In empowering with technology to enhance the level of intelligence, SPD Bank is the first among joint-stock banks to realize the financial application of a fully domestic computing power platform + the DeepSeek large model, empowering multiple application scenarios such as intelligent Q&A, metric-based Q&A, financial analysis, and report writing.

As the lead underwriter for the “Hu Hui Bao” program, **China Pacific Insurance** has been responsible for product actuarial calculations, plan design, operational implementation, and claims services. CPIC has also taken the lead in organizing market promotion and sales, and has continuously advanced product, model, and service innovations. In 2024, the program enrolled 6.416 million participants, ranking first among city-level customized inclusive insurance products nationwide for four consecutive years, and has become a new “city calling card” for Shanghai’s livelihood services.

Throughout program operations, CPIC has consistently leveraged its strengths in big data analytics, benefit design, and actuarial pricing to maintain the product’s defining features of low premiums, high protection, and broad coverage. On the service side, CPIC established a dedicated hotline and formed specialized teams for claims and advisory services, providing standardized and efficient claims support for Shanghai residents. In 2024, the program upgraded its proactive claims services through the application of blockchain and privacy-preserving computing technologies. The utilization rate of electronic medical data rose to 90 percent, and the average time to close a case was shortened to the same day, significantly enhancing the user experience. At the same time, the “Hu Hui Bao” program supports the

development of the biopharmaceutical industry through the integration of insurance and pharmaceuticals. The program continues to include “new and high-quality” drugs and devices in its special medicines list. More than 70 percent of the items on this list are produced, developed, or introduced within Shanghai, thereby strengthening the city’s capacity to reimburse innovative medicines.

(II) Actively Innovating Diverse Assistance Models to Support Rural Revitalization

Orient Securities, with “industrial blood-making + financial empowerment + cultural preservation” at its core, has constructed a "five-in-one" (industry, finance, public welfare, culture, ecology) assistance model, effectively tackling challenges such as weak rural industries, scarce financial resources, and cultural gaps. In industrial blood-making, the company invested over ¥7 million in 2024 in the "Orient Coffee" project in Qiongzhong, Hainan. By upgrading processing technology and incorporating biodiversity-themed packaging design, it has increased the added value of the product, driving employment and income growth, and was recognized as an excellent case of rural revitalization by China.org.cn in 2024. In financial empowerment, the company gained a deep understanding of the real risk management needs of farmers. In 2024, it implemented over 170 "insurance + futures" projects, using futures tools to hedge against price fluctuation risks for agricultural products such as rubber, helping to consolidate the achievements of poverty alleviation. In cultural preservation, the company, relying on its Xindeyizhang Public Welfare Foundation, has promoted intangible cultural heritage and the protection of youth mental health. In 2024, it conducted 6 special courses for its Xindeyizhang Art Classrooms and held multiple special events, increasing the number of Xindeyizhang Art Classrooms to 16. It held a "Public Welfare Psychology Carnival" at Mengsong Township Middle School in Yunnan, integrating psychological lectures with intangible cultural heritage experiences to promote rural cultural revitalization.

As of the end of 2024, Orient Securities and its subsidiaries had signed rural revitalization pairing agreements covering 49 regions. In 2024, the total investment in various assistance projects was ¥24.01 million, benefiting 8,900 children and farmers. The company's Xindeyizhang Public Welfare Foundation raised a total of ¥13.5 million, achieving a deep integration of social value and financial empowerment and providing a replicable, innovative

path for financial institutions to participate in rural revitalization.

III. Innovative Practices of Shanghai's Financial Institutions on Governance (G)-related Issues

(I) Actively Practicing ESG Principles and Deeply Integrating Them into Operational Management Systems

Fullgoal Fund has been deeply cultivating the ESG field across multiple dimensions with significant results. In terms of stewardship and promoting the enhancement of ESG capabilities of listed companies, Fullgoal Fund emphasizes the construction of ESG systems and takes active measures through means such as voting at shareholder meetings and routine communication. It once vetoed a related-party transaction proposal by a listed company that would have harmed the interests of minority shareholders, prompting the company to standardize its operations. By participating in symposiums, it opposed an unreasonable brand usage fee plan, helping the listed company to improve its governance quality and sustainable development capabilities, and effectively safeguarding the interests of its fundholders.

Fullgoal Fund deeply integrates ESG into its investment and research system. Through positive and negative screening and integrated analysis, it effectively enhances investment performance and avoids risks, such as achieving excess returns from accurate judgments on companies with high ESG performance. In product innovation, as of March 2025, Fullgoal Fund managed 34 public ESG funds with a scale of ¥50 billion, covering active equity, stock indices, and bonds. For example, it has laid out green industry thematic funds and green bond funds, and also launched the Shanghai Environment and Energy Exchange Carbon Neutral ETF, listed on the Shanghai Stock Exchange, comprehensively practicing the ESG investment philosophy.

Orient Securities enhances its ESG governance effectiveness through institutional innovation and risk management. It has built an effective governance architecture, formulating *the ESG Risk Management Measures* and *ESG Due Diligence Guidelines*, and has incorporated ESG risks into its comprehensive risk management system. It has been included in the Hang Seng A-share Sustainability Index for five consecutive years.

Section III: Bottlenecks and Optimization Strategies for ESG Financial Services at Shanghai's Financial Institutions

Based on business data and practical case studies, there is still room for improvement in the ESG services of Shanghai's financial institutions.

I. Challenges and Bottlenecks

(I) ESG Data is Difficult to Obtain and the Quality of Information Varies

Data constitute a critical foundation for ESG-related financial services. However, the efficiency of data acquisition and the rigor of quality control pose serious challenges for financial institutions in Shanghai and across the country. At present, many small and medium-sized enterprises and other non-listed entities have a limited willingness to disclose ESG information. Their disclosures are often incomplete and nonstandard, which leaves financial institutions without high-quality, cross-comparable ESG datasets. As a result, institutions must devote substantial time and manpower to guiding firms to supplement information through questionnaires, onsite verification, and other methods. The limitations of this process significantly undermine the scientific robustness of ESG assessments and investment decisions. A weak data foundation has thus become a core bottleneck constraining the sector’s development.

(II) ESG Products Show a Trend of Homogenization, with Low Attention to Emerging Fields

Although financial institutions are actively exploring innovation in ESG financial products, the problem of homogenization remains prominent. Currently, existing products have a high degree of similarity in their design and business models, lacking customized solutions that target different corporate life cycles and risk appetites. At the same time, while there are many ESG products for large enterprises and key projects, there is a scarcity of products adapted to the "short-term, small-scale, frequent, and urgent" financing needs of micro, small, and medium-sized enterprises. Similarly, while there are many ESG products for mature fields like photovoltaics and wind power, there is a relative lack of products focusing on emerging fields such as biodiversity protection and the circular economy. Homogenized competition not only limits the coverage of ESG financial services but also weakens the profitability of financial

institutions. This, in turn, hinders the innovation of ESG products that require large investments in technology R&D, talent cultivation, and data accumulation, further constraining the innovation and development of financial products.

(III) ESG Standards Require Further Improvement, and Industry Collaboration is Weak

In terms of ESG information disclosure, although regulatory requirements are gradually becoming stricter, some enterprises still engage in selective disclosure, which severely affects the comparability and reliability of information and increases the difficulty of assessment and supervision for investors and regulatory bodies. At the same time, there is a lack of clear legal basis for defining and penalizing "greenwashing," and the restraint mechanisms are insufficient. In terms of ESG evaluation, a consensus on standards has not yet been formed. For example, in the certification of green projects, banks focus on the value of collateral, while insurers focus on long-term environmental risks. This difference in standards means the same project may need to be repeatedly assessed. In the ESG investment decision-making process, there is a lack of mature methodologies for integrating non-financial factors such as environment, social, and governance into traditional financial valuation models, leading many institutions to act independently and hindering collaborative progress in the industry.

(IV) ESG Incentive Policies Need Strengthening, and Attracting Long-Term Capital Faces Challenges

ESG projects, particularly those in green infrastructure and clean energy, are typically characterized by large investment scales, long construction periods, and slow return cycles. They have an urgent need for long-term capital. However, the current banking system is dominated by short-term deposits, and the proportion of equity investment for insurance funds is limited, leading to the co-existence of "borrowing short to lend long" and "inefficient use of long-term capital." At the same time, there is a lack of ESG investment incentive policies for long-term capital, with insufficient mechanisms such as tax incentives and risk compensation. This obstructs the inflow of long-term capital and affects the promotion and implementation of ESG products. Furthermore, the returns on ESG investments often materialize in the medium to long term. The mismatch between short-term performance assessment mechanisms and the nature of long-term capital limits the deepening and expansion of ESG business and weakens

the motivation to continuously advance ESG strategies.

II. Optimization and Breakthrough Strategies

To address the above bottlenecks and achieve broader and deeper breakthroughs in the ESG development of Shanghai's financial industry, multi-party collaborative efforts are needed to fundamentally resolve these constraining factors.

(I) Optimization of Financial Institutions' Internal Actions

1. Optimize the Data Foundation and Strengthen Technological Empowerment

Data governance is a critical lever for breaking down ESG information barriers. First is to broaden data sources. On the basis of traditional financial data, institutions should actively incorporate multi-dimensional data on corporate environmental, social, and governance aspects. By cooperating with government departments and third-party data service providers, they can obtain information on corporate carbon emissions, energy consumption, and pollution discharge to build a comprehensive corporate profile. Second is to enhance data processing capabilities. Technologies such as big data, artificial intelligence, and blockchain should be leveraged to clean, integrate, analyze, and mine ESG data. For example, AI can be used to build intelligent ESG rating models, and blockchain technology can be used to make green asset information traceable and immutable, preventing the risk of "greenwashing." Third is to strengthen data application. The application of ESG data should be deeply integrated into all stages of business processes to achieve full-process digital and intelligent management.

2. Drive Product Innovation and Optimize Service Supply

Product innovation is the core path to breaking through the dilemma of homogenization. First is to strengthen customer segmentation. Customized ESG financial products should be designed for enterprises of different industries, scales, and development stages. For example, comprehensive solutions such as project financing, green bonds, and green leasing can be provided for large-scale green projects, while green credit products based on light assets such as orders, accounts receivable, and intellectual property can be developed for MSMEs. Second is to actively expand into emerging fields. Institutions should actively develop ESG financial products in areas such as biodiversity protection and the circular economy, and explore

innovative businesses like carbon finance and transition finance to provide capital support for the low-carbon transition of high-carbon industries. Third is to promote service model innovation. Institutions can transform from being single-product providers to integrated service providers, offering enterprises value-added services such as ESG strategic planning, carbon asset management, green certification, and technical consulting to help them enhance their sustainable development capabilities.

(II) Optimization of External Collaborative Actions

1. Unify and Standardize Norms to Promote International Mutual Recognition

Standard unification is the cornerstone for promoting industry collaboration and enhancing international ESG influence. First is to build a unified ESG standard system. The standards for ESG information disclosure and green project certification should be optimized, clarifying requirements for the scope and content of disclosure to improve the comparability and transparency of information. Collaboration within the Yangtze River Delta region should be strengthened to promote the mutual recognition and alignment of green finance standards and eliminate barriers to cross-regional operations. Furthermore, drawing on international experience and combined with China's national conditions, an ESG standard system with Chinese characteristics can be explored. Second is to strengthen alignment with international rules. Institutions should actively participate in the formulation of international ESG standards, promote mutual trust and recognition between domestic standards and mainstream international standards, and encourage local institutions to take the lead in adopting advanced international ESG management frameworks and risk management tools like the Equator Principles to enhance their international competitiveness. Financial institutions and research institutions should be supported to participate in the activities of international organizations such as the International Organization for Standardization (ISO) and the TCFD, to voice the "China story" and contribute "Shanghai wisdom."

2. Improve Incentive Mechanisms to Stimulate Market Vitality

Incentive mechanisms are a vital engine for stimulating the market's internal driving force. First is to improve a diversified incentive policy system encompassing fiscal, monetary, and regulatory measures. In terms of fiscal policy, support such as interest subsidies and rewards

for businesses like green credit and green bonds should be increased to reduce the capital costs for financial institutions. In terms of monetary policy, tools such as the Carbon Emission Reduction Facility and special green re-lending facilities can be used to provide low-cost funding support to financial institutions. In terms of regulatory policy, preferential risk weights can be applied to green credit to reduce the capital occupation of banks and increase their motivation to conduct green finance business. Second is to establish and improve market-based risk-sharing mechanisms. The role of government-backed financing guarantee agencies can be leveraged to provide guarantees for the green credit of MSMEs and solve the problem of "difficulty in obtaining guarantees." The establishment of a green finance risk compensation fund can be explored to provide appropriate compensation for losses incurred by financial institutions from conducting green finance business, thereby reducing their risk concerns. The development of green insurance should be vigorously promoted, providing risk protection for green projects through products such as environmental pollution liability insurance and green credit guarantee insurance. Third is to cultivate and develop diversified investment entities. Long-term capital from sources such as pension funds, insurance funds, and social security funds should be actively attracted. Policies like tax incentives should be used to guide them to increase their investment in the ESG field. The establishment of specialized investment institutions such as green industry funds and carbon funds should be supported to provide equity financing for green projects. At the same time, investor education should be strengthened to popularize the ESG investment philosophy, cultivate a culture of responsible investment, and expand the market demand for ESG products.

Chapter 4: The Current State of ESG Development in Shanghai's Trading Markets

This chapter focuses on a vital component of the Shanghai ESG ecosystem—the security trading markets. It systematically reviews the multi-dimensional progress of different Shanghai's trading markets in promoting and empowering ESG practices and explores the innovative models of the Shanghai trading market in the ESG field through case analyses of various security exchanges. Finally, it summarizes the bottleneck issues in deepening ESG practices and proposes targeted optimization strategies.

Section I: Multi-dimensional Progress in the ESG Development of Shanghai’s Trading Markets

I. Innovative Practices and Achievements of the Shanghai Stock Exchange

As a crucial piece of infrastructure for the capital market, the **Shanghai Stock Exchange** (SSE) has, in recent years, fully leveraged its capital market functions and actively taken measures to promote green development and practice social responsibility. In 2024, the SSE continued to promote equity and debt financing for green enterprises, continuously strengthened the environmental responsibility awareness of listed companies, investors, and market institutions, and consistently deepened international cooperation in green finance. Specific measures include:

First, supporting the financing of green enterprises and projects. The SSE actively cultivated green productive forces and supported equity and debt financing for green enterprises. In terms of equity financing, in 2024, 15 companies were listed on the STAR Market, of which 2 were related to green industries, raising ¥2.94 billion. There were 17 IPOs on the Shanghai Main Board, of which 4 were related to green industries, with a financing amount of ¥4.39 billion. Two green-related companies on the STAR Market completed refinancing, with a total financing amount of ¥2.15 billion. In terms of green bonds, in 2024, a

total of ¥140.3 billion in green bonds were issued in the SSE market, including ¥59.8 billion in green corporate bonds and ¥80.5 billion in green asset-backed securities. The SSE also promoted the issuance of public REITs. In 2024, three clean energy REIT projects were listed on the Shanghai market, with a total financing scale of ¥3.52 billion.

Second, strengthening the sustainable information disclosure of listed companies. The SSE formulated and released *the Three-Year Action Plan for Promoting the Improvement of ESG Information Disclosure Quality of Companies Listed on the Shanghai Main Board (2024-2026)*, clarifying the direction and goals for enhancing ESG information disclosure quality over the next three years. It successively formulated and released *the Shanghai Stock Exchange Listed Companies Self-Regulatory Guidance No. 14 - Sustainability Report (Trial), the Shanghai Stock Exchange Listed Companies Self-Regulatory Guidelines No. 4 - Preparation of Sustainability Reports (Exposure Draft)*, and *the Shanghai Stock Exchange STAR Market Listed Companies Self-Regulatory Guidelines No. 13 - Preparation of Sustainability Reports (Exposure Draft)* to standardize the disclosure of sustainability-related information by listed companies. In 2024, a total of 1,193 listed companies published their 2023 ESG reports, sustainability reports, or social responsibility reports. Among them, 198 companies on the STAR Market made disclosures, with the number and proportion of disclosures continuously increasing since the board's launch.

Third, enriching ESG indices and products. The SSE continued to promote the innovation of green investment products and enrich the tools for green finance practices. For example, as of the end of 2024, the SSE, in collaboration with the China Securities Index Company, had cumulatively released 147 sustainable development indices, including ESG indices, with 89 tracking products and a total scale of ¥84.13 billion. This provides tools for guiding resources toward green and low-carbon industries and assisting the entry of medium- and long-term capital, such as pension funds, into the market. The SSE also continued to promote the development of ETF products. As of the end of 2024, there were 46 green ETFs listed on the Shanghai market, with a total scale of ¥34.0 billion, providing investors with more green investment choices.

Fourth, guiding and cultivating the concept of green development. The SSE produced and

broadcasted investor education materials on the theme of green finance to popularize green knowledge. For example, in collaboration with authoritative media such as CCTV Finance and Yicai, it produced programs like *Let's Do Research Together* and *Value and Investment* to help investors understand the industry and green finance. It launched the carbon neutrality-themed works as part of the "SSE ETF Gala" to showcase the value of indexed investing in sustainable development. It has deepened its investor education work, releasing a new version of the "rational, value-based, and long-term investment" initiative to convey the concepts of green and responsible investment to investors. It has also conducted specialized ESG training through a combination of online and offline formats to effectively help listed companies standardize their sustainability information disclosure practices.

Fifth, deepening international cooperation in green finance. The SSE actively participates in international exchanges and cooperation on green finance. For example, on December 10, 2024, the SSE sent representatives to Jakarta, Indonesia, to participate in the Asian Financial Cooperation Association's "Belt and Road" Green Finance Cooperation Forum, sharing topics related to green development with association members and institutions along the route. It continues to deepen international cooperation in green finance, setting up a special session on green finance at the 2024 SSE International Investors Conference. It invited representatives from internationally renowned investment institutions and companies listed on the Shanghai market to jointly discuss "Sustainable Disclosure and the New Stage of ESG Investment."

II. Innovative Practices and Achievements of the Shanghai Futures Exchange

As a vital piece of financial infrastructure in China, the **Shanghai Futures Exchange** (SHFE) has, in recent years, carried out systematic and innovative practices in the ESG field. Its work covers the three dimensions of environment, social, and governance, showcasing the in-depth exploration of the Chinese financial market on the path to sustainable development.

In the environmental dimension, on May 22, 2025, SHFE and the Shanghai International Energy Exchange (INE) were officially approved to join the United Nations Sustainable Stock Exchanges (UN SSE) initiative, becoming the first commodity futures exchanges in mainland China to join this initiative. SHFE is actively promoting the innovation of green financial products, including advancing the listing of casting aluminum alloy futures and options to

support the aluminum recycling industry and the development of the circular economy. It is conducting research on hydrogen futures, has jointly released the "China Hydrogen Price Index System" and *the Group Standard for Carbon Emission Accounting Methods for Industrial By-product Hydrogen*, providing a basis for pricing and carbon accounting for the hydrogen energy industry. It has listed low-sulfur fuel oil futures to promote RMB denomination in the bonded fuel oil sector; is accelerating the research and development of liquefied natural gas (LNG) futures and options to promote the low-carbon transition of the energy structure; and is continuously exploring carbon emission rights futures trading, aiming to enhance Chinese influence in international carbon pricing.

In the social responsibility dimension, SHFE focuses on leveraging the function of the futures market to serve the economy. By enhancing the quality and efficiency of market operations, it provides effective price discovery and risk management tools for enterprises in the industrial chain. The exchange actively carries out investor education and protection work, enhancing the risk awareness and professional capabilities of market participants through platforms like the "Futures Academy" and "Legal System Promotion." At the same time, it promotes financial poverty alleviation and rural revitalization work, carrying out specialized assistance that is integrated with the functions of the futures market, and has played a positive role for many years in serving national strategies and ensuring public welfare.

In the governance dimension, SHFE continuously improves its internal governance structure and risk management system, strengthening compliance operations and the construction of transparency. The exchange is constantly optimizing its product design and rules system to enhance the efficiency and fairness of market operations. It is strengthening interconnectivity with international markets, expanding the range of products available for trading by qualified foreign investors. Currently, 22 products are open to foreign participation, with overseas clients from more than 30 countries and regions. At the same time, it is deepening international exchange and cooperation, signing cooperation agreements with international institutions such as the Osaka Exchange and the Gulf Mercantile Exchange to promote the "going global" of Chinese standards. Under the guidance of the China Securities Regulatory Commission (CSRC), SHFE is also actively participating in the formulation of sustainable

development information disclosure standards, promoting the standardization and normalization of ESG information disclosure.

Through these systematic practices, the Shanghai Futures Exchange is steadily advancing the deep integration of ESG principles with the development of the futures market. This not only enhances its own sustainable development capabilities but also lays a foundation for the Chinese futures market to play a greater role in the global sustainable finance governance system, demonstrating the sense of responsibility of Chinese financial institutions in achieving the coordinated development of the economy, environment, and society.

III. Innovative Practices and Achievements of the Shanghai Environment and Energy Exchange

(I) Launching the Nationwide Carbon Emission Trading Exchange

The Shanghai Environment and Energy Exchange (SEEE) undertake the construction and operation of the national carbon emission trading exchange and, under the guidance of the competent authorities, is deeply involved in building the institutional framework of the carbon market. By implementing a system for carbon emission data accounting, reporting, and verification, it ensures the accuracy of corporate carbon data, providing foundational data support for carbon-related ESG information disclosure. At the same time, the systems for allowance allocation and compliance, as well as carbon emission trading and supervision, have guaranteed the stable operation of the market. As of the end of 2024, the cumulative trading volume reached 630 million tons with a turnover of ¥43.033 billion. It covers approximately 5.1 billion tons of carbon dioxide emissions annually, includes 2,257 key emitting entities, and is currently the world's largest carbon market by volume of greenhouse gas emissions covered.

SEEE also serves as the designated trading platform for Shanghai's pilot carbon trading scheme and as the national trading platform for China Certified Emission Reductions (CCER), registered with the national carbon trading authorities. Since the construction of the pilot trading system began in 2011, the Shanghai carbon market has operated smoothly for over 14 years, experiencing three stages: “building the system, expanding the scope, and optimizing the mechanism,” and has gradually formed a relatively mature market structure and mechanism. The Shanghai carbon market currently covers 28 industries and 378 enterprises (including steel,

petrochemicals, aviation, and shipping), covering over 50% of the city's carbon emissions. It has achieved 100% compliance for 12 consecutive years, with a cumulative spot trading volume of 252.6 million tons (¥4.769 billion) and a cumulative carbon allowance forwards trading volume of 4.7166 million tons.

(II) Introducing the Shanghai Carbon Inclusion System

Adhering to the principle of “benefiting the public and enterprises,” SEEE is building a value realization pathway for small and medium-sized emission reduction projects and individual low-carbon behaviors. The working objectives include supporting the development and verification of small and micro emission reduction projects, covering public low-carbon scenarios, improving the incentive system, promoting the development of personal carbon accounts, and constructing a closed loop for the development and offsetting of emission reductions, ultimately stimulating broad societal participation in carbon reduction.

The personal carbon account platform opened for testing in November 2024 and was officially launched for promotion on June 25, 2025. Users can open a personal carbon account through the "Suishenban" WeChat mini-program. Emission reductions from green travel such as taking the subway, bus, or cycling are calculated as carbon assets, which can be exchanged for digital RMB, enterprises platform benefits, or physical goods, realizing a “measurable, visible, and obtainable” green travel experience. Since September 2024, the platform has launched two trading products (SHCERCIR1 and SHCERCIR2). Application scenarios include compliance offsetting for the Shanghai carbon market, alternative restoration for environmental damage compensation, and voluntary purchases by enterprises/institutions to offset emissions, supporting carbon neutrality goals. The construction of the carbon inclusion system provides a path for enterprises to enhance their brand image and fulfill their social responsibilities, setting a benchmark for green development. Through mechanisms such as carbon credit redemption, it stimulates the internal motivation of the public to participate and promotes the realization of ESG principles and value.

(III) Accelerating Innovation in Carbon Finance

From the perspective of serving market participants and promoting low-carbon investment and financing, SEEE has developed carbon market-related trading tools, financing instruments,

and support tools to provide financial support for enterprises' ESG practices. In terms of financing instruments, it has launched carbon pledges, carbon repos, and carbon borrowing to help enterprises activate their carbon assets, reduce financing costs, and provide cash flow support for ESG practices such as energy-saving and emission-reduction retrofits. In terms of trading tools, it has launched the Shanghai Carbon Allowance Forwards, which is the nation's first and only centrally cleared standardized carbon financial derivative, used to regulate the costs and benefits of emission reduction and to manage risks. In terms of carbon finance support tools, it has launched a carbon neutral stock index and ETF—the CSI SEEE Carbon Neutral Index. This is the first application of the SEEE's carbon neutrality evaluation model, which forms a low-carbon evaluation system by calculating the emission reduction potential of industries and analyzing the key carbon emission indicators of enterprises. It is currently actively promoting innovative financial products such as carbon insurance and carbon funds to broaden financing channels for enterprises undergoing a low-carbon transition. In terms of carbon pricing benchmark tools, it released the Shanghai Carbon Price Index in December 2024. This integrates the prices of representative products such as SHEA and SHEAF to provide a diversified pricing benchmark, which helps to promote the improvement and development of the carbon market and enhance market transparency and efficiency.

IV. Innovative Practices and Achievements of the Shanghai Equity Exchange

To improve the green finance service system and support Shanghai in building an international carbon finance center, the **Shanghai Equity Exchange** (SEE) has, since April 2021, successively launched two innovative instruments: the Carbon Neutrality Index and the Green Q Board.

(I) Unveiling the Carbon Neutrality Index and the Green Q Board

The Carbon Neutrality Index selects as its sample companies listed on the Equity Transfer System (E Board) and the Technology Innovation Board (N Board) that operate in sectors such as new energy and energy conservation and environmental protection. Using February 15, 2012, as the base date (1,000 points), the index dynamically reflects the market performance of green enterprises. By the end of July 2024, the index included 165 constituent companies and had reached 12,327.61 points; by April 2025, it further increased to 12,406.16 points. According to

2024 annual reports, the average operating revenue of constituent companies was RMB 93.70 million, significantly higher than the average operating revenue of RMB 61.94 million for all companies that disclosed annual reports. This demonstrates the superior quality, growth potential, and profitability of green enterprises.

The Green Q Board, established under the basic disclosure tier of SEE's display board, specifically provides incubation and financing services for enterprises aligned with China's Green Industry Guidance Catalogue. Together with the Carbon Neutrality Index, it forms a comprehensive green finance service system. As of the end of March 2025, the Green Q Board had 163 enterprises, and the Carbon Neutrality Index included 148 constituent companies, with the index standing at 12,435.387 points. For now, both instruments have been incorporated into the key initiatives of the Yangtze River Delta Green Finance Reform and Innovation Pilot Zone, promoting the development of Shanghai's green enterprise project repository, strengthening market attention to ESG and sustainable development, and laying the foundation for the construction of an international carbon finance center.

(II) Introducing Tiered and Categorized Disclosure Framework

SEE has established a tiered and categorized information disclosure framework, It adopts a differentiated management model across multiple boards, tailoring regulatory rules to enterprises at different development stages and board types. Companies are assigned to appropriate boards, such as the Technology Innovation Board, the Equity Transfer System (basic disclosure tier), the Shanghai Specialized, Refined, Differentiated, and Innovative (SRDI) Board, and the Display Board—based on dimensions including development stage, industry sector, innovation profile, qualifications, and business needs.

For more mature small and SMEs, disclosure requirements include periodic reports and ad hoc announcements. For early-stage micro- and small-sized enterprises, disclosure focuses on significant events, with annual reports and other filings encouraged but not mandatory. Disclosure guidelines for each board and development stage are published in the form of checklists that specify key elements, clarify disclosure standards, and provide templates and verification forms.

The tiered disclosure design enhances governance by clearly defining disclosure frequency

and granularity, helping firms systematize internal processes, refine operational mechanisms, and strengthen internal controls. This enables timely identification and rectification of management weaknesses, improving decision-making transparency and compliance from the source, and elevating governance standards. It also supports enterprises in transitioning from "passive compliance" to "proactive optimization."

For archival and management of disclosure materials, SEE has established a "multi-level review + effective record-keeping" mechanism. Disclosure documents must undergo multiple rounds of review and be submitted through a dedicated system to ensure authenticity and immutability. Each year, nearly 10,000 disclosure documents—such as annual reports and interim announcements—are archived, creating a "digital archive" that tracks the evolution of corporate governance. These records serve not only as a core reference for the market but also as a vital self-assessment tool for enterprises. Many firms, by reviewing historical archives, have identified recurring management issues and optimized processes, thereby significantly improving compliance efficiency.

This closed-loop design of "rules + tools + archives" effectively lowers the threshold for governance standardization. The time required for disclosure by companies across different boards has been greatly reduced, while financing obstacles caused by information asymmetry have diminished. By transforming abstract governance requirements into an actionable document-based guidance system, SEE has facilitated a substantive shift from "form-filling compliance" to "institutionalized governance-building."

V. Innovative Practices and Achievements of the Shanghai Data Exchange

The **Shanghai Data Exchange** (SDE) has actively advanced market development through systematic strategies aimed at enhancing market activity, aligning with international practices, and taking the lead in building a data import market. It has gradually promoted cross-border two-way circulation and explored outbound data pathways, while simultaneously developing and operating a carbon segment that focuses on data elements and low-carbon scenarios. This has been instrumental in establishing data circulation and trading channels in the green and low-carbon sector.

Accelerated Development of the Data Trading Market: Guided by the *Shanghai Data*

Exchange Data Trading Management Measures, the SDE has established a three-tier regulatory system of "measures-standards-guidelines." This framework covers four modules: participant management, trading management, operational management, and dispute resolution, supported by eight standards and five guidelines, thereby forming a comprehensive governance structure from top-level design to operational details. By May 2025, the SDE had led or participated in 45 international and domestic standards, and in December 2024 contributed to drafting the *ITU CxO Conference Declaration*, continuing to export Chinese rules to the global stage.

To strengthen market liquidity, the SDE has promoted the integrated market cultivation initiative known as the TTP Project (Ten Thousand Projects). This initiative centers on market participants and uses the NDP (Nexus Data Market Pivot) as the operational hub to construct a new paradigm for integrated data markets. It has standardized trading practices by regulating the registration, listing, and trading processes for data products to ensure legality and compliance. Systems such as the niDts platform and service provider management system have been launched with a demand-matching hub, while regular supply-demand matchmaking events foster collaboration between data suppliers and buyers.

In cooperation with leading enterprises and research institutions, the SDE has established industry innovation centers to advance the marketization of sectoral data through product listings and trade facilitation. It has cultivated a data intermediary ecosystem, supporting services in governance, compliance, development, and quality evaluation to enhance market vitality. Furthermore, the SDE has continued to improve pricing mechanisms by partnering with the Data Pricing Committee of the China Price Association to develop relevant standards and practices, exploring models and mechanisms for pricing data elements.

In terms of product diversity, the SDE has created specialized zones, including an International Zone, Corpus Zone, Public Data Zone, and Biomedicine Zone, tailored to the needs of specific industries and sectors. This expansion has consistently enlarged the scale of the data product market, enabling more precise and efficient support for industry needs and contributing to the high-quality development of the digital economy.

In terms of international engagement, the SDE has launched an International Zone, introducing data products in sectors such as finance and biomedicine. It has provided compliant

channels for accessing global data, facilitating data development, utilization, and cross-sectoral integration, while laying the foundation for a globally connected hub of data-element circulation. Within the ESG domain, the SDE has innovatively advanced green finance by establishing the carbon segment, effectively addressing bottlenecks in the circulation of low-carbon data elements. This segment enables efficient data flows and applications in the green and low-carbon sectors, injecting new momentum into sustainable economic and social development. The carbon segment has pioneered the deep integration of the carbon market with the data-element market, standardizing carbon data transactions to provide accurate data support for carbon emissions trading and carbon reduction project evaluations. Conversely, demand from the carbon market has also stimulated the vitality of the data-element market, optimizing resource allocation and unlocking data value. This fusion mechanism provides robust data support and market assurance for achieving China's "dual-carbon" (carbon peaking and carbon neutrality) goals.

By the end of May 2025, the SDE had signed agreements with more than 1,600 data intermediaries and listed over 5,000 data products. In 2024, the value of data product transactions exceeded RMB 5 billion, while transaction volume in the first half of 2025 alone surpassed RMB 3 billion-a year-on-year growth of more than 50%.

As of June 2025, the SDE had undertaken 45 data standards research projects. Among them, 14 had already been published (including one international standard, two national standards, four local standards, and seven group standards), while 31 remained in progress (including one international standard, 12 national standards, two industry standards, seven local standards, and nine group standards). These projects span key areas such as data circulation, data infrastructure, data security, data trading, and data assets.

The SDE has actively developed ten categories of data intermediaries, including data consulting, governance, compliance, quality evaluation, product development, brokerage, infrastructure, delivery, security, and asset evaluation. It also established the Shanghai Data Intermediary Association, comprising 250 members, and has organized activities such as the Global Data Intermediary Conference, DET (Data Empowerment Training), DSM (Data–Service Matching) sessions, and professional salons, creating an integrated service ecosystem

spanning the full data value chain.

Achievements of the carbon segment: since its launch in 2024, the carbon segment had, by the first half of 2025, attracted 36 data suppliers and listed 184 data products. These products cover fields such as ecological and environmental governance, energy efficiency, resource recycling, carbon emission management, and green finance. The data products include datasets, data services, and data applications, reflecting the breadth and diversity of the carbon-data market.

Section II: Innovative Cases of ESG Practices Among Shanghai's Trading Markets

I. Innovative Practices of Shanghai Trading Markets on Environmental (E)-related Issues

(I) Launching the Shanghai Carbon Price Index

The release of the Shanghai Carbon Price Index on December 19, 2024, jointly compiled by the Shanghai Environment and Energy Exchange (SEEE) and the Shanghai Futures Exchange, marked an important milestone in improving price discovery in the carbon market. The index draws on representative products in Shanghai's carbon market across multiple trading methods and provides a comprehensive indicator of price levels. Its purpose is to convey market information more efficiently to a broad range of participants. The carbon market has long struggled with inadequate price discovery, as the absence of an integrated benchmark across different products and trading types has made it difficult for companies and investors to accurately assess overall price levels. This in turn has reduced pricing efficiency. By consolidating the prices of various products, the Shanghai Carbon Price Index addresses this gap, enabling market participants to make more accurate decisions and thus improving the efficiency of market pricing.

The design of the index reflects Shanghai's unique market structure. It selects products such as SHEA, SHEAF, and SHCERCIR that represent the most important spot and forward transactions, prioritizing those that have been in stable operation for at least one year to guarantee price continuity and stability. In contrast to other indices, this approach emphasizes

maturity and reliability in sample selection. The weighting of the index is based on the cumulative trading volume over the previous 244 trading days, updated daily, thereby ensuring a dynamic reflection of changing market preferences. In practice, the index does not merely provide closing information but serves as a comprehensive benchmark for carbon asset valuation and for assessing the economic returns of emission reduction activities. It is also directly applicable to financial services such as carbon pledges, repurchase agreements, and borrowing, where it aligns with the valuation logic of banks and other institutions. Furthermore, it provides a continuous and traceable carbon pricing reference for green finance and climate-related investment and financing projects. By embedding the index into financial products, it also strengthens the link between the carbon market and the capital market, acting as a bridge between the two.

(II) Building the Shanghai Carbon Inclusion Platform

Another key innovation in Shanghai is the Carbon Inclusive Platform, which was connected to the city's carbon market through the launch of the SHCERCIR1 product in late 2024. This product, derived from the Carbon Inclusive Category I methodology, primarily reflects emission reductions from distributed photovoltaic projects. It can be used for compliance in the Shanghai carbon market, ecological compensation, voluntary carbon offsets, voluntary retirements, and donations. In the first half of 2025, a second product, SHCERCIR2, was introduced under the Category II methodology, covering low-carbon electricity consumption and electric vehicles. Unlike the first product, it cannot be used for compliance in the carbon market but is valid for ecological compensation, voluntary offsets, retirements, and donations. These two categories create explicit monetization pathways for emission reductions in diverse scenarios ranging from household photovoltaics to private electric vehicles.

The broader significance of the Carbon Inclusive Platform lies in its effort to make individual contributions to emission reduction visible and valuable. On June 25, 2025, the platform was formally launched, creating a straightforward channel for enterprises, organizations, and individuals to engage in low-carbon practices. By applying quantification methods, the platform measures everyday behaviors such as bus or subway travel and assigns

corresponding reductions in carbon emissions. These quantified reductions are then converted into carbon credits that individuals can exchange for digital RMB, vouchers, or consumer goods. In this way, the platform not only provides tangible benefits but also fosters motivation for low-carbon lifestyles. The mechanism is supported by a closed-loop system in which users open carbon accounts via the "Suishenban (Shanghai E-Government)" application, authorize specific behaviors to be recorded, and have them automatically transformed into credits. Blockchain and digital identity technologies ensure that data are authentic, complete, and traceable while preserving privacy. The credits can then be redeemed in the "Carbon Credit Mall," which has already been populated with products and services ranging from discount vouchers to merchandise. The system has now been stabilized with supporting regulatory documents and the participation of financial institutions and internet companies, and its integration with the compliance carbon market further enhances its role in guiding public participation in the green transition.

(III) Launching Pilot Project for Low-Carbon Transition in Agricultural Sector

Under the guidance of China's "dual-carbon" goals, promoting a green and low-carbon transition in agriculture is not only an inherent requirement of national strategy but also a practical necessity for advancing high-quality agricultural development in Shanghai. At present, agricultural carbon emissions and carbon sinks lack effective measurement and market mechanisms, meaning that the value of green production practices remains unrecognized and resource allocation efficiency is low. Advancing the assetization of agricultural carbon can enhance pricing capacity, direct the optimal allocation of green production factors, and incentivize agricultural producers to participate in the low-carbon transition. At the same time, developing facility-based agriculture and strengthening carbon reduction and carbon sink capabilities contribute to meeting domestic green product standards while also improving the international competitiveness of Chinese agricultural products.

In December 2024, the Shanghai Environment and Energy Exchange (SEEE) completed a project commissioned by the Shanghai Municipal Agriculture and Rural Affairs Commission titled the "Monitoring and Assessment of the Green Countryside Pilot Zones and the Low-Carbon Transition of Modern Facility Agriculture." This project focused on modern facility

agriculture and responded to the national strategy for sustainable agricultural development. It explored pathways for low-carbon agricultural transformation by optimizing energy use and creating ecological recycling value. The project, based on the *Measures for Monitoring and Assessment of Shanghai Green Countryside Pilot Zones*, evaluated the construction and development of thirteen pilot zones across the municipality in 2024.

The evaluation adopted a multidimensional framework covering five core dimensions: industrial development, technological equipment, green development, management practices, and policy support. These indicators comprehensively captured key areas of progress. However, because the pilot zones differ significantly in geographical conditions, resource endowments, foundations, industrial priorities, and project implementation progress, direct comparison of indicator data across zones was infeasible. To ensure scientific, objective, fair, and standardized assessment, the project adopted a "development index" for each zone as the primary criterion. The index measures the relative speed of development by comparing the level of performance in the reporting period with the baseline, thereby capturing each zone's dynamic growth. Using this methodology, the project produced the "Shanghai Green Countryside Pilot Zone Development Index," which enabled systematic quantitative analysis at the overall, dimensional, and zonal levels.

The project not only verified the feasibility of green development pathways in facility agriculture but also generated experience and practices that can inform agricultural low-carbon transitions across China. First, the scientific evaluation system provided strong policy support for green transition in agriculture. By structuring an assessment framework around five dimensions and setting measurable indicators, the project clarified the key directions for modern facility agriculture and facilitated quantifiable and verifiable targets. The development index ensured comparability across zones while maintaining scientific rigor. Such evaluation mechanisms can serve as important references for monitoring agricultural green development and optimizing resource allocation in other regions. Second, the identification of low-carbon value laid the groundwork for developing agricultural carbon assets. By incorporating low-carbon factors such as energy optimization and ecological recycling into the evaluation logic, the project captured the carbon reduction and carbon sink contributions of green agricultural

practices, thereby creating a foundation for the recognition and monetization of agricultural carbon assets.

(IV) Issuing Guidance on Climate Investment Methodologies

In the *Guidelines on Promoting Climate Investment and Financing* jointly released by the Ministry of Ecology and Environment and four other ministries, the government emphasized the importance of optimizing the energy structure, controlling greenhouse gas emissions from industry, agriculture, and waste management, and directing capital flows toward climate-related and sustainable development activities. The guidelines also called for financial institutions to be supported and incentivized in developing climate-friendly green financial products. Against this policy backdrop, the SEEE and China International Capital Corporation (CICC) undertook joint product development with a focus on "climate-friendly" investment. Using low-carbon transition as an entry point, they produced a fixed-income investment methodology that identifies assets balancing economic return with environmental performance, thereby enriching the toolkit for climate finance.

In September 2024, the SEEE formally released the "SEEE–CICC Low-Carbon Transition Investment Method." This methodology innovatively integrates the SEEE's low-carbon transition evaluation system with the ESG assessment frameworks of financial institutions, creating a dual evaluation model that assesses both issuers and projects. The method provides governments, financial institutions, and enterprises with a practical tool to identify high-quality low-carbon projects and represents an important innovation within the Pudong Climate Finance Pilot.

To further advance carbon accounting practices in fixed income investment, SEEE and CICC jointly constructed a systematic "Low-Carbon Transition + ESG" evaluation methodology. This framework integrates SEEE's low-carbon transition evaluation system—which assesses issuers on climate performance, transition planning, transition measures, transition progress, and green operations—together with CICC's fixed-income ESG and carbon performance assessment system, which evaluates ESG quality and carbon emissions across bonds, asset-backed securities, and public REITs. The combined framework covers issuers and underlying assets comprehensively, and it incorporates key Chinese policy priorities such as

environmental protection, energy conservation, carbon reduction, and rural revitalization. Currently, this system profiles over 4,000 domestic bond issuers and nearly RMB 500 billion in financing products in terms of ESG quality.

The "SEEE–CICC Low-Carbon Transition Investment Method" is widely applicable. It can be tailored to specific institutional needs for building bond portfolios and customized financial products, or it can be used at a market-wide scale to conduct exclusions and form broad-based investment portfolios. It also serves as a performance benchmark for green investment activities. By applying this methodology, financial institutions gain a clear understanding of the carbon emissions associated with their portfolios and can adjust investment strategies to better manage their own carbon footprints. The method directs capital flows toward enterprises engaged in low-carbon transition, broadens their financing channels, and encourages them to improve climate-related disclosures. Its dual evaluation approach, combining classification-based and principle-based definitions of transition activities, helps mitigate the risk of greenwashing and contributes to the development of robust transition finance standards.

II. Innovative Practices of Shanghai Trading Markets on Social (S)-related Issues

Supporting the "Data Elements ×" Three-Year Action Plan

In December 2023, the National Development and Reform Commission (NDRC) and the National Data Administration (NDA) jointly released the *"Data Elements ×" Three-Year Action Plan (2024–2026)*. The plan identifies green and low-carbon development as one of twelve priority domains empowered by data elements. It explicitly calls for strengthening fusion and innovation in ecological and environmental public data, promoting the integration of manufacturing and energy data, and supporting end-to-end connectivity of carbon-emissions data—covering materials, auxiliaries, and energy—across the full life cycle of key products, as well as harmonizing sectoral carbon-footprint data. The policy orientation is to accelerate society-wide transitions toward greenness, low-carbon operations, and intelligent upgrading. At the national level, sustained attention to green and low-carbon development is accompanied by the ongoing refinement of policy and institutional frameworks related to the "dual-carbon" goals. Within this context, the application of data elements is positioned to advance

environmental protection and underpin sustainable economic development.

The Shanghai Data Exchange (SDE) established its carbon segment to serve the national agendas of the digital economy and the dual-carbon strategy by using digitalization to empower the green and carbon markets. Its core functions are to facilitate the efficient circulation of green and low-carbon data that injects fresh momentum into economic and social development, and to realize deep integration between the carbon market and the data-element market, thereby supporting emissions trading and the evaluation of emissions-reduction projects.

To this end, the SDE has built a comprehensive data-circulation and trading system that provides services spanning product registration, compliance assessment, listing, trade facilitation, and contracting. It has released a suite of institutional norms for data trading and continues to improve review procedures to ensure lawful and compliant data use through proceduralized vetting. The SDE also advances standardization of data products by anchoring content through an integrated toolkit, notably the Tradable Data Product Specification. This specification is a normative document developed to regulate trading behavior and protect the rights and interests of all parties, with the objective of guiding and promoting the standardization of data products offered for trade.

Despite steady progress in data valorization, “data silos” remain prominent, and cross-departmental and cross-sector data sharing is difficult. As a result, the mining and application of data value are still insufficient. Although firms in many industries have accumulated substantial data resources and are actively exploring applications such as carbon accounting and carbon-footprint management, the absence of unified standards and sharing mechanisms has limited reuse, fusion, and synergies across sectors and enterprises. Against this backdrop, the SDE’s carbon segment is intended to dismantle circulation bottlenecks specific to green and low-carbon data by establishing a unified, standardized, and efficient trading platform. The platform enables cross-sector and cross-industry fusion of carbon data and unlocks the value potential of data elements in achieving the dual-carbon objectives. Application scenarios for the carbon segment include green finance—supporting product innovation, decision optimization, and risk management; green trade—enhancing firms’ carbon-management capabilities and supporting export activities; and green supply chains—optimizing life-cycle

management, reducing waste emissions, and balancing economic returns with emissions reductions.

Given the complexity of data generation, collection, processing, and use—often involving multiple actors, departments, business processes, and even jurisdictions with differing laws—property rights can be difficult to define with precision. Consequently, data-use behaviors must comply with relevant laws and regulations. Listing and circulating data products through a licensed data-trading institution helps standardize development and utilization, elevates the security and compliance of data-use practices, and clarifies provenance, flows, and usage conditions, thereby ensuring that data development and use remain lawful, compliant, and controllable.

The maturation of data elements depends fundamentally on market mechanisms. The SDE seeks to aggregate market-based, self-reinforcing momentum by encouraging data holders to transform raw data—guided by concrete demand scenarios—into developed data products for proactive supply to the market. It simultaneously brings in professional data intermediaries to provide multi-functional services. Together, these measures safeguard the circulation and trading of data products and support the high-quality development of the digital economy.

III. Innovative Practices of Shanghai Trading Markets on Governance (G)-related Issues

(I) Introducing the Shanghai SRDI (Specialized, Refined, Differentiated, and Innovative) Board

To improve equity pricing efficiency and differentiated service capabilities for SMEs, and to align with the goal of building a unified national market, Shanghai has established the SRDI Board under the SEE. In response to the weak incentives for green transition among SMEs facing international carbon-border pressures, the Board leverages capitalization-based incentives to foster endogenous momentum for transformation. Anchored in the SEE's "base-of-pyramid" capital-market function, the SRDI Board concentrates on SMEs within Shanghai's "2+2+(3+6)+(4+5)" industrial framework (a policy taxonomy covering strategic pillar, key, and future industries). It serves the full life cycle of SME development by building a comprehensive financial service system in which foundational services are broadly accessible, equity services are refined and industry-specific, and listing services are tailored to firm-level

conditions. Using an enterprise profiling system for “precision scanning” together with the “Qixiang Wanqian—SME Hierarchical Evaluation and Management System” for “intelligent navigation,” the Board provides reference bases for firms undertaking green process upgrades, thereby supporting a shift from “emissions-reduction cost” to “green revenue.” Customized ESG training is delivered in parallel so that improvements in governance can be translated into financing advantages.

The SRDI Board thus forms a replicable SME ESG service template characterized by “policy integration + digital enablement + capital linkage,” with a tiered evaluation framework suitable for adoption across regional equity markets nationwide. By designing a growth channel from “SRDI — capital market,” it offers a promotable development paradigm for enhancing the ESG capabilities of technology-oriented SMEs, including the cultivation of a cohort of ESG benchmark firms and the development of a “SRDI ESG Index” to standardize metrics and guide capital toward high-quality enterprises. Over the longer term, the initiative promotes interconnection among SRDI markets across the Yangtze River Delta, forming a cross-regional enterprise incubation alliance.

As of the end of May 2025, the SRDI Board hosted 359 enterprises. On average, each firm held 3.64 patents; more than 60 percent possessed qualifications such as National High-Tech Enterprise status or designation as SRDI SMEs; and 24 firms were controlled or partially owned by state capital, accounting for 6.69 percent. The SEE had cumulatively funneled 24 companies to listing on the Shanghai, Shenzhen, or Hong Kong stock exchanges; transferred 112 enterprises to listing on the National Equities Exchange and Quotations (NEEQ); and recorded 44 acquisitions of Board companies by issuers listed on the Shanghai, Shenzhen, or Beijing stock exchanges.

(II)Launching Pilot Project for Comprehensive Equity-Warrant Services

To address the traditional challenge among science-and-technology firms of prioritizing technology over governance, the SEE has introduced a comprehensive equity-warrant service that links employee development to shareholder value and elevates governance quality. The program provides a market-based ESG governance solution for hard-technology companies and mitigates investor concerns about transparency. The SEE issued China’s first standardized

document specific to equity-warrant services, the Working Guidelines for Comprehensive Equity-Warrant Services, which codifies rules and procedures for warrant-related business within Shanghai's jurisdiction. It delivers end-to-end services to innovative SMEs, financial institutions, industrial parks, and other market entities, covering warrant creation and issuance, registration and custody, valuation and pricing, secondary transfers, and exercise. Blockchain technology is used to realize digital registration and confirmation of warrant rights, while dedicated valuation models address pricing fairness. Together these components form a full-chain empowerment model of "institutional safeguards – technological enablement – value realization."

The digital confirmation of rights within the comprehensive service provides a reference paradigm for the marketization of data elements; by tightly aligning employee development, shareholder value, and social responsibility through the warrant instrument, it offers a replicable digital solution for SMEs to achieve leapfrogging in the ESG domain. The initiative enhances corporate governance, standardizes market behavior, protects orderly and lawful trading, reduces market risk, and improves transparency and stability.

By June 2025, the SEE's pilot platform for comprehensive equity-warrant services had completed 63 warrant registrations and confirmations; among these, two issuances were conducted via private placement through the platform, and two transfers were executed based on valuation reports issued by the warrant valuation system and completed through the warrant transfer system. The 52 enterprises with registered and custodied warrants are concentrated in priority sectors aligned with Shanghai's "3+6+X" modern industrial system—medical devices, biopharmaceuticals, new energy, artificial intelligence, data technology, information technology, and integrated circuits—with roughly 20 percent operating in green-related industries. More than 70 percent of the subject firms hold qualifications such as "SRDI Little Giant," SRDI Enterprise, National High-Tech Enterprise, or Technology-Based SME.

Section III: Bottlenecks and Optimization Strategies for ESG Practices Among Shanghai's Trading Markets

I. Potential Challenges and Structural Bottlenecks

(I)Institutional Level Challenges: Lag in Legislation and Fragmentation of Disclosure Standards

Legal support at the higher-law level is lacking for the ownership, pricing, and transfer of ESG-related elements, such as carbon assets and data property rights. Current practice relies primarily on local policies, whose binding force is limited. The delineation of data property rights remains unclear, which weakens the legal basis for data transactions. As a new type of asset, data do not yet have clearly defined legal attributes, making it difficult to specify ownership rights, usage rights, and rights to income. Domestic ESG disclosure standards are fragmented (more than 50 group standards) and have low compatibility with international frameworks such as the ISSB and GRI. This leads to disclosures that are piecemeal and lack comparability. Cross-border ESG requirements, including the EU's CSDDD and new U.S. climate disclosure rules, further increase compliance pressures, creating the risk of regulatory conflicts for enterprises.

(II) Market Level Challenges: Factor Mobility is Constrained and Market Participation is Limited

The effectiveness of existing instruments is modest: the carbon market remains relatively inactive; the carbon price index system is incomplete; the supply of green assets is insufficient; and scope for financial innovation is constrained. Small and medium-sized enterprises, facing tight resources, struggle to bear ESG compliance cost. Pricing mechanisms remain under-developed; information asymmetries distort the valuation of ESG-related factors, and the absence of a unified assessment framework undermines investor confidence.

(III) Data Level Challenges: Quality Deficiencies and Sharing Barriers Persist

Disclosures of climate-related information remain at an early stage, with limited data availability for SMEs and a lack of third-party assurance leading to uneven data quality. Technical standards are not harmonised; interoperability across platforms is costly; and cross-

border data flows face conflicts of jurisdiction, all of which compound compliance difficulty.

(IV) Regulatory Level Challenges: Gaps in interdepartmental Coordination

Regulatory rules for data trading are still fragment—particularly for cross-border data transactions, where divergent national requirements can trigger jurisdictional conflicts and raise compliance costs. Effective data governance requires cross-departmental coordination spanning rights confirmation, security, and trading supervision, yet responsibilities are not clearly delineated, resulting in regulatory gaps.

II. Optimization and Breakthrough Strategies

(I) Optimization of Exchanges' Internal Actions

1. Strengthening Institutional and Capacity Building

Refine disclosure standards by drawing on the Shanghai Stock Exchange's industry-specific ESG preparation guidelines, and establish governance architectures and exemplar templates for key indicators to enhance standardisation of disclosures. Build a unified data platform by leveraging Shanghai's strengths in financial infrastructure to create an ESG data-sharing center that integrates corporate carbon data and supply-chain information, thereby reducing disclosure costs for SMEs.

2. Innovating Market Instruments and Application Scenarios

Embed financial product design within business contexts by promoting applications of the carbon price index in green bond issuance and preferential loan-rate setting, thus improving the practical utility of instruments. For example, financial institutions can incorporate ESG ratings into financing decisions and develop ESG-themed exchange-traded funds (ETFs). Lower participation thresholds by providing ESG capacity-building subsidies for SMEs, streamlining disclosure procedures, and promoting lightweight self-assessment tools.

(2) Optimization of External Collaborative Actions

1. Strengthening Domestic Coordination: Building an Integrated Ecosystem

Promote cross-regional mutual recognition by establishing a Yangtze River Delta coordination mechanism for carbon-inclusive schemes and exploring inter-provincial circulation of carbon credits, thereby extending the reach of Shanghai's toolkit. Strengthen

policy incentives by incorporating ESG ratings into state-owned enterprise procurement and the recognition criteria for trade-oriented headquarters, and by linking fiscal support to disclosure practices.

2. Enhancing International Engagement: Aligning Rules and Exporting Expertise

Align with international standards by encouraging enterprises to adopt ISSB-based climate disclosures and advancing mutual recognition between China Securities Index (CSI) ESG ratings and international methodologies. Deepen participation in global governance by supporting professional bodies' membership in international ESG organisations such as the Global Reporting Initiative (GRI) and the Science Based Targets initiative (SBTi), thereby exporting a "Shanghai approach" and enhancing international discourse power.

Looking ahead, Shanghai's trading markets will integrate more proactively into the national development strategy, fully leverage exchange functions, and mobilise market participants to better serve China's dual-carbon objectives and sustainable development. Priority directions include improving equity- and bond-financing systems for green enterprises and projects to support eligible stock and bond issuance; enriching the range of green investment products by actively developing green indices and continuously improving the ESG index system; cultivating a base of green investors to embed green-development concepts while steadily standardizing sustainability disclosures by listed companies; and advancing international cooperation in green finance through active participation in global initiatives and sustained international promotion of green finance to enhance the global influence of China's sustainable capital markets.

Chapter 5 The Current Development of ESG Third-Party Services in Shanghai

ESG third-party professional services refer to a suite of activities—conducted by independent institutions—covering ESG-related advisory, evaluation, certification, reporting, and allied offerings. In recent years, under the strategic impetus to build Shanghai into "five centers" (an international center of economy, finance, trade, shipping, and scientific & technological innovation), ESG professional services in the city have accelerated in both agglomeration and upgrading. The mutual reinforcement between cross-border capital factors and local institutional supply has deepened the embedding of ESG concepts in corporate practice and in investment and financing, while also advancing the implementation of foundational infrastructures—such as ratings, indices, and disclosure—into operational standards. Together, these developments have formed a replicable and scalable "Shanghai Solution."

Section I: Multi-dimensional Progress of Shanghai's ESG Third-Party Services

I. Expansion of Institutional Numbers and Service Boundaries: Synchronous Growth

In recent years, Shanghai's third-party ESG service providers have exhibited vigorous growth. According to statistics from the Shanghai Municipal Commission of Commerce, by the end of 2024 more than 300 professional institutions registered in Shanghai were engaged in ESG-related business—an increase of nearly 200% compared with 2020. Survey evidence indicates that close to 90% of these providers consider local demand for ESG services to be stable or high, with 50% rating demand as "very high" (see Figure 5.1).

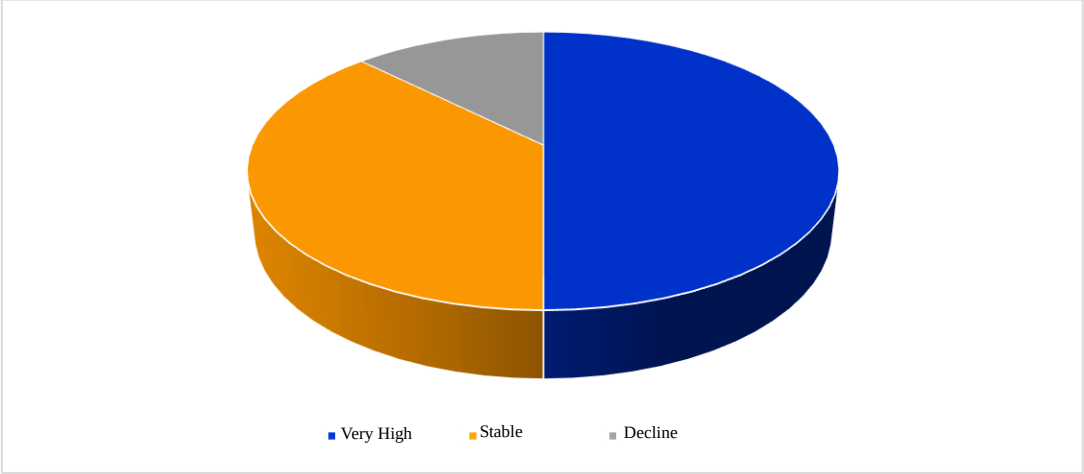


Figure 5.1 Client Demand for ESG Services among Third-Party Institutions

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

On the service-content side, early offerings were largely concentrated on a single line of business—namely, preparation of ESG reports. As markets matured and corporate needs diversified, the portfolio of services broadened and became more granular. A comprehensive system has now taken shape, spanning ESG strategy advisory, data monitoring and analytics, ratings enhancement, carbon neutrality advisory, capability-building and training, and support for green investment and financing. In areas such as strategy advisory, data monitoring and analytics, and differentiated service features, Shanghai's ESG consultancies have earned client recognition on the strength of professional teams and deep experience, innovative delivery models, and tailored solutions; strong reputation, client satisfaction, and localized service capabilities are likewise key differentiators (see Figure 5.2).

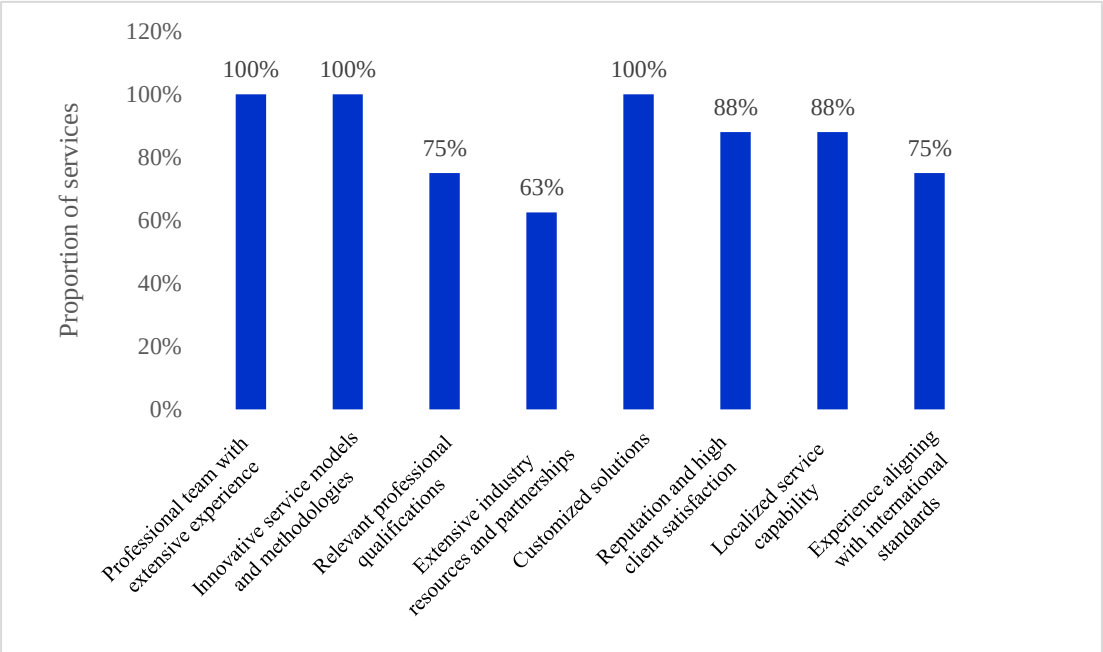


Figure 5.2 Distinctive Features and Advantages of Third-Party ESG Services as Viewed by Clients

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

II. Data- and AI-Driven Transformation: Platform-Based Upgrading of ESG Services

Technological progress has become the decisive variable driving step-changes in the efficiency and quality of ESG services in Shanghai. With advances in big data and artificial intelligence, local consultancies are actively adopting digital tools to enhance service delivery. Big-data capabilities enable the collection and analysis of large-scale corporate ESG datasets and the extraction of latent value; AI facilitates automated ESG report generation and intelligent risk early-warning, thereby improving efficiency; blockchain applications safeguard data authenticity and immutability, strengthening credibility. In a survey of future opportunities, 62.5% of ESG consultancies identified breakthroughs in technologies such as AI as the primary source of new service models.

III. Market Structure and Service Reach: Rising Concentration at the Top, Deeper Penetration among SMEs

Leading consultancies occupy a prominent position in Shanghai's ESG service market. Leveraging brand influence, professional teams, and resource advantages, they provide comprehensive, high-quality services to large corporates. At the same time, penetration among SMEs has been increasing. Historically, SMEs' smaller scale and tighter budgets dampened demand, while higher unit service costs limited provider incentives—resulting in low

penetration. Policy guidance and changing market conditions have significantly improved this situation. Some third-party firms now offer standardized and modular ESG products tailored to SMEs, reducing costs and improving accessibility. The share of Shanghai SMEs receiving professional ESG services has risen from under 10% in 2018 to around 20% by 2024. Survey data show that, for three-quarters of Shanghai's third-party ESG consultancies, SMEs account for 5–20% of their client base (see Figure 5.3).

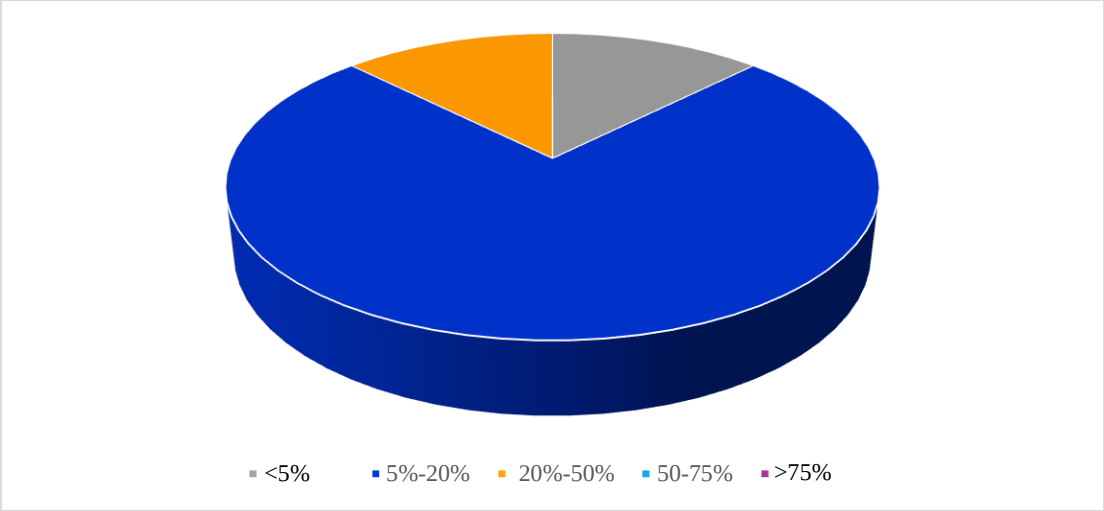


Figure 5.3 Share of SME Clients among Third-Party Institutions' Customer Base

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

IV. Professional Capability and Standard-Setting: Advancing Service Fineness and Harmonization

Shanghai's ESG consultancies continue to professionalize. Team structures have become more balanced, bringing together expertise from environmental science, sociology, finance, and management to deliver interdisciplinary services. Service processes have become more standardized—from upfront needs assessment and solution design, through mid-project implementation and client communication, to post-engagement follow-up evaluation and review—thereby ensuring stable and reliable quality.

For example, the Oriental Sports Evaluation Center operated by Juss Sports has developed a sustainability evaluation system for sporting events. Experience from this niche sector indicates that scientific indicator design and end-to-end evaluation by specialised third parties can improve transparency in event operations and effectively advance the adoption of green practices. The lesson generalises: in the ESG service field, independent and professional third-

party institutions are urgently needed to drive both interdisciplinary integration and institutional innovation.

On standard harmonization, 2024 saw a succession of sustainability-related policies and guidance from regulators such as the Ministry of Finance and the China Securities Regulatory Commission. Shanghai's ESG consultancies have actively participated in formulating and promoting domestic and international standards, thereby advancing convergence. On the one hand, institutions draw on globally used disclosure frameworks—such as the GRI Standards and the ISSB—while aligning with domestic policy requirements and industry characteristics to develop standards and norms suited to local firms. On the other hand, industry associations and similar bodies have strengthened exchanges and cooperation among institutions, facilitating unification and dissemination of service standards.

V. Legal Compliance and Institutional Embedding: Coordinated Efforts by the Legal Profession

Legal services are becoming an indispensable component of the ESG services ecosystem. With the support of the Shanghai Municipal Bureau of Justice, the Shanghai Bar Association in 2024 established China's first ESG Professional Committee, bringing together 47 practicing lawyers and 3 corporate lawyers from 39 firms—including Jin Mao Law Firm, AllBright, Hiways, and Landing—along with three in-house counsels. Through regulatory research, case analysis, specialized training, and cross-sector collaboration, the committee participates actively in ESG standard-setting and policy consultation at both local and national levels, building an integrated "law + ESG" service chain. In practice, lawyers help corporates optimize governance structures and strengthen risk management; they design compliance solutions for green financial products for financial institutions; and they provide policy advice to regulators and industry associations. They have become a key force in advancing the rule-of-law foundations of ESG services. As market demand deepens and the institutional environment matures, the role of legal services in elevating Shanghai's ESG governance and ecosystem coordination is set to become even more prominent.

VI. Global Benchmarking and Local Positioning: Rising Status and Differentiated Advantages

Shanghai's ESG consultancies now occupy a meaningful position in the global ESG landscape, with steadily improving professional capabilities, service breadth, and international influence. Their differentiated strengths—deep understanding of the domestic market and policy regime, strong industry research and data-analytics capabilities, diversified and customized solutions, and cost-effectiveness—are enabling them to stand out amid both competition and cooperation with international peers. As global ESG concepts continue to gain traction, Shanghai-based consultancies are poised to leverage these advantages to play a larger role in driving corporate sustainability and advancing global ESG practice, thereby contributing to a greener and more sustainable world economy.

(I) Deep Understanding of the Domestic Market and Policy Environment

Compared with international peers, Shanghai's third-party ESG consultancies possess a finer grasp of China's market conditions, regulatory frameworks, and the operational realities of the firms they serve. China's ESG policy evolution has distinctive features, and enterprises' needs and constraints vary by industry and size. Shanghai consultancies are able to pinpoint these differences and deliver ESG strategies and implementation plans that closely fit actual practice.

(II) Strong Industry Research and Data-Analytics Capabilities

As China's economic hub and a global metropolis, Shanghai offers rich industry and data resources. Third-party ESG consultancies draw on these advantages to excel in industry research and analytics. By closely studying Chinese firms' operating models, industry characteristics, and policy environments, they identify sector-specific ESG material issues and risk points and assemble ESG datasets that better reflect Chinese realities. Through extensive data collection, curation, and analysis, they furnish robust, evidence-based decision support to clients.

(III) Provision of Diversified and Customized Services

Shanghai consultancies emphasize meeting heterogeneous client needs through one-stop, end-to-end offerings spanning ESG strategy design, report preparation, indicator-system construction, ratings enhancement, and training/coaching. Solutions are tailored to firms'

industry attributes, development stage, and ESG objectives. Survey data indicate that current demand concentrates in ESG consulting and ratings services (see Figure 5.4), while needs for ESG training and ESG branding are also growing rapidly.

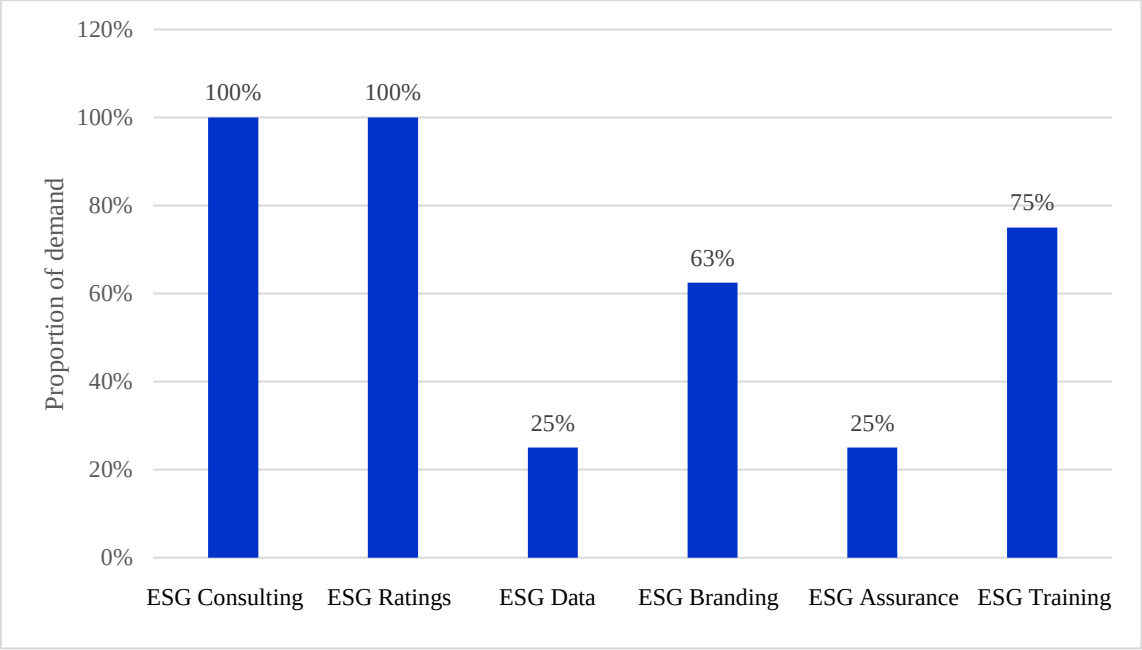


Figure 5.4 Primary Client Demands for ESG Services among Third-Party Institutions

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

(IV) Cost-Effectiveness as a Competitive Advantage

Relative to large international consultancies, Shanghai's third-party ESG firms offer advantages in cost control. They can deliver high-quality services at more accessible prices, helping firms—especially smaller enterprises or those at an early stage of ESG adoption—achieve objectives within constrained budgets. In today's market environment, cost-effectiveness strengthens the competitiveness of Shanghai-based consultancies when serving domestic companies and cost-sensitive foreign investors alike.

Section II: Innovative Cases of ESG Practices Among Shanghai's Third-Party Institutions

This section examines the ESG service ecosystem formed by Shanghai's third-party institutions. It surveys representative practices, extracts the capability pathways through which services are shifting from "disclosure compliance" toward "value creation," and distills experience that can be replicated and scaled.

I. Building a New Service Model of "Carbon Assessment as the Foundation + Finance as the Activator"

State Grid Yingda Carbon Asset Management (Shanghai) Co., Ltd. has developed a dual-engine model combining "carbon assessment + finance" to provide one-stop green-supply-chain services for State Grid suppliers. The first component is an end-to-end carbon assessment offering that spans green development planning, sustainability disclosure, and product carbon-footprint accounting, thereby helping enterprises navigate international green trade barriers and enhance their competitiveness in green tendering and procurement (see Figure 5.5). The second component is innovative green-finance products built on a "carbon-efficiency–pricing" linkage that directly ties financing costs to emissions-reduction performance, including instruments such as ESG report-linked financing and product carbon-footprint-linked financing, so that "lower carbon means lower cost." In 2025, for example, on the basis of assisting Zhejiang Wanma Co., Ltd. in preparing its ESG report, the company, together with the Industrial and Commercial Bank of China Zhejiang Branch, arranged a three-year RMB 70 million "report-linked" facility whose first-year interest rate was reduced by 10 basis points; in another case, working with Shanghai Electric Commercial Factoring and drawing on a product carbon-footprint report for Feihang Cable, the financing rate was reduced by 50 basis points. The third component is scenario-based deepening along the power-grid supply chain, supporting multiple suppliers in obtaining green certifications, procuring green electricity, and advancing related transitions with demonstrable regional spillovers (see Table 5.1).

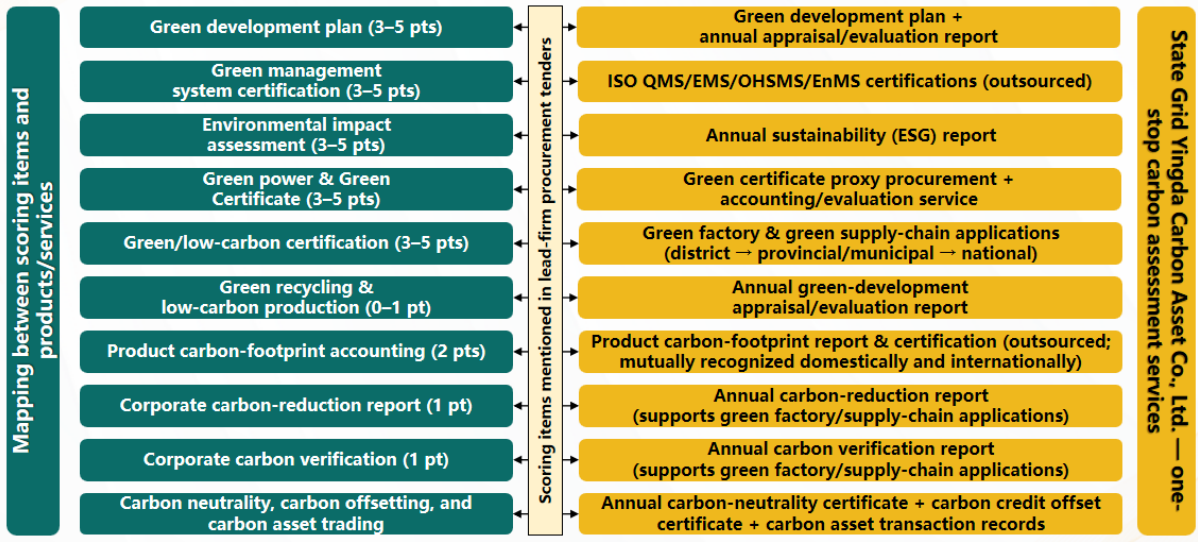


Figure 5.5 One-Stop Carbon Assessment Services by State Grid Yingda Carbon Asset

Source: State Grid Yingda Carbon Asset Management (Shanghai) Co., Ltd.

Table 5.1 Multi-Scenario Service Cases by State Grid Yingda Carbon Asset (Jan-Jun 2025)

Scenario Category	Concrete Outcomes
Green and Low-Carbon Certification	Supported four firms in applying for Green Factory and Green Supply-Chain Management Enterprise status.
Environmental Impact and Reporting	Assisted twenty-one firms in preparing annual ESG reports.
Green and Low-Carbon Production	Prepared product carbon-footprint, carbon-reduction, and emissions-verification reports for six firms; fourteen firms obtained carbon-neutrality certificates; two firms prepared green packaging reports.
Green Development Planning	Helped six firms draft green development plans and appraisal reports.
Green Management System Certification	Supported five firms in energy-management system certification and one firm in environmental-management system certification.
Green Power and Green Certificates	Prepared green power consumption assessment reports for three firms; two firms obtained green power certificate transaction vouchers.
Green Finance Services	Signed green-finance cooperation agreements with sixty-nine banking institutions (branch, sub-branch, and head-office levels), e.g., a RMB 5 billion facility with the head office of Huaxia Bank and a RMB 500 million facility with the CITIC Bank Shanghai Branch; cumulative green order financing with the Bank of Communications exceeds RMB 1 billion.

Source: State Grid Yingda Carbon Asset Management (Shanghai) Co., Ltd.

This innovation has been propelled by three reinforcing forces: compliance pressure from policy, the green-procurement needs of anchor (chain-leading) enterprises, and the upgrading of financial institutions' risk controls. It effectively addresses core frictions such as weak incentives for corporate emissions reduction and misallocation of green-finance resources. The

experience suggests that standardized carbon-assessment toolkits, a supportive green-finance product ecosystem, and a regional coordination network together enable replication of the "carbon assessment + finance" model. Remaining obstacles include high costs of carbon-data collection, limited mutual recognition of international standards, and constrained acceptance of carbon metrics by some financial institutions. Looking forward, priorities include developing low-cost emissions-monitoring solutions, advancing mutual recognition of carbon standards across the Yangtze River Delta, and incorporating carbon-assessment services into local green-finance support policies to broaden coverage and elevate service effectiveness.

II. AI-Driven Innovation in Intelligent ESG Advisory

In April 2025, EY Greater China launched "EY Intelligent Q&A," establishing a new paradigm for AI-enabled ESG services. The platform integrates two intelligent agents—EYA.ai and ESG.ai—built on the proprietary EY METIS platform, enabling multimodal interaction and vertical-domain knowledge orchestration to deliver advisory functions covering ESG disclosure guidance, strategic planning, and carbon accounting. It deploys hybrid model orchestration and a Retrieval-Augmented Generation (RAG) framework, pooling expertise across EY's five service lines and aggregating information from sectors such as life sciences and healthcare, retail and consumer, infrastructure, automotive, manufacturing, energy and resources, technology, media, and telecommunications. The hallucination rate is reduced to roughly one-fifth of the industry average, materially improving the reliability of professional responses. Now in version 3.0, the platform focuses on enterprise ESG management scenarios, offering one-click generation of ESG narratives, intelligent construction of ESG topic libraries, automated rendering of ESG vision maps, quantified presentation of enterprise carbon accounting, and guided virtual "call" interactions (see Figure 5.6). These functions help enterprises establish a full-cycle ESG management loop and systematically empower green transition and high-quality sustainable development. For example, users can generate ESG narratives and topic libraries with a single click, visualize carbon data, and obtain operational guidance and interpretive support for complex regimes such as the EU's CBAM.

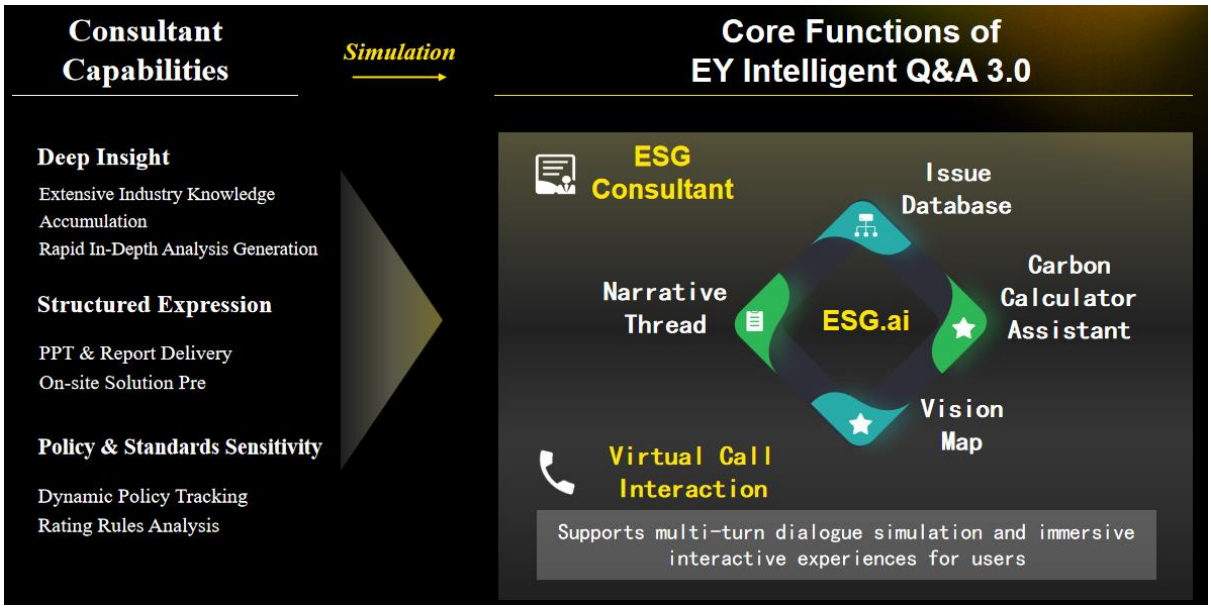


Figure 5.6 Core Functions of EY Intelligent Q&A 3.0

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

This innovation responds to three structural pain points: extreme fragmentation of ESG information, high thresholds for interpreting relevant knowledge and policy, and rising complexity in firms' internal ESG management. By embedding technology, EY has addressed low service efficiency, limited accessibility, and lagging knowledge updates, thereby enhancing standardization and intelligence in delivery. Built on EY METIS, the system integrates an agent architecture and optimized model portfolio to strengthen reasoning and understanding in professional contexts; an intelligent parsing engine converts unstructured inputs into structured, multi-format outputs; and a voice module fuses context with cross-domain knowledge for practical deployment of intelligent advisors in professional services. The experience demonstrates that AI tools can significantly improve response speed and scalability in ESG consulting.

III. Constructing an ESG Evaluation and Index Ecosystem Integrated with Investment

As a leader in China's index-investment domain, **China Securities Index** has systematically embedded ESG factors within index-based investment frameworks, expanding the use-cases for sustainable finance. Coverage has been extended from listed companies to credit-bond issuers and public mutual funds, while home-market concerns—such as arrears on commercial receivables—have been incorporated as social-responsibility indicators. CSI has also introduced climate-transition assessments to evaluate corporate climate risk and transition

performance along multiple dimensions. Crucially, ESG factors have been integrated into broad-market benchmarks with strong market influence—such as the CSI A50, CSI A500, and SSE 180—thereby shifting ESG investing from niche and thematic segments to mainstream, benchmarked strategies. By the first half of 2025, CSI had released 155 sustainability indices, and investment products referencing CSI's ESG evaluations had surpassed RMB 300 billion in assets, supplying a diversified toolkit to support the national dual-carbon strategy. In parallel, CSI has participated deeply in disclosure rules, evaluation standards, and high-impact industry reports, offering exemplars that combine international consensus with Chinese characteristics. Through CSI's evaluations and ESG-related indices, firms can better showcase sustainability outcomes in capital markets, attract long-term investor attention and capital, and enhance market recognition and brand value.

Wind has also played a pivotal role in integrating ESG index systems. As of August 2025, Wind had compiled eighty-four ESG-related indices, including market-first benchmarks such as the ESG Mandatory Disclosure Index and the ESG Report Index, which directly reflect the performance of firms meeting regulatory disclosure requirements or publishing ESG reports. As early as 2021, Wind launched its ESG ratings system based on two decades of data-processing and analytics experience. The system covers all A-share and Hong Kong-listed companies and extends to bond issuers, funds, and a carbon-emissions database, thus forming a complete chain of "data → ratings → indices → products." For enterprises, Wind's services help identify strengths and weaknesses across environmental, social, and governance dimensions and offer authoritative references for communication with investors, regulators, and the public. Leveraging these indices and ratings, companies can refine governance structures, raise compliance levels, and achieve recognition and valuation premia in capital markets.

The two institutions have jointly expanded the ESG investment ecosystem. China Securities Index has incorporated ESG factors into its series of broad-based indices, thereby integrating ESG investment strategies into the mainstream market. Wind, for its part, has promoted comprehensive participation by diverse market actors through the construction of an ESG evaluation system that spans multiple markets and asset classes. This end-to-end

"standards – ratings – indices – products" output model has effectively alleviated problems such as the insufficient supply of ESG investment products and the disconnect between evaluation and practice. That said, the ESG ratings and index ecosystem represented by these two institutions remains constrained by systemic weaknesses, including the limited data foundation of domestic enterprises and the lack of uniform disclosure specifications. In response to these challenges, both institutions are expected to intensify efforts in data governance, standards convergence, institutional collaboration, and international mutual recognition, in order to enhance the global influence of China's ESG indices and evaluations in international capital markets.

IV. Building Data-Driven ESG Digital Infrastructure

Leveraging its leading data, technology, and service capabilities, **MioTech** provides a robust digital infrastructure for ESG governance (see Figure 5.7). The company maintains Asia's largest sustainability database, covering more than six million enterprises and over 1,300 indicators, with market-leading scale and granularity across the region. Its self-developed ESG ratings system utilizes AI to deliver high-frequency updates and material issue analysis, being highly adapted to local markets while aligning with international standards. Simultaneously, MioTech launched the ESGhub all-in-one digital management platform, which supports corporates, suppliers and investors in automated data collection, generating reports compliant with various disclosure standards, managing sustainability operations for corporate groups and subsidiaries, and monitoring ESG risks across the supply chain and investment portfolios—substantially improving management efficiency.

In practice, MioTech comprehensively serves a wide range of listed, state-owned, and private enterprises in mainland China, Hong Kong, and overseas markets. Examples include assisting Shanghai Chengtou Expressway in compiling its first ESG report, which systematically presented governance innovations in green infrastructure, community engagement, and smart operations, thereby providing a disclosure model for non-listed state-owned corporates; supporting ANTA Group in establishing a comprehensive digital sustainability management platform, extensively serving leading manufacturing enterprises and integrating corporate ESG management into daily operations and strategic planning; and

helping globalizing companies like JinkoSolar address compliance requirements such as the EU's Corporate Sustainability Reporting Directive (CSRD) and CBAM, as well as international disclosure standards like CDP, SBTi, and EcoVadis — tackling the initial challenges faced by companies expanding overseas.

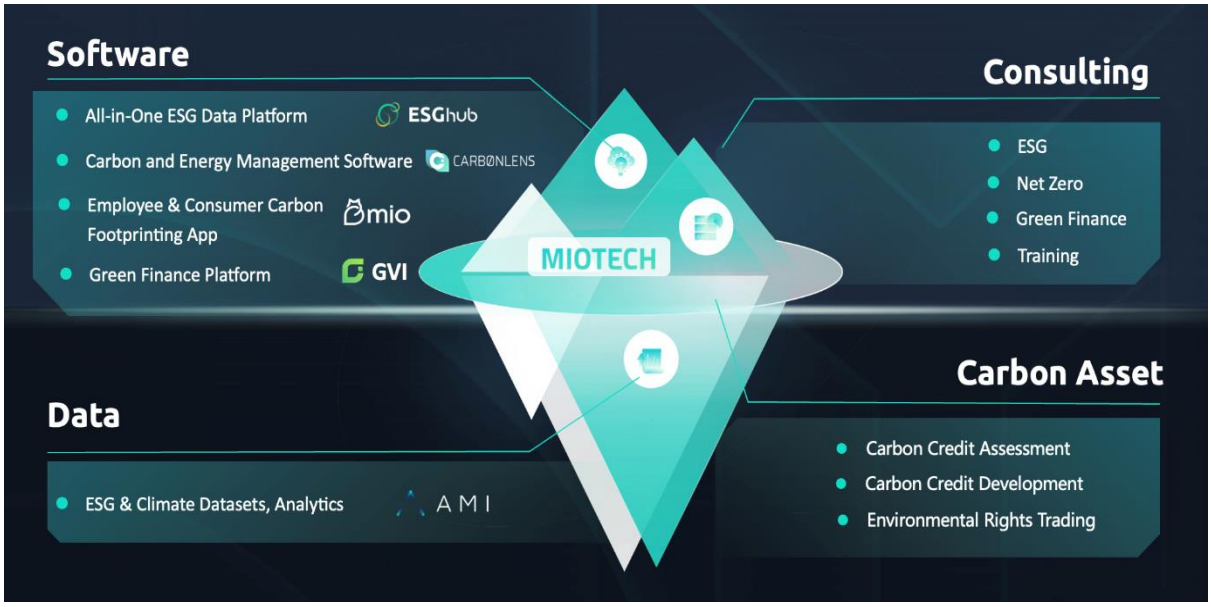


Figure 5.7 MioTech Product Matrix

Source: MioTech.

MioTech's rapid growth highlights the significant advantages of a technology-driven service model in overcoming issues such as missing ESG data, high disclosure costs, low management efficiency, and difficulties in investment integrating. Its core strength lies in transforming vast amounts of unstructured data into structured, actionable insights that empower enterprises to enhance governance transparency and strategic management capabilities. Future challenges include better enabling SMEs, persisting data silo, and adapting international models to local contexts. Moving forward, MioTech will continue to optimize its algorithm models, develop lightweight products, and actively participate in formulating national standards to promote the widespread adoption and deep application of ESG digital governance tools.

V. Legal and Compliance Enablement for Green-Finance Practice

Hiways Law Firm has supported multiple clean-energy companies in issuing green bonds. In 2021, one client successfully issued a first-phase green corporate bond dedicated to carbon neutrality—the first carbon-neutrality bond in its industry—with a size of RMB 1 billion. In

2024, another client issued its first green super short-term financing note (a "Sci-Tech Note") of the year, the first green sci-tech note in its province for 2024, with a size of RMB 500 million and a 1.83% coupon—setting the recent provincial low for the same tenor and rating. In 2025, a client issued a green technology-innovation corporate bond—the province's first such instrument in 2025—with a size of RMB 500 million and a 1.95% coupon, the lowest in East China for the same tenor and product type.

Across these transactions, Hiways served as legal counsel throughout, conducting legal due diligence on issuers (including credit checks, internal decision-making procedures, major litigation, and external guarantees), reviewing the legality and compliance of issuance plans, coordinating submission of supporting documentation as arranged by the lead underwriters, witnessing the bookbuilding and issuance processes, and issuing legal opinions on the legality, compliance, authenticity, and validity of the offerings. As a core component of ESG investment, these green-bond projects demonstrate the robust professional capabilities of Shanghai's legal community in ESG.

Section III: Bottlenecks and Optimization Pathways for ESG Services by Shanghai's Third-Party Institutions

Drawing on the practices of multiple representative organizations and industry surveys, Shanghai's third-party ESG service providers—despite rapid development—still face several common bottlenecks. These issues constrain service effectiveness and market credibility, and they also affect the health and sustainability of the broader ESG ecosystem. This section identifies the core tensions now confronting the market and proposes pathways to resolution from two angles: internal capability enhancement and external ecosystem co-construction.

I. Common Difficulties and Structural Tensions

(I) Data Standards and Access: Insufficient Standardization and Constraints on Availability

The standardization of ESG data in China remains limited. Although the three mainland stock exchanges have issued guidance on sustainability reporting, the Ministry of Finance's sustainability disclosure standards are still in a pilot phase, and the first cohort of firms subject

to mandatory disclosure will not publish their 2025 reports until 2026. Significant disparities persist across firms in reporting formats, content, and statistical definitions, making it difficult for rating agencies and data vendors to obtain comparable underlying data efficiently and thereby amplifying divergences in assessment outcomes. Even in Shanghai, although third-party institutions have made some progress in data collection and management, data quality and availability remain the principal bottlenecks constraining service effectiveness. Some corporate disclosures are nonstandard and incomplete, with occasional omissions or distortions. Small and medium-sized enterprises, limited by professional capacity and resources, find it difficult to establish stable data governance mechanisms. Non-public information is often withheld for reasons such as commercial confidentiality, resulting in gaps in critical operational and supply-chain data. These issues increase the costs of data cleansing and verification and weaken cross-institutional comparability and reusability. With multiple disclosure frameworks operating in parallel, institutions struggle to harmonise collection and statistical methodologies, further limiting the effectiveness of model training and horizontal benchmarking.

(II) Plural Standards and Methodological Divergences: Tension Between Harmonizations and Differentiated Demand

While ESG disclosure standards are converging, multiple domestic and international frameworks still coexist, with differing indicator sets and weightings. Firms face uncertainty in selecting a framework, and third-party providers are compelled to "multi-home," raising delivery cost and complexity. Needs are also highly heterogeneous across sectors and firm sizes: financial institutions emphasize risk exposure and stress testing; manufacturing enterprises priorities supply chains and environmental performance; and disclosure depth and process design differ between SMEs and large corporates. On the evaluation side, rating agencies vary markedly in indicator architecture, scoring algorithms, and sectoral weightings. Cross-provider correlations remain low, limiting the emergence of a "common language" widely adopted by capital markets. With supervision and unified standards still evolving, linkages between evaluation results and incentive/discipline mechanisms are inadequate, weakening the pull of ESG assessments on governance improvement and resource allocation. A balance is therefore needed between "baseline harmonization" and "scenario-specific customization," supported by

regulator- and alliance-led methodological white papers and verification benchmarks to raise consistency and usability over time.

(III) Market Cognition and Talent Supply: Low Acceptance and Structural Skills Gaps

Although more firms are paying attention to ESG, many still view it chiefly as an unavoidable compliance cost rather than a strategic investment that can lower financing costs, strengthen supply-chain resilience, enhance brand value, and mitigate risk. Consequently, many are only willing to pay for "report writing" and neglect integrating ESG into strategy, risk management, and daily operations. Third-party services thus remain superficial, and corporate practice struggles to form a cycle of continuous improvement. On the supply side, there are pronounced capability gaps. ESG services require knowledge spanning environmental, social, and governance domains, combined with skills in data analytics, risk quantification, and strategic consulting. Higher education and professional training have yet to produce such talent systematically, and the industry lacks unified competency standards and certification. In a competitive labor market, service providers find it difficult to attract and retain specialists, leading to templated and fragmented delivery that raises costs and compresses space for innovation. Weak demand-side understanding depresses appetite for high-quality services, while talent shortages limit providers' ability to deliver depth—together reinforcing a low-equilibrium cycle that blunts the perceived value of ESG.

II. Breakthrough Pathways

Survey results indicate that Shanghai's third-party ESG consultancies see their main opportunities ahead in market expansion via internationalization ("going global"), expected moves toward mandatory disclosure, and supportive government policy (see Figure 5.8). Looking forward, providers should pursue breakthroughs through internal optimization and external collaboration.

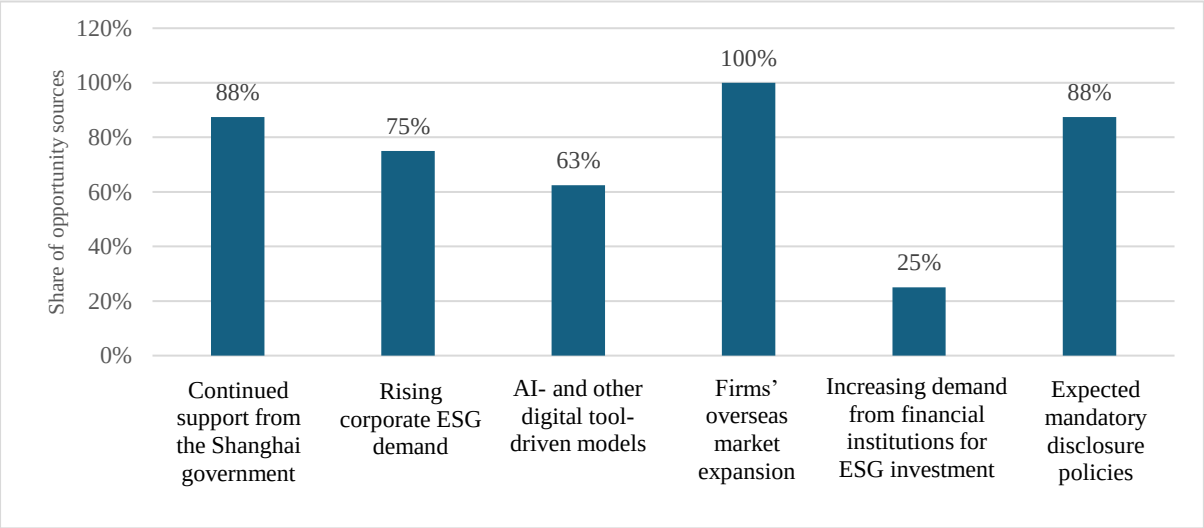


Figure 5.8 Survey of Third-Party Institutions on Opportunities for ESG Service Development

Source: Ernst & Young Hua Ming LLP (Special General Partnership).

(I) Internal Optimization of Actions

1. Enhance Differentiated Service Value

Third-party ESG consultancies should probe client needs in depth and, building on their comparative advantages, intensify product innovation to address differentiated requirements across industries and firm sizes. The aim is to develop personalized, customized service offerings rather than one-size-fits-all solutions.

2. Strengthen Technological Innovation Capacity

To align with digital transformation, Shanghai's third-party ESG providers should increase investment in big data, artificial intelligence, and blockchain. They can improve data-processing capabilities by developing proprietary ESG data platforms and analytics tools, or accelerate capability building through partnerships with technology firms.

(II) External Collaboration Requirements

1. Improve Data Management Capability

Providers should work with enterprises to improve disclosure quality; expand cooperation with government bodies, industry associations, and financial institutions to access more non-public data; and intensify R&D in big data and AI to enhance data-processing capacity.

2. Advance Policy Support and Standard Harmonization

It is advisable for government departments to introduce supportive policies—such as tax

incentives and financial subsidies—to lower operating costs for ESG service providers. Authorities should promote industry standards, strengthen supervision of disclosures, and foster industry associations to deepen domestic and international exchanges and cooperation, thereby advancing the unification and diffusion of ESG standards.

3. Strengthen Industry-Chain Collaboration

Providers should deepen collaboration with enterprises, financial institutions, and research organizations to drive coordination along the value chain. Customized ESG services for firms, co-development of investment products with financial institutions, and joint innovation with research institutes can collectively raise professional capability and service effectiveness.

4. Promote International Exchange and Cooperation

Providers should actively participate in international ESG exchanges, learn from best practices, join global organizations, and take part in standard-setting to enhance international competitiveness. At the same time, by attracting leading international ESG institutions to establish operations in Shanghai—and fostering cooperation and constructive competition with local firms—the market can mature more rapidly.

Overall, third-party institutions in Shanghai have undertaken diverse explorations in the ESG services domain, but further breakthroughs are needed through standard harmonization, talent development, and international mutual recognition in order to consolidate the city’s leading position within the global ESG ecosystem.

Chapter 6 The Current Status of ESG Talent Training and Public Awareness in Shanghai

Anchored in the themes of talent supply, cognitive transformation, and behavioral demonstration, this chapter reviews the ESG practice outcomes of Shanghai's educational institutions and media, and examines sports events and public spaces as vehicles for public communication and participation. It explores pathways through which ESG moves beyond disclosure compliance toward value creation. By distilling quality upgrading on the education side, cognitive transformation and action guidance on the media side, and low-carbon governance and community co-creation in sports-related venues, the chapter identifies common pain points—such as data and standards, supply-demand mismatches, and incentive design—and proposes a series of strategies to overcome these constraints.

Section I: Practices to Improve the Quality of ESG Talent in Educational Institutions

In recent years, as global sustainable development issues have deepened and China's dual-carbon strategy has advanced, Shanghai's educational institutions have actively responded to rising societal demand for ESG talent. They have continuously refined curricula, faculty development, pedagogy, and experiential learning projects, and have initially formed a training system that integrates interdisciplinary knowledge and bridges theory and practice, thereby providing solid support for building an international financial center and a demonstration city for sustainable development. However, the rapid evolution of the ESG field imposes higher requirements on talent cultivation. The current education system still shows mismatches between supply and demand and structural gaps in resource allocation, course content, practical training, and faculty capabilities. Multi-stakeholder collaboration is needed to explore effective optimization pathways.

I. Current Demand for ESG Talent

As the supply side of ESG talent, Shanghai's educational institutions must closely track

changes on the demand side to ensure that curricula and training models remain tightly aligned with market needs.

According to recruitment-platform data, from January 2014 to March 2025, demand for sustainability-related positions across more than 2,000 listed companies shows a sustained upward trend. In 2024, nationwide demand for ESG positions exceeded 9,500, an increase of 4.5 percent over 2023. Regionally, the Yangtze River Delta, with Shanghai at its core, has maintained a leading position since 2014. Its total demand significantly exceeds that of the Beijing–Tianjin–Hebei region and the Pearl River Delta. In 2024, ESG-related job postings in the Yangtze River Delta surpassed 2,300, accounting for 24 percent of the national total (see Figure 6.1). This highlights the region's strong industrial foundation in ESG, rapid policy responsiveness, and strong capacity to attract talent. As green finance, intelligent manufacturing, and green building accelerate within the region, the increase in quantity is accompanied by higher requirements for cultivating ESG talent with interdisciplinary backgrounds.

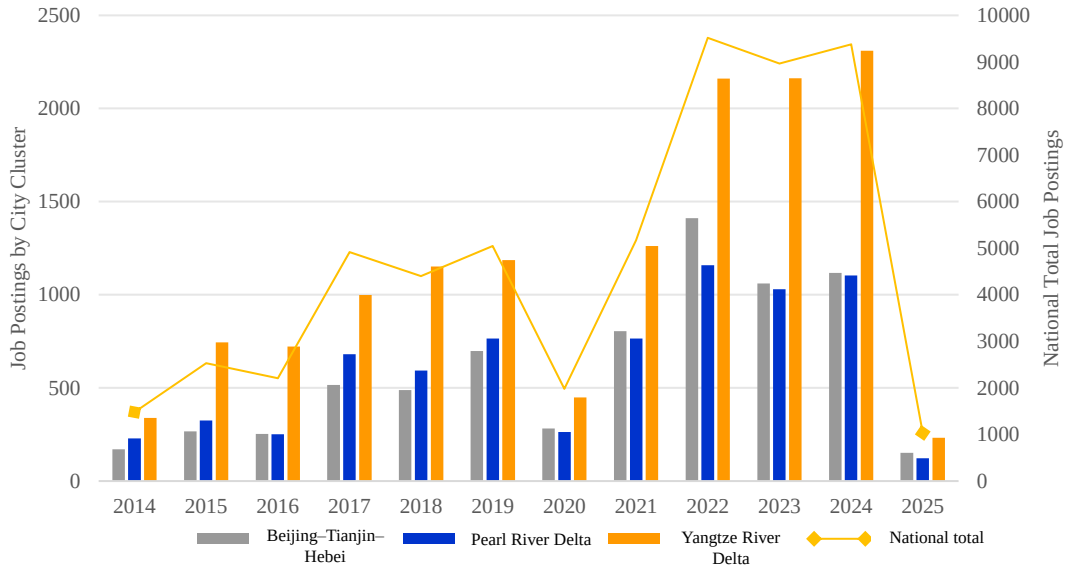


Figure 6.1 Distribution of ESG-Related Job Postings Nationwide and Across China's Three Major Urban Clusters (Jan 2014 to Mar 2025)

Source: Center for Sustainable Investment, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University

From the perspectives of city and industry, in 2024, ESG-related positions nationwide and in China's four first-tier cities are concentrated in industries such as manufacturing, information

technology, and finance. Shanghai is particularly prominent in information technology, leading the country in the number of postings (see Figure 6.2), which underscores its first-mover advantage in green digital transformation. At the same time, demand is also growing in traditional industries such as healthcare, utilities, and real estate, indicating that sustainability is rapidly permeating a diversified industrial system.

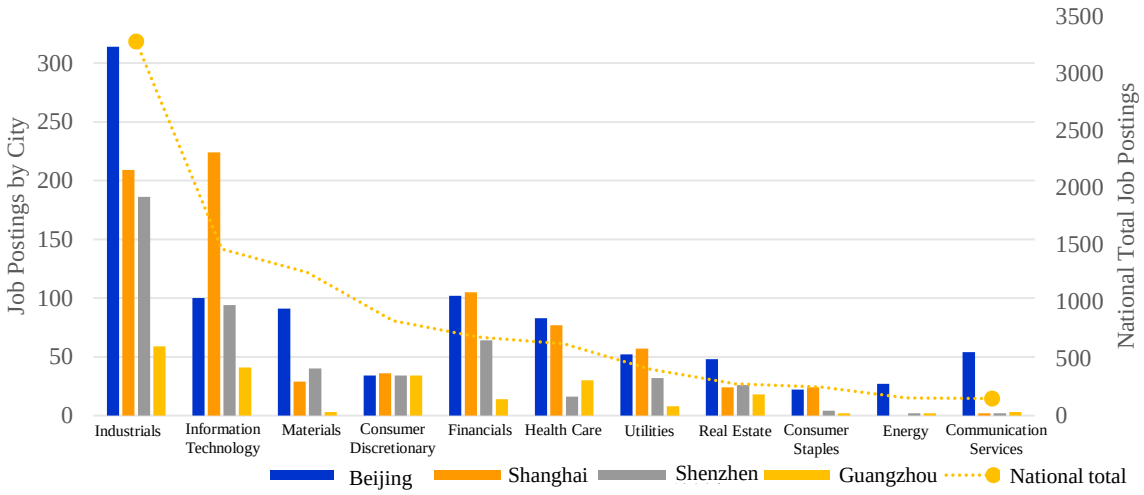


Figure 6.2 Industry Distribution of ESG-Related Job Postings Nationwide and in First-Tier Cities

Source: Center for Sustainable Investment, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University

Viewed by firm ownership attributes across the four first-tier cities, overall demand for ESG positions increased in 2024, with notable variation in activity among different enterprise types (see Figure 6.3). Private enterprises remain the primary engine of ESG demand. In Shanghai in particular, demand doubled in 2024, reflecting strong corporate initiative and swift market response in driving sustainable transition. Beijing, by contrast, continues to be led by central state-owned enterprises, reflecting steady expansion under policy guidance.

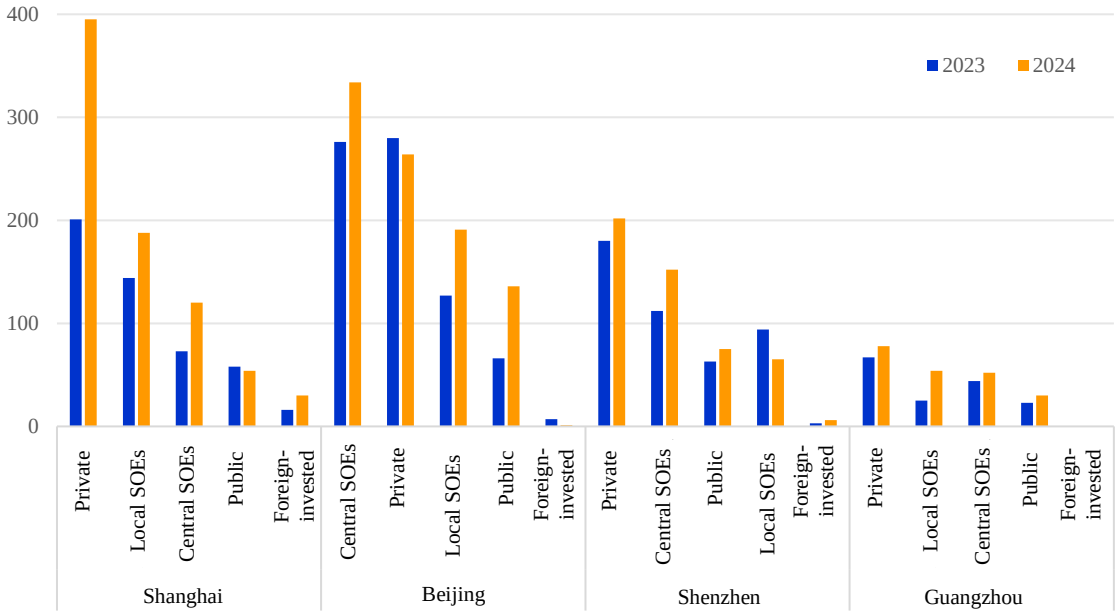


Figure 6.3 Comparison of ESG Job Postings by Enterprise Ownership in First-Tier Cities

Source: Center for Sustainable Investment, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University

In terms of compensation, Shanghai generally maintains a leading average salary level for ESG-related positions (see Figure 6.4), signaling sustained demand for high-quality talent amid the city's green transition.

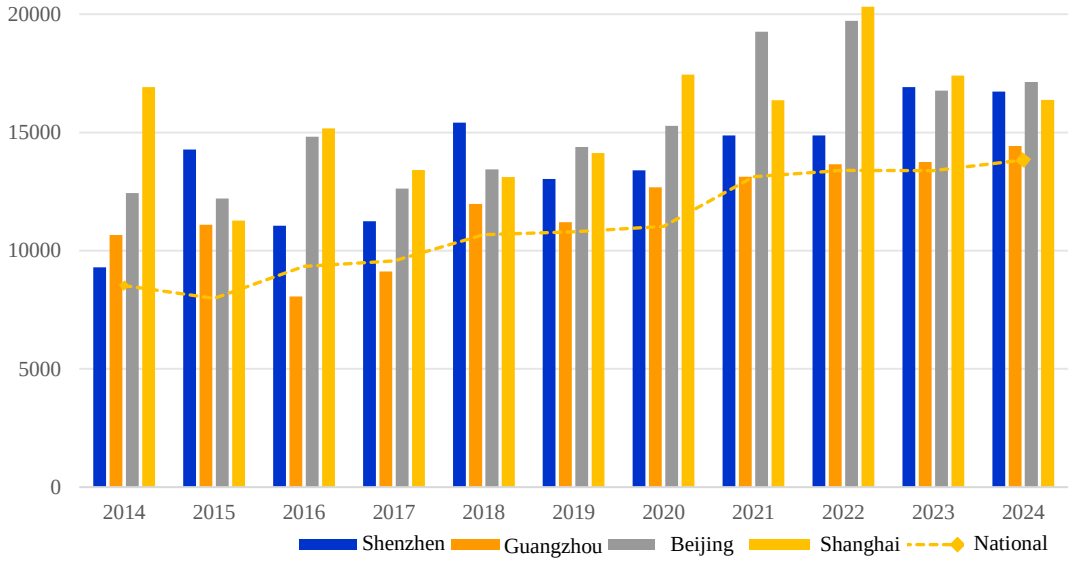


Figure 6.4 Annual Statistics on Average Monthly Salaries for ESG-Related Positions

Source: Center for Sustainable Investment, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University

Regarding job seniority, the structure of ESG positions in Shanghai is expanding from mid-level roles toward senior management, and from managerial functions toward a broader array of specialized roles. In 2024, demand for senior management positions increased substantially, nearly double the 2023 level (see Figure 6.5). This reflects robust demand for high-level, hybrid-skill talent and further underscores the current structural shortage in the education

system's ability to supply advanced-tier professionals.

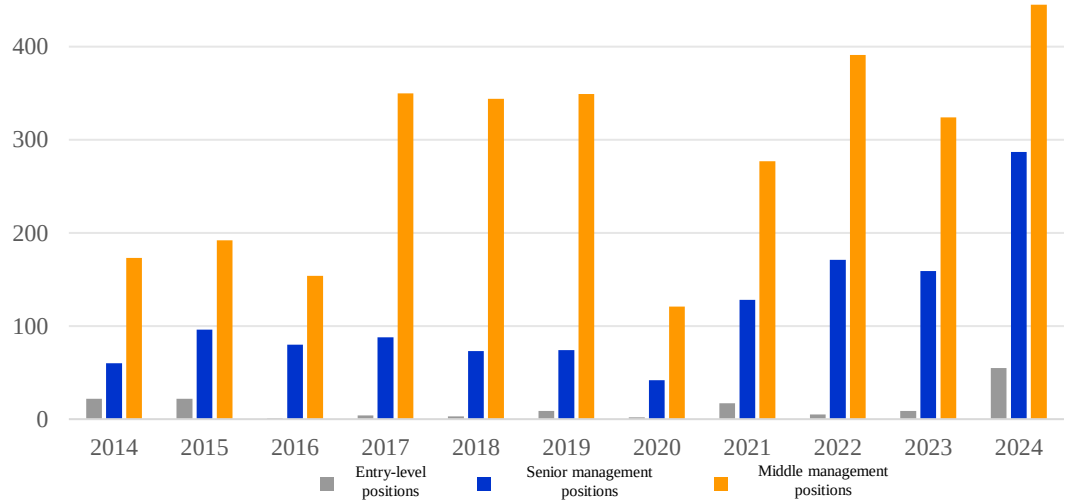


Figure 6.5 Summary Statistics of ESG Job Seniority Levels in Shanghai by Year (2014 to 2024)

Source: Center for Sustainable Investment, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University

II. Case Studies and Pathways for the Promotion of ESG Talent Development

In response to rapidly growing demand for ESG talent, a number of universities and professional training institutions in Shanghai are progressively restructuring curricula and integrating teaching resources to build a training mechanism that is more systematic, forward-looking, and aligned with market needs. Representative universities, including Shanghai Jiao Tong University and Shanghai University of Finance and Economics, have embedded sustainability-related content into programs in management, finance, law, and environmental science, and are exploring new interdisciplinary pathways.

(I) Systematic Curricula Driving the Deepening of Sustainable Finance Education

Take the **Shanghai Advanced Institute of Finance at Shanghai Jiao Tong University** as an example. On December 12, 2024, at the "2024 China Sustainable Investment Development Forum," the institute released a systematic sustainable finance curriculum. Based on a review of global university offerings and industry demand, and grounded in domestic market realities and enterprise-side practice, the curriculum advances both vertical depth and horizontal breadth across areas such as business ethics, green finance, impact investment, climate risk, and corporate governance. It covers all degree and non-degree programs, further integrating theory and practice.

According to the institute's Academic Affairs Office, in the 2024 to 2025 academic year

SAIF offered 110 courses, including 13 courses that introduce ESG tools and concepts, and 9 specialized courses in sustainable finance and ESG, up from 7 in the 2023 to 2024 academic year. This change indicates SAIF's incremental expansion of ESG-related course supply and its effort to raise the overall weight of sustainable finance education within the curriculum. Student participation has remained high. "Corporate ESG: Cases and Practice" and "Clean Energy and the Dual-Carbon Goals" each enrolled more than 70 students, while "Financial Ethics" and "Chinese Financial Laws and Regulation" continued to attract strong participation, reflecting sustained student interest in ethics and compliance.

At the same time, in 2024 the **Dishui Lake Advanced Finance Institute at Shanghai University of Finance and Economics** became the first in China to establish a Master of Finance program with an ESG concentration. The curriculum spans carbon finance, climate and environmental economics, and green financial technology, emphasizing interdisciplinary integration and practice. This initiative responds to urgent demand for hybrid ESG talent. It also helps move ESG concepts from the classroom into broader public awareness, thereby deepening the integration of sustainable development into both financial education and societal consciousness.

(II) Signaling Effects of Flagship Academic and Policy Activities

Beyond curriculum development, in 2025 the **Shanghai Advanced Institute of Finance** (SAIF) consolidated its leadership within China's ESG education system through a series of landmark initiatives. In June, the institute co-hosted the ESG session of the Caixin Summer Summit — "Resilient Growth and Breakthrough Paths: How Sustainable Development Navigates the Cycle"—together with Caixin Think Tank and the ESG 30 Forum. The session examined the inclusion of carbon assets on balance sheets and innovations in green finance, and it facilitated the launch of the "ESG 30 Young Scholars Program," highlighting SAIF's bridging role between policy practice and the cultivation of young talent. Also in June, SAIF successfully convened its annual finance research conference, designating sustainable finance and climate investment as core themes. In addition, in June 2024 the institute partnered with the National Bureau of Economic Research (NBER) to host a specialized academic workshop on "Climate Finance and the Sustainable Energy Transition." These multi-tiered, high-caliber

academic and practice-oriented activities have not only enhanced Shanghai's influence within the global ESG research network, but have also provided SAIF's curriculum with an ongoing stream of academic support and timely updates.

(III) Industry–Academia–Research Collaboration as a Driver of an Innovative ESG Education Ecosystem

Since its establishment in 2022, the **Fullgoal ESG Research Institute at Shanghai University of Finance and Economics** has leveraged a "university plus financial institution" collaboration model to build a systematic layout spanning research, exchange, talent development, policy engagement, and practical application. Over the past three years, the institute has launched 55 research projects, published eight monographs, and produced policy-influential advisory outputs, demonstrating the advantages of university-finance collaboration in knowledge production, policy provision, and talent training. The participation of Fullgoal Fund has brought a capital-markets perspective and industry resources, aligning research outcomes more closely with regulatory priorities and real-economy practice. In addition, by mobilizing resources across the university and the broader industry since its inception, the institute has developed a "four-in-one" model for talent cultivation: innovating ESG curriculum reform, publishing a series of ESG textbooks, adding new ESG training tracks, and hosting an ESG case competition. This model comprehensively updates approach to interdisciplinary and practice-oriented training and explores instructional frameworks that promote cross-school, cross-unit, and cross-domain collaborative innovation.

Concurrently, with a similar focus on industry–academia–research collaboration, SAIF has partnered through its **Center for Sustainable Investment** and the **Zijiang Discipline Development Special Fund** to create a platform that combines policy leadership with practical implementation. From 2022 to 2024, drawing on the Center for Sustainable Investment and the Zijiang Fund, the institute has continuously hosted the "SAIF–Zijiang Distinguished Lecture Series," a high-level, closed-door seminar format that convenes representatives from financial institutions and the real economy for in-depth dialogue on sustainability investment. The series explores innovative mechanisms and practical pathways for industry–finance collaboration to enable a green and low-carbon transition in the real economy. By 2024, the series had held six

sessions, inviting four academicians and 115 guests from academia, industry, and finance, with nearly 400 cumulative participants. Satisfaction surveys indicate that participants and guests broadly reported frontier-leading keynote insights and high-quality, high-intensity dialogues, and that the workshop has gradually become one of SAIF's signature events.

These cooperation models highlight the unique value of university–enterprise collaboration in advancing ESG education. Universities construct professional training systems, financial institutions contribute industry experience, and technology firms drive the implementation of data and digital tools. Through deepening dialogue, joint research, and practical cooperation, Shanghai's universities and enterprises are forming an ESG education and knowledge-supply system powered by collaborative innovation. This not only underpins Shanghai's leading position in ESG education and research nationwide but also offers replicable and scalable experience for China's exploration of an industry–academia–research integrated model for ESG talent development.

III. Bottlenecks in ESG Talent Training and Directions for Optimization

(I) Common Challenges and Tensions

1. Incomplete talent pipeline across educational tiers

At present, undergraduate, master's, doctoral, and executive education have not yet formed a fully articulated sequence in terms of ESG course content and talent positioning. Undergraduate programs often lack training in hybrid competencies, master's programs tend to remain at the level of theoretical frameworks, and there is insufficient stock of both high-level research talent and practice-oriented managerial talent. This structural gap constrains the education system's ability to respond systematically to differentiated talent needs.

2. Insufficient faculty capacity and professional bottlenecks

Faculty capacity in ESG education shows clear shortcomings. On the one hand, the number of specialized instructors with international academic backgrounds and practical experience remains limited. On the other hand, existing instructors often lack cross-disciplinary teaching and research capabilities. There is insufficient interaction between teaching and research, making it difficult to translate the latest policy studies and industry practice directly into classroom resources, which constrains the overall quality of ESG education.

3. Inadequate cross-disciplinary integration and persistent disciplinary silos

Although ESG issues are inherently cross-disciplinary, knowledge systems in finance, law, environmental science, and data technology remain relatively segmented in practice. Many courses remain confined to a single disciplinary frame and lack cross-domain integration. Students thus risk encountering fragmented knowledge when addressing complex ESG problems, which hinders the development of comprehensive analytical and problem-solving skills.

4. Tension between importing international experience and achieving local relevance

In international cooperation, universities actively introduce courses and textbooks from Europe and the United States. However, China's policy environment for green transition, its industrial structure, and its social foundations differ substantially from those contexts. Without the development of local cases and close coupling with domestic policies, straightforward transplantation of international experience can lead to misalignment with local needs, weakening the effectiveness of ESG education in serving domestic practice.

(II) Breakthrough Pathways

1. Internal actions by educational institutions

Educational institutions in Shanghai need to achieve system-wide improvements in internal development. With respect to curriculum, they should strengthen modular design and frontier orientation by incorporating emerging topics such as carbon finance, green financial technology, and dual-carbon governance tools, and provide differentiated training pathways tailored to different student tiers. For faculty development, institutions should balance international recruitment with local cultivation and build a "teaching–research–practice" linkage through academic exchanges, industry partnerships, and professional training. To promote cross-disciplinary integration, universities should proactively break down departmental boundaries, advance co-teaching and joint research, and combine law, finance, and data analytics in a coherent way to enhance students' cross-domain competencies.

2. External collaboration needs of educational institutions

On the external side, it is necessary to build a framework for deep collaboration among

education, industry, and government. First, policy support should better align the education sector with the dual-carbon strategy and encourage local governments to introduce dedicated funding and incentives for curriculum development. Second, industry–academia–research collaboration should be strengthened. Universities can co-develop teaching cases and establish internship bases with financial institutions, energy companies, and technology firms, directly linking talent cultivation with enterprise practice. Third, international cooperation should be paired with local adaptation by maintaining a global perspective while developing local cases, in order to form an ESG education model with distinctive Chinese characteristics. Finally, the role of societal mobilization should not be overlooked. Media and industry associations can help disseminate sustainability concepts and translate educational outcomes into public awareness and industry consensus.

Section II: Media Practices to Enhance Public Awareness of ESG

Since 2024, media organizations have played an increasingly effective role in ESG public education, using diverse formats to reach broad audiences. Mainstream practices now include launching ESG columns, establishing ESG awards and case-collection campaigns, and hosting large conferences. From 2024 to 2025, innovative approaches have also emerged, such as frontline enterprise reporting, executive interviews, think-tank building, and the provision of data and research services. Regionally, Shanghai's local media have developed distinctive features that emphasize multiple formats and hands-on public engagement.

I. Characteristics of ESG Communication by Shanghai and National Media

(I) Shanghai Media: Diverse Formats and Emphasis on Local Practice

Shanghai media have cultivated ESG communication that is concise in content, varied in format, and grounded in everyday practice. In 2024, the Shanghai Municipal Commission of Commerce issued the *Three-Year Action Plan (2024–2026) to Enhance the ESG Capabilities of Foreign-Related Enterprises in Shanghai*, which called for intensified ESG advocacy, support for local firms' participation in domestic and international ESG selections, and showcasing Shanghai cases and experience at international ESG conferences and on mainstream media platforms. It was the first ESG policy nationwide to explicitly highlight

media participation. Leveraging this policy support, Shanghai media explored ESG public-education pathways with a distinctive "Shanghai style." They emphasized format innovation and approachable content—through documentary variety shows, short videos, interactive livestreams, and social platforms—to bring ESG into daily life. Platform outlets seeded content around "ESG, green, sustainability," while "public-interest environmental documentaries" and similar programs helped translate ESG concepts into concrete public actions.

(II) National Media: Platformization and Cross-Sector Empowerment

Across China, ESG communication has trended toward platform integration and cross-sector resource mobilization. Media have created high-level dialogue platforms, launched specialized research programs, and promoted industry standard-setting, thereby expanding both the depth and breadth of ESG public education. China Central Television (CCTV) has served as a catalyst by mobilizing corporate participation and generating wide social impact. Market-oriented outlets represented by Sina Finance have pursued a series of communication innovations, converting ESG outreach into platform-based endeavors and moving into data-service and consulting domains.

II. Innovations in Media Communication Models and Collaboration Models for ESG

According to statistics compiled since 2024 using the self-built media database of Sina Finance, as of July 2025 there were fifty-three mainstream media outlets active in ESG nationwide—an increase of thirteen year-on-year, or 32.5 percent. Seven of these were Shanghai-based, accounting for 13.2 percent. Since 2024, in addition to standard practices such as ESG columns, ESG awards and case programs, and the organization of large ESG conferences, many media have rolled out frontline enterprise reporting, thematic interview series, ESG think-tank platforms, and the provision of ESG data and consulting services, generating substantial communication reach (see Figure 6.6).

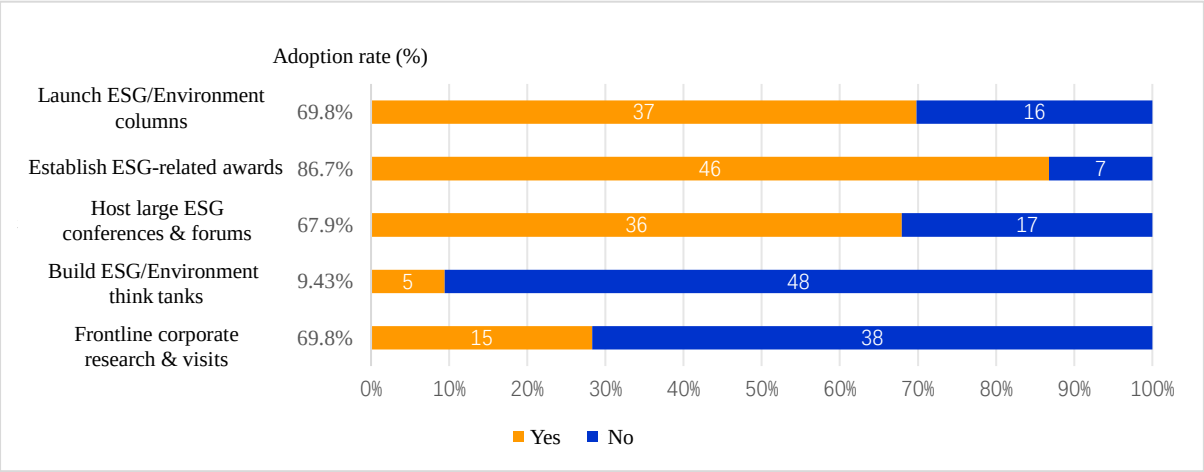


Figure 6.6 Trends in Practices by Media Active in ESG in 2025

Source: Sina Finance Media Statistics Database.

(I) Editorial Planning for ESG Columns

Media have deepened and strengthened columns devoted to ESG and environmental topics. Nationwide, thirty-seven outlets now operate dedicated ESG or environmental columns (see Figure 6.6), up nine from the previous year (see Figure 6.7). Of these, five are based in Shanghai, and nearly half are official media. The establishment of the "Ecology and Environment & ESG China Watch" channel on CCTV.com signals that ESG has entered the core focus of official media.

Frontline enterprise reporting and executive interviews have become popular forms. Two main models have taken shape. One organizes visits by academic and industry experts to diagnose corporate ESG status and disseminate exemplary practices. The other features high-level interview programs with corporate executives. Since August 2024, both formats have expanded markedly: fifteen outlets have launched related initiatives, up by ten year-on-year (see Figure 6.7), with six conducting enterprise visits and nine launching executive interviews. Content production favors lightweight, high-frequency new-media methods such as short videos and social interaction, thereby forming a communication matrix that balances depth with breadth and professionalism with popularization, and that reaches multiple audience tiers.

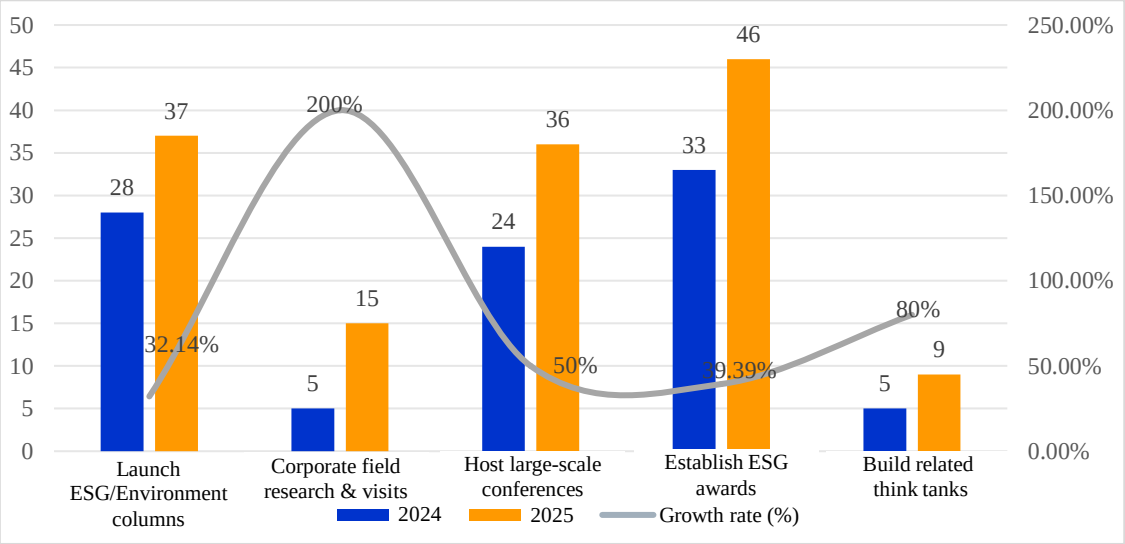


Figure 6.7 Growth in ESG-Related Media Practices, 2024–2025

Source: Sina Finance Media Statistics Database.

(II) Platform Collaboration

The number of large ESG conferences and symposia has risen rapidly. By July 2025, thirty-six outlets had hosted major ESG events, up by thirteen year-on-year, a 56.5 percent increase (see Figure 6.7). Such events facilitate exchange of ESG ideas and amplify communication impact.

ESG awards and case-collection campaigns have likewise increased. By July 2025, forty-six outlets nationwide had conducted ESG award or case programs, thirteen more than the previous year (see Figure 6.7). Six were Shanghai-based, reflecting the city's rising influence.

Social media is becoming a key arena for disseminating ESG concepts. Platforms such as Xiaohongshu and Bilibili in Shanghai embed ESG into daily life through "seeding" content, short videos, and interactive activities, popularizing sustainable lifestyles and boosting public participation.

(III) Data Tools

Media organizations are extending into think-tank construction and the provision of data and research services. Nine outlets have established ESG think-tank entities (see Table 6.1), assembling expert teams to deliver policy advice. Some have created dedicated ESG research teams and expanded into ESG data, ratings, product tools, and consulting services.

Table 6.1 ESG Think-Tank Entities Established by Media

Media Outlet	ESG Think-Tank Entity
Southern Weekly	China Corporate Social Responsibility Research Center
The Beijing New	Zero Carbon Research Institute
Sina Finance	ESG Leaders Organization Forum
Yicai	Yicai Center for Sustainable Business
Caixin	China ESG 30 Forum
The Paper	ESG Think Tank Committee
Zhejiang Business (Zheshang)	Zheshang Think-Tank ESG Research Center
Red Star News	Red Star ESG Research Institute
Chongqing Daily	Chongqing Daily Think Tank - Western ESG Research Center

Source: Sina Finance.

III. Shanghai Media ESG Service Cases and Promotion Pathways

(I) Sina Finance: Enterprise-Wide Enablement for ESG Communication and Capability Building

As a leading platform-type media organization, **Sina Finance** has systematically built out ESG since 2019, leveraging its user base, technological strengths, and resource-integration capacity to act as a "connector" and "enabler." Its annually hosted ESG Global Leaders Conference in Shanghai has become an international platform for ESG exchange.

1. Sustainability Global Leaders Conference

In 2024 the Sustainability Global Leaders Conference was permanently anchored in Shanghai and has grown into the country's largest ESG event with strong international influence. Past editions have featured IMF Managing Director Kristalina Georgieva, former World Bank President David Malpass, former UN Secretary-General Ban Ki-moon, nearly ten heads of government, over a dozen Nobel laureates and academicians, and hundreds of Fortune 500 CEOs and senior executives. The 2024 summit achieved strong social impact, with more than 100 million livestream views and 500 million Weibo topic reads. The 2025 summit will add a "Green Industry and Sustainable Consumption Expo," combining high-level forums with a green exhibition to translate ESG enabling effects into business practice.

2. ESG Leaders Forum

Since 2019, Sina Finance has, together with over forty leading domestic and international enterprises and institutions and prominent scholars, launched the ESG Leaders Forum in Shanghai. The forum has built professional research teams, convened seminars and corporate trainings, led government research projects and white papers, and provided ESG data and consulting. Examples include co-hosting Shanghai corporate ESG disclosure roundtables with the Shanghai Municipal Commission of Economy and Informatization and an exchange seminar with Korea's Taejae Future Strategy Research Institute; undertaking ESG strategy consulting for Tsingtao Brewery; participating in ESG training for Anhui automotive enterprises and for Shede Spirits; operating a free ESG ratings search platform that aggregates fifteen authoritative domestic and international ESG ratings, including MSCI, S&P, and CSI, with advanced screening and visualization; and developing three ESG indices in cooperation with partners such as Orient Securities, including an industry carbon-neutral index, the Better China ESG 100 Index, and the SSE-SZSE ESG 100 Select Index. Through conferences, site visits, professional services, and special interviews, Sina Finance disseminates ESG frontiers to the public, enterprises, and institutions, connects government–industry–academia–finance via international platforms such as the ESG Global Leaders Conference, and equips enterprises with ratings, indices, consulting, and research-report tools that provide objective, standardized, and transparent references. These measures support benchmarking and improved governance disclosure, while reducing information asymmetry.

(II) Shanghai Media Group (SMG) and Bilibili: A Green Trip

A core challenge for media organizations is to convert the grand narrative of environmental protection into social action that the public can perceive and join. Traditional environmental content is often serious in tone and limited in format, necessitating innovation in content forms and communication pathways that connect the topic to everyday life and shift audiences from passive reception to active exploration. Co-produced by **Shanghai Media Group** (SMG) and **Bilibili**, the large-scale public-interest environmental documentary program Yilu Qianxing (A Green Trip) combines the authority of mainstream media with the youthful, interactive advantages of an online platform to reach broad audiences and translate environmental

awareness into concrete action.

Launched in early 2024 and produced by the SMG Documentary Center and Dragon TV, the ten-episode program focuses on environmental protection and low-carbon lifestyles. Blending reality-show and documentary formats, it follows three celebrities—Hu Ge, Liu Tao, and Chen Long—on a thirty-day, low-carbon, restorative journey through deserts, national parks, and other locations, telling stories of advancing green development and building a "Beautiful China." The program added offline exhibitions at the Shanghai Library and the Oriental Pearl Tower and interactive dissemination to create a combined "content innovation + public co-advocacy" highlight. In 2024 it was shortlisted for the 29th Shanghai TV Festival Magnolia Award for Best Variety Program and won the 2024 Weibo Variety Annual Popularity Award.

Through short videos, behind-the-scenes features, and celebrity environmental-advocacy vlogs, the program executed a matrix distribution across Bilibili, Weibo, and Xiaohongshu. Concise, engaging, and highly topical content expanded reach—for instance, the hashtag "#HuGe picks up litter" sparked extensive online discussion—significantly increasing public awareness of biodiversity and climate change and encouraging green lifestyles. By pioneering a public-interest environmental documentary-variety format and combining authentic celebrity participation with on-site cinematography, the program turned serious topics into accessible, shareable content. It linked mainstream media, public figures, and city landmarks, establishing a mechanism of zero-fee participation, all-platform dissemination, and offline activities that achieved high social benefits at low cost and offered a replicable model for ESG communication.

(III) Xiaohongshu: A New Social-Media Frontier for "Seeding" ESG

Historically, ESG publicity has focused on macro policy interpretation and corporate responsibility coverage, emphasizing institutional arrangements and organizational actions but lacking direct ties to daily life. Such top-down communication often leaves public understanding abstract and hard to translate into concrete lifestyle choices. The key challenge for new media is to embed sustainability into everyday consumption and habits and to guide the public from passive acceptance to active practice.

As a lifestyle-sharing platform, **Xiaohongshu** has leveraged its distinctive "seeding" culture and user-trust mechanisms to integrate ESG with personal life. "ESG seeding" centers on user-generated content: authentic influencer experiences, product reviews, and lifestyle sharing reach across sustainable living, green consumption, zero-waste practices, and nature education. Topic operations (for example, #SustainableLiving, #GreenMobility, #NatureEducation), collaborations with creators, and brand partnerships have gradually formed a systematic ESG content ecosystem. The communication formats—image-and-text notes, short-video sharing, and livestream interactivity—span apparel, beauty, home, mobility, food, and other daily scenarios, rendering the concept of sustainability visible, tangible, and actionable.

Platform metrics indicate strong dissemination efficiency for ESG topics: the #ESG tag has recorded 89.565 million views and 735,000 discussions; #SustainableLiving has 270 million views and 723,000 discussions; #NatureEducation has 750 million views and 2.962 million discussions; and #EnvironmentalProtection has 1.23 billion views and 3.06 million discussions. Utilizing this user-driven mechanism, Xiaohongshu advances adoption of green lifestyles through authentic experience and word-of-mouth effects, translating macro policy orientations into specific decisions and consumption choices—for example, seeding low-carbon products, sharing green mobility routes, and organizing offline environmental activities. Such innovation in public-awareness building strengthens the social penetration of ESG and offers reference pathways for other platforms and enterprises exploring communication methods and product innovation.

IV. Bottlenecks and Optimization Directions in Shanghai's Media ESG Practice

(I) Common Difficulties and Structural Tensions

1. There remains a gap between concept dissemination and public uptake

Although fifty-three mainstream outlets now engage in ESG communication and formats such as columns, awards, and forums are proliferating, much of the outreach still centers on policy advocacy or corporate showcases, and lacks vivid, life-oriented storytelling for general audiences. As a result, public understanding is fragmented and deeper social consensus is hard to build.

2. Homogenization and innovation shortfalls coexist

Awards and forums have increased markedly, but some awards suffer from vague criteria, raising risks of "over-extension" and "greenwashing" and undermining credibility. Conferences often repeat content and lack sustained exploration of substantive topics, making it difficult to retain public attention. Truly innovative breakthroughs through cross-sector collaboration, digital technology, or new-media narratives remain relatively scarce.

3. A disconnect persists between information supply and professional services

While some outlets now offer data, consulting, and research, these services remain insufficiently systematic and professional overall. Existing coverage concentrates on case presentations and lacks rigorous indicator systems, comparative studies, and long-term tracking, limiting its usefulness for enterprises, investors, and regulators. The role of media as "communicator" versus "service provider" is therefore still indistinct, and market-oriented capabilities are underdeveloped.

4. Structural tension also exists between policy direction and market logic

On one hand, local governments encourage media to strengthen ESG advocacy and to cultivate a "green public sphere." On the other, outlets must balance commercial operations and returns. Heavy reliance on advertising and event models can yield "lively content with limited implementation." Achieving balance between policy goals and market demand has thus become a core challenge for media advancing ESG.

(II) Breakthrough Pathways

1. Internal actions by media organizations

Media organizations should prioritize innovation in communication formats and develop high-quality content that resonates with broad audiences and "breaks the bubble." They can diversify the presentation of ESG topics, increase narrative appeal and interactivity, and use short videos, livestreams, social-media challenges, and interactive H5 programs to expand reach. Drawing on SMG's "A Green Trip", media can create documentary and participatory programs focused on green practices. Examples include a documentary series "Zero-Carbon Shanghai Log" chronicling corporate decarbonization journeys; an "ESG Open Day" for listed

companies; and immersive, on-site programs such as “I Work as an ESG Manager,” using livestreams, vlogs, and short videos to construct multi-dimensional ESG content and scenarios.

Building on their information and public-opinion advantages, outlets are encouraged to evolve into professional ESG information and service providers and to construct end-to-end ESG service systems. Potential functions include a real-time “ESG Controversy Radar” for risk control; SME-oriented ESG diagnostic tools that generate improvement roadmaps and compliance checklists; and, where conditions permit, extended consulting offerings such as ESG planning and report assurance—creating a China-based analogue to “Thomson Reuters.” Revenues from market-based professional services can, in turn, subsidize public-interest ESG communication, helping Shanghai develop into an internationally influential ESG information hub.

2. External collaboration needs of media organizations

External collaboration is equally important. Broader mobilization of social media should expand ESG communication to wider circles. A Shanghai ESG Media Alliance, led by the Municipal Publicity Department, could coordinate mainstream outlets, commercial platforms, short-video creators, and lifestyle influencers to form a joint communication force. Relevant authorities could also issue Guidelines on Incentivizing ESG Content Communication to bring more Shanghai-based media into the ESG communication ecosystem.

Media should also leverage resource-aggregation strengths to build leading, full-spectrum platforms that integrate television and radio, mobile apps, social media, and short-video channels into an all-media matrix. On the content side, outlets can promote thematic features, videos, interviews, and programs; on the technology side, they can use AI foundation models and big-data tools to increase ESG content reach and social salience. Drawing on Sina Finance’s experience—combining guest interviews, high-level forums, data services, and think-tank development—media can foster cross-domain linkage for ESG at scale and establish influential, full-field communication paradigms.

Section III: Practices in Promoting ESG Concepts within the Sports Industry

Shanghai's sports industry stands at a pivotal intersection of policy guidance and strategic implementation in ESG development. As a key vehicle for advancing China's "dual-carbon" goals within the sports domain, Shanghai has used the Outline for Building Shanghai into a World-Famous Sports City and the 14th Five-Year Plan as its core policy framework to drive a systematic green and low-carbon transition of the sports sector. The scope has expanded beyond the traditional focus on event economies and public fitness facilities to encompass an innovation paradigm powered by both technological enablement and green development. Against this backdrop, analyzing Shanghai's pathways and future directions for embedding and advocating ESG concepts in the sports industry carries significant theoretical and practical value for exploring sustainable development models in megacities.

I. Characteristics of the Sustainable Transition in Sports Events and Public Spaces

(I) Green Event Systems and Carbon-Neutrality Exploration

Shanghai is developing a low-carbon event system centered on technological application, operational optimization, and behavioral guidance. New-energy shuttle buses and photovoltaic power enable coordinated emissions reduction across transport and venues; paperless administration and green procurement reduce the operational carbon footprint; incentives for green travel and carbon-points rewards cultivate low-carbon habits among spectators. Large-scale events such as Formula 1 (F1) establish carbon-neutral working groups and pair these efforts with carbon offsets, while small and mid-sized events pursue lightweight reductions by reusing materials and simplifying setups. International events strictly observe environmental standards, whereas domestic events embed municipal green-transition policies, together forming replicable models with demonstrative effects.

(II) Public Sports Facilities and Urban Spatial Support

Shanghai has also achieved notable progress in facility construction. By 2024, per-capita sports-venue area reached 2.6 square meters, meeting the 14th Five-Year Plan target ahead of schedule. Citywide, 34 community fitness centers, 89 fitness trails, 1,186 community "smart

fitness" stations, 81 fitness hubs, 183 public sports courts (including 100 badminton courts), and 38 senior wellness centers had been completed. These facilities not only meet citizens' fitness needs and enhance the city's overall sporting atmosphere, they also respond to low-carbon requirements laid out in the Shanghai Sports Development 14th Five-Year Plan and provide experience for megacities seeking to balance economic, social, and ecological benefits.

(III) Public Awareness Shifts and Expanded Social Participation

Sustainable practices in events and public sports spaces extend beyond technology and infrastructure to shaping green awareness and habits. Shanghai promotes low-carbon travel, waste sorting, and green consumption throughout events, integrating sustainability into everyday experiences. At the F1 venue, for example, direct-drinking water stations, waste-sorting, and green ticketing make "green spectating" routine. Beyond infrastructure, the city also deploys consumption-oriented nudges. In 2024, Shanghai issued RMB 60 million in sports consumption vouchers, with over 2.6 million redemptions and more than RMB 1 billion in direct consumption. Such "soft" measures—including vouchers, sports consumption festivals, and off-peak reservation systems—lower cost and convenience barriers, enabling broader engagement in fitness and events and gradually internalizing healthy, green, and shared lifestyles. As public campaigns, volunteer services, and community co-creation deepen, citizens move from "passive recipients" to "active participants," and green events and public spaces become important platforms for transforming social consciousness.

II. ESG Practice Cases and Promotion Pathways in Shanghai Sports

(I) Formula 1 Chinese Grand Prix: Racing Toward a Sustainable Future

As a premier international commercial event, the **F1 Chinese Grand Prix** in Shanghai demonstrates that commercial events can be deeply integrated with sustainability. Organizers embed green concepts across the entire lifecycle—reducing single-use plastics, refining waste sorting, supplying green energy, and guiding low-carbon transport—thereby creating a management loop spanning pre-event, in-event, and post-event stages. Digital platforms play a critical role by monitoring energy use and carbon emissions in real time, tracking waste treatment, and managing spectator flows intelligently to raise resource-allocation efficiency.

In 2025, the three-day event attracted more than 220,000 in-person spectators, of whom

70 percent were from other provinces and municipalities and 15.25 percent were international visitors. Direct economic impact reached RMB 2.47 billion and indirect impact RMB 6.91 billion. The event's community outreach further extended sustainability beyond the circuit. Total waste collected and processed reached 560 tonnes, including 455.28 tonnes of residual waste, 81.3 tonnes of recyclables, 5.42 tonnes of wet waste, and 18 tonnes of renovation debris. Waste-bin designs were revised to align with waste-sorting advocacy, strengthening environmental awareness. The Grand Prix also fostered two-way value creation with host communities through volunteering and public-interest activities. A total of 305 volunteers were recruited, including 239 from six local universities, 51 from the organizer's corporate group, and 15 international students studying in Shanghai, contributing 10,680 service hours. Volunteers not only underpinned event delivery but also supported community–event synergy.

The drivers behind **Juss Sports**' implementation of these practices stem, on the one hand, from the Fédération Internationale de l'Automobile's sustainability standards and, on the other hand, from the combined effects of brand value enhancement and evolving market demand. Formula 1 integrates technological emissions reductions with behavioral guidance to construct a full value-chain decarbonization system, and it employs quantitative indicators—such as the volume of waste processed and the rate of green mobility—to evaluate outcomes. Although high environmental investment costs and the inertia of spectator consumption habits present obstacles, the event operator has translated ESG into a competitive advantage through pathways of brand valorization and community empowerment.

The core lesson from hosting the F1 Chinese Grand Prix in Shanghai is that environmental stewardship need not be a commercial burden; it can function as an engine of value creation. When environmental measures are transformed into brand assets through digital management and public participation, large-scale events can achieve synergies across economic, environmental, and social outcomes. This model provides a practical, replicable paradigm for major events in China.

(II) Yangtze River Delta Athletics Diamond Gala: A "Chinese Solution" for Green Events

Practice under the **Yangtze River Delta Athletics Diamond Gala** illustrates how small and mid-sized events can explore sustainability with limited resources. The core is a

"lightweight across the lifecycle" strategy. Before events, green procurement is implemented in materials preparation, prioritizing biodegradable inputs and local supply chains; during events, transport is optimized by encouraging public transit and bike-sharing to control the carbon footprint; after events, volunteer partnerships extend event value by converting short-term participation into long-term community sports initiatives. This closed-loop approach reduces costs while amplifying social benefits. Drivers include the World Athletics requirements on sustainability and alignment with the Yangtze River Delta's regional coordination and Shanghai's urban green transition. Emissions are reduced primarily through transport optimization, while social inclusion is enhanced by improving accessibility to raise participation among disadvantaged groups, yielding a pragmatic "low-cost, high-return" pathway. The experience dispels the misconception that ESG necessarily entails high expenditure; through meticulous operations, cultural integration, and legacy planning, environmental and social value can be jointly maximized, offering a practical sustainability template for other resource-constrained events.

III. Bottlenecks and Optimization Directions for ESG in Shanghai Sports

(I) Common Difficulties and Structural Tensions

1. Awareness remains to be strengthened

Sustainability has yet to become a sector-wide consensus from top to bottom. Although policies advocate "green events" and "green venues," binding indicators and systematic communication are limited; many enterprises stay at the level of slogans, lacking ESG performance tracking and carbon-footprint assessment. Public understanding of green sports is likewise modest, and green fitness or carbon-neutral events have not yet become mainstream topics.

2. Institutional supply and governance mechanisms are incomplete

The sports industry lacks policies and standards that span the full lifecycle. Existing measures are fragmented; comprehensive norms covering planning, delivery, and post-event evaluation are missing; green-venue certification and event-assessment systems are under-developed; and ESG disclosure and third-party oversight are insufficient, leading to uneven outcomes. Departmental silos persist, and unified process templates for transport, energy use,

and waste management are lacking, impeding the scaling of green practices.

3. Incentives for sustainable transition are weak

Externalities are difficult to internalize. The costs of green technology upgrades and carbon-neutral operations are high, while subsidies and tax preferences are limited. Firms may thus face a perverse "the greener, the costlier" signal. Financial institutions remain cautious due to long payback periods and higher risk profiles in sports projects, and suitable green-finance products are scarce, further constraining transition.

4. Collaborative mechanisms among diverse stakeholders are not yet established

Social mobilization and cross-sector integration are insufficient; research capacity, public communication, and volunteer systems are relatively weak; and green events lack a broad civic foundation. Divergent standards and policies across sports, tourism, education, and finance raise coordination costs and limit the depth and breadth of integration.

(II) Breakthrough Pathways

1. Internal actions by sports industry

Optimization within the sports industry requires elevating sustainability to a medium- to long-term strategic objective, embedding carbon reduction, green procurement, and ESG rating outcomes into performance assessment, and shifting from "compliance response" to "proactive innovation." Event operations and venue management should explore new models such as zero-carbon event IPs, green intelligent fitness products, and digital monitoring platforms, turning green development into a commercial growth point. Equally important is leveraging the sector's unique role as a conduit for public communication, placing public-awareness building at the core of transition. On-site guidance for green travel, waste-sorting infrastructure, and drinking-water stations function not only as operational measures but also as public education. Community fitness vouchers and carbon-points reward help convert green consumption habits into everyday behavior. Through repeated, long-term everyday experiences, the public can progress from "participants in green behavior" to "practitioners and disseminators of sustainability," providing durable social recognition and public support for sectoral transition. Only when green development penetrates public consciousness through sports channels will

the industry possess sustained endogenous momentum for a low-carbon transition.

2. External collaboration needs of sports industry

External collaboration is indispensable. Green transition in sports depends on cross-departmental and cross-industry coordination to build standards that cover event planning, construction, operations, and spectator mobility, requiring joint promotion by authorities responsible for sports, ecology, finance, science and technology, and education. Policy incentives and financial instruments should take public-awareness enhancement as a key objective. Special funds and green loans supporting venue retrofits can incorporate requirements for public-participation components; sustainability-linked bonds can include terms tied to green-travel rates among spectators and community-participation metrics, linking capital to public behavior. Digital enablement is likewise a catalyst for shifting public awareness. Through carbon-points systems, intelligent mobility monitoring, and voucher platforms, citizens can perceive their contributions to green action and receive tangible rewards. Drawing on the carbon-management mechanisms of the International Olympic Committee (IOC) and Fédération Internationale de Football Association (FIFA), China's sports sector can align a "low-carbon event management loop" with a "public education loop," making the elevation of public awareness a central objective of external-coordination policies. Public-awareness improvement should not be a mere by-product of green sports development; it should be the ultimate destination of sectoral governance and policy design.

In sum, education, media, and sports—respectively representing professional talent development, public communication, and social participation—are the three pillars propelling Shanghai's ESG ecosystem from compliance-oriented approaches toward value creation. Continued effort remains necessary to advance standard harmonization, talent pipelines, and social consensus in order to build a more internationally competitive model of sustainable development.

Chapter 7 The Current State of Shanghai's International ESG Cooperation

As China's front-line window of opening-up and an international economic hub, Shanghai has consistently acted as both an energetic practitioner and an innovative explorer within the global ESG governance architecture. In recent years, the city has grounded its approach in institutional construction, used rule convergence as a connective tissue, and relied on coordinated cooperation as a driving force, thereby achieving multi-dimensional breakthroughs and a three-dimensional layout in international ESG cooperation. From the systematic construction of a policy framework and the international benchmarking of disclosure standards, to regional alliances and the global interconnection of financial infrastructure, Shanghai has advanced the progression of ESG from macro policy to micro practice through institution building, standard alignment, platform creation, and practical innovation. These efforts provide robust support for foreign-related firms in Shanghai to embed themselves within global sustainability networks and, more broadly, offer a salient case of Chinese participation in global ESG governance and the contribution of local knowledge. They underscore Shanghai's strategic role as a fulcrum connecting China and the world in ESG collaboration.

Section I: Multi-dimensional Progress in Shanghai's International ESG Cooperation

I. Laying the Institutional Foundation and Deepening International Integration: Building and Evolving Shanghai's ESG Policy System

In a context where ESG concepts are diffusing rapidly worldwide and international cooperation on sustainable development is deepening, policy leadership and support determine the depth and breadth of regional ESG practice. In October 2021, the General Office of the Shanghai Municipal People's Government issued the Implementation Opinions on Accelerating the Building of an International Green Finance Hub to Serve the Dual-Carbon Goals, proposing the establishment of a green-finance system and creating an early policy basis

for foreign-related firms in Shanghai to fulfill the "E" dimension of ESG. Policy continuity is evident in successive editions of the Shanghai Foreign Investment Guide from 2016 to 2024; notably, the 2023 edition for the first time incorporated "green and low-carbon transition," clarifying development directions for green and low-carbon industries. This adjustment aligns with goals for building a green-finance system and, crucially, provides more concrete operational guidance tailored to foreign-invested enterprises' local practice needs, pushing ESG from high-level advocacy toward on-the-ground implementation. On 1 March 2024, the Municipal Commission of Commerce released the *Three-Year Action Plan (2024–2026) to Enhance the ESG Capabilities of Foreign-Related Enterprises in Shanghai*. As the first region-level ESG action plan in China, it marks the beginning of a systematic push for ESG policy in Shanghai. The action plan echoes the policy orientation of the 2021 green-trade framework, producing strong policy resonance and jointly driving deep alignment between the ESG practice of foreign-related firms and international rules.

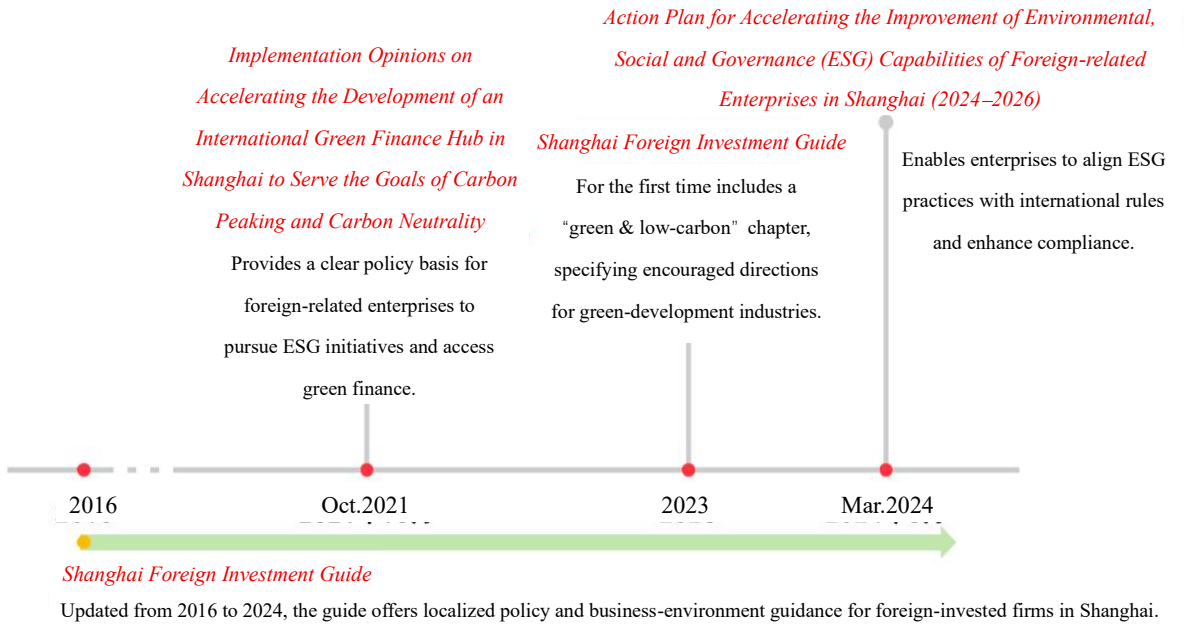


Figure 7.1 Timeline of ESG Policies and Guides for Foreign-Related Enterprises in Shanghai

Source: Public information, compiled by Prestige and Fortune Fintech (Beijing).

II. Fusing Standards and Benchmarking the Frontier: The SSE "Guidelines" Lead International Alignment in Disclosure

In January 2025, the Shanghai Stock Exchange issued the Self-Regulatory Guidelines for Listed Companies No. 4—Preparation of Sustainability Reports ("the Guidelines"). Integrating

leading domestic and international statutes, standards, and industry norms relevant to sustainability disclosure, and informed by the current practices of listed companies, the Guidelines offer authoritative, professional guidance for preparing sustainability reports. They align closely with the ISSB standards in several respects. At the level of architecture, they adopt a two-part structure—general requirements and disclosure framework corresponding to IFRS S1, and climate-related requirements corresponding to IFRS S2—while establishing a four-element disclosure framework centered on governance, strategy, management of impacts, risks and opportunities, and metrics and targets, which together provide the foundation for sustainability disclosure. On materiality, the Guidelines adopt the "double materiality" principle similar to the EU's CSRD and ESRS, requiring reporters to assess both "financial materiality" and "impact materiality." This approach helps firms identify and evaluate sustainability risks and opportunities more comprehensively and significantly improves the structure and cross-border comparability of reports.

Table 7.1 Correspondences between the SSE Guidelines and International Standards

Core Dimension	SSE "Guidelines" Requirement	Corresponding International Standard
Core Disclosure Framework	Establishes a four-element disclosure framework: Governance – Strategy – Management of Impacts, Risks and Opportunities – Metrics and Targets.	Aligned with the core framework of ISSB standards (IFRS S1 and IFRS S2).
Materiality Principle	Requires assessment from two dimensions: financial materiality and impact materiality.	Consistent with the EU CSRD/ESRS "double materiality" principle.
Standard Structure	The main body comprises No. 1 General Requirements and Disclosure Framework and No. 2 Climate-Related Topics.	Structure closely aligned with ISSB IFRS S1/S2.
Disclosure Objective	Provides consistent, comparable, high-quality sustainability information for investors, creditors, and other market participants.	Consistent with the ISSB's core mission to provide a global baseline for sustainability disclosures to capital markets.

Sources: Shanghai Stock Exchange; IFRS; European Commission. Compiled by Prestige and Fortune Fintech (Beijing).

III. Coordinated Momentum and Green Upgrading: An ESG Development Alliance Driving High-Quality Regional ESG

On 9 November 2024, at the High-Quality Development Factor-Matching Conference for the Yangtze River Delta G60 Science and Innovation Corridor, the Joint Office of the G60 Corridor, together with ESG rating agencies, carbon-trading platforms, service organizations,

research bodies, and brand enterprises from the corridor's nine cities, launched the Yangtze River Delta G60 ESG Development Alliance. The Alliance seeks to support enterprises across the nine cities in low-carbon and eco-friendly transitions, and to lead the manufacturing sector toward high-end, intelligent, green, and low-carbon development. Its work priorities include policy interpretation and education, consulting services, and the publication of an ESG white paper for science-and-innovation enterprises, while building an open mechanism for cooperation and exchange. In June 2025, the Alliance and several member organizations participated in the 3rd Carbon Governance Forum, disseminating international experience and model cases on themes such as green going-global, artificial intelligence, green finance and ESG, and dual-carbon governance, and releasing relevant international standards and outcomes. During the forum, the UK–China Carbon Governance Committee and the Alliance signed a strategic cooperation agreement. They reached consensus on a green low-carbon industry fund and IPOs, sustainable information disclosure across the G60 Corridor, and the co-creation of a regional ESG coordination mechanism, thereby accelerating cross-regional integration in the Yangtze River Delta and supporting upgrading along global value chains and high-quality economic development. Looking ahead, the Alliance will continue to deepen ESG ecosystem building, strengthen engagement with international organizations, and empower green, low-carbon upgrading along industrial and supply chains in the region, contributing "G60 wisdom" and a "China solution" to higher-quality regional integration and global sustainability governance.

Figure 7.2 Signing of a Strategic Cooperation Agreement between the UK–China Carbon Governance Committee and the Yangtze River Delta G60 ESG Development Alliance

Source: 3rd Carbon Governance Forum (2025).

IV. From Breaking Bottlenecks to Setting Standards: Launching the World's First International ESG Standard for Logistics

China is moving from "standard taker" to "standard setter" in ESG rulemaking. Leveraging its roles as an international financial center and a hub for scientific and technological innovation, Shanghai has built practice platforms, advanced standard development, and promoted global convergence, thereby offering crucial support to the national ESG governance framework and assuming a growing role in international standard-setting. In November 2024, Shanghai Second Polytechnic University and Shanghai Shanghengdao International Standards Technical Services Co., Ltd. jointly proposed an international standard, "Innovative logistics—ESG for logistics—Framework and factors" (ISO/NP 25403). The proposal passed a member vote under ISO/TC 344 and was successfully launched as a project. This is the world's first international ESG standard proposal dedicated to logistics and China's second project under ISO/TC 344. It represents a breakthrough for China in ESG international standard-setting and a major achievement for Shanghai's international shipping center and sustainable development. The project provides a primary framework and key elements for implementing ESG in logistics enterprises and can guide the design and normalization of ESG strategy in the sector. The draft outlines the relationship between logistics and supply chains, sets a general framework for logistics ESG, and describes, from environmental, economic, and governance perspectives, factors such as transport energy consumption and emissions, low-carbon warehousing, warehouse safety, transport and distribution safety, and warehouse automation and intelligence. It will encourage more logistics companies to adopt coordinated ESG frameworks and elements, build robust ESG systems, and achieve green and sustainable development across the industry, contributing to economic, social, and ecological progress worldwide.

V. Platform-Building and Model Contribution: World Cities Day as a Convergence Mechanism for Global ESG Consensus

World Cities Day is the first UN international day themed on cities and the first initiated and successfully established by the Chinese government. Originating in the 2010 Shanghai World Expo, it aims to advance sustainable development in cities worldwide. On 31 October 2024, under the theme "Building a People's City, Sharing a Better Life," the China-hosted main event for World Cities Day and the 2024 Global Conference on Urban Sustainable

Development were held at the Shanghai World Expo Exhibition and Convention Center. Approximately 350 attendees took part, including government representatives from home and abroad, mayors and delegations from various cities, experts and scholars, business leaders, and officials from international organizations. China collaborated closely with UN-Habitat, the Bureau International des Expositions, and others to organize global thematic activities, forums, research training, and outreach, creating knowledge products such as the "Shanghai Index" and the "Shanghai Manual" to raise awareness of urban problems and promote sustainable urban pathways worldwide. As a benchmark for the "people's city" concept, Shanghai is providing replicable and scalable ESG implementation pathways to cities worldwide and continues to lead the movement toward more inclusive, greener, and better-governed urban futures.

Section II: Innovative cases and Core Initiatives in Shanghai's International ESG Cooperation

I. Case One: Interconnected Financial Infrastructure as a Critical Link for ESG Cooperation

Interconnection of financial infrastructure underpins deeper international ESG cooperation. On 22 May 2025, the Shanghai Futures Exchange (SHFE) and the Shanghai International Energy Exchange were approved to join the UN Sustainable Stock Exchanges Initiative, becoming the first commodity futures exchanges in mainland China to do so. This milestone signals deep integration of China's commodity derivatives markets into a global sustainability network and builds a higher-level bridge for cross-border ESG cooperation. In June 2025, SHFE listed cast aluminum alloy futures. Cast aluminum alloy is a principal channel for recycled aluminum utilization with significant energy-saving and emissions-reduction effects; it is an important product for the aluminum industry's low-carbon transition and belongs to the resource-recycling and remanufacturing industries that China is vigorously developing. To support high-quality development and contain risk, SHFE formulated and revised rules for cast aluminum alloy futures and options and continued market training and investor education.

II. Case Two: The Bridge Role of High-Level International Events—From Information Exchange to Standard Collaboration

Amid surging global attention to energy and climate issues, Shanghai has leveraged keen insight and integrative capacity to construct high-level dialogue platforms. In November 2024, the "Shanghai Dialogue on Major Energy and Climate Issues" was successfully held as a China International Import Expo side event. The dialogue rapidly became a focal point in the global ESG field, offering a significant stage for deliberations on energy transition and climate governance. Concentrating on the clean-energy supply chain, industrial low-carbon transition, and topical mechanisms such as the EU's CBAM, it attracted experts from Asia, Europe, and Africa who shared experiences, lessons, challenges, and opportunities in clean transitions across energy and industry; online reach exceeded 2.65 million viewers.

Table 7.2 ESG Focus Areas of the Shanghai Dialogue on Major Energy and Climate Issues

Dimension	Focus Area	Key Problem Addressed
Environment (E)	Global energy transition and climate governance	For example, high industrial emissions, insufficient deployment of clean technologies, and trade–environment rule conflicts faced by emerging economies in response to unilateral border carbon adjustment mechanisms (e.g., CBAM).
Society (S)	Global geopolitics and international supply chains	The impact of geopolitical shifts on the stability of international supply chains.
Governance (G)	Corporate compliance and governance enhancement	Strengthening firms' capacity to comply with complex international ESG regulations—especially supply-chain due-diligence requirements—and improving overall governance quality.

Source: 5th International Carbon Neutrality and Green Investment Conference (2024). Compiled by Prestige and Fortune Fintech (Beijing).

III. Case Three: "Bring In" and "Go Global"—From Talent Development to Practice Innovation

Shanghai advances international ESG cooperation through mutually reinforcing pathways of introducing global resources and facilitating outward engagement. On talent development, the UNITAR Shanghai Centre organized municipal officials to study European models of sustainability education, receiving briefings from European experts and institutions and generating reference experience for Shanghai's ESG talent system. The Shanghai Stock Exchange has, for five consecutive years, hosted the "Dialogue with International Investors: ESG Empowering Listed Companies" training series, building a bridge between Shanghai-listed firms and international investors and rating agencies to improve global compatibility and

rating outcomes for ESG disclosure. Experts from Norges Bank Investment Management, MSCI, and other institutions have given lectures, and corporate secretaries and ESG leads from more than thirty Shanghai-listed firms engaged in direct exchange. An annual platform was established to examine international disclosure rules, ESG rating methodologies, and real-world cases, encouraging open, practical discussion between listed companies and international institutions on topics ranging from scoring mechanics to financial materiality. By prioritizing two-way "dialogue," the program transcends the limits of one-way training and creates a replicable ecosystem for international knowledge sharing. Under its impetus, the ESG reporting rate among Shanghai-listed firms reached 57 percent in 2024, spanning over 1,300 companies, a result that reflects the Exchange's leading role in global ESG governance.

Table 7.3 Key Dimensions of SSE ESG Talent Development and Empowerment

Dimension	Focus Area	Key Problem Addressed
Governance (G)	Disclosure–rating compatibility	Resolving risks of regulatory penalties and market-access restrictions arising from misalignment with international ESG disclosure rules and incompatibility with global rating models.
Governance (G)	ESG governance gaps and capital costs	Steering companies to remedy ESG governance deficiencies to alleviate structurally higher financing costs and persistent valuation discounts.
Governance (G)	Governance effectiveness and investor trust	Enhancing governance effectiveness to strengthen investor confidence in the sustainability of corporate cash flows, thereby narrowing valuation gaps with international peers.

Source: Shanghai Stock Exchange. Compiled by Prestige and Fortune Fintech (Beijing).

Section III: Bottlenecks and Optimization Strategies for Shanghai's International ESG Cooperation

Across the diverse initiatives described above, several common features stand out. At the level of global vision, these initiatives track international ESG trends closely, align with global rules, and accelerate Shanghai's international integration. In domestic practice, they dovetail with policy guidance and market demand, providing targeted support for real-world problems in enterprise ESG. In terms of problem-solving, they accurately identify sectoral pain points and address them with proactive, innovative measures. With respect to collaboration, they prioritize the building of multi-stakeholder platforms that foster information sharing and mutual learning. Ultimately, all of the cases aim to elevate Shanghai's position and influence within the international ESG landscape and to support China's deep participation in global sustainable development.

The accumulated experience has broader transferability. **Deep integration into international networks is fundamental to improving ESG practice,** and institutions of all types can build international cooperation channels to accelerate capability building. **The construction of diversified professional platforms is an effective vehicle** for coordinated ESG development; by aggregating resources and focusing on core themes, such platforms create conduits for information flow and problem resolution. **Sustained and normalized practice is the bedrock of durable ESG outcomes;** only through institutional arrangements that ensure continuity can results accumulate and long-term mechanisms emerge.

At the same time, Shanghai faces several structural barriers. **External uncertainty exerts pressure on the continuity of cooperation.** As an open gateway city, Shanghai must continually manage geopolitical risk when convening global resources, lest volatility undermine collaboration and weaken the durability of influence. **Rule alignment and local translation pose a dual challenge,** especially in financial-infrastructure interconnection: as a global financial center, Shanghai must reconcile international frameworks with domestic market characteristics and translate them into operational standards suitable for China's derivatives markets, avoiding execution gaps arising from institutional differences. The deeper obstacle is a shortage of talent capable of localizing international rules, compounded by

divergent corporate perceptions of ESG's strategic value; this dampens the conversion of "international dialogue" into "local action." **Finally, ecosystem balance and resource allocation remain uneven.** High-quality ESG talent and capital are concentrated among large enterprises and leading institutions. The high cost of international programs limits the participation of SMEs and local financial institutions, potentially widening practice disparities and weakening the city's overall collaborative momentum. Moreover, some successes rely on Shanghai's unique endowments—top-tier talent, deep capital, and mature international networks—making replication in other regions difficult and slowing the diffusion of demonstration effects.

Given the implementation barriers Shanghai faces in advancing international ESG cooperation—including external environmental uncertainty, the twin challenges of rule alignment and local translation, and structural tensions in ecosystem balance and resource allocation—multiple dimensions of action can be explored to propel cooperation to a higher level.

I. Strengthening Risk-Response Mechanisms to Stabilize the External Cooperation Environment

The first priority is to establish regularized channels for international dialogue. Building on Shanghai's existing platforms for global engagement—such as the China International Import Expo and international financial forums—dedicated ESG dialogue tracks should be created. These tracks would routinely invite government representatives, corporate leaders, and scholars from different countries and regions. Through sustained face-to-face engagement, participants can deepen mutual understanding and consensus regarding ESG concepts, rules, and practices, thereby building the trust necessary to buffer external uncertainty. The second priority is to cultivate a diversified network of international partners. Enterprises, financial institutions, and industry associations in Shanghai should be encouraged to forge broad partnerships with counterparts across regions and sectors worldwide so that cooperation resources do not become overly concentrated in any single geography or field.

II. Deepening Rule Convergence and Advancing Local Translation

Professional third-party institutions can serve as bridges in the deeper alignment and

localization of rules. Firms with both international perspective and local experience—such as accounting networks, consultancies, and rating agencies—should be supported to participate substantively in connecting international ESG rules with domestic practice. Leveraging their strengths in standard interpretation, data processing, and process optimization, they can deliver tailored services that help enterprises grasp the core requirements of international rules and adapt them to their own operational contexts. For example, beginning 1 July 2025, Prestige and Fortune Fintech, as an independent third-party service organization, became the first GRI-authorized global software and tools partner in mainland China. This milestone indicates that China's professional sustainability-services community is entering the core application ecosystem of international standards. It enables companies to comply with international norms while efficiently completing ESG disclosures that meet domestic regulatory requirements, thus closing gaps between international rules and local practice. In addition, professional third-party institutions should be encouraged to collaborate with universities and research bodies on localization studies of international ESG rules, producing targeted research reports and operational guidance. Through industry seminars and case-sharing sessions, these outputs can disseminate methods and experience for rule translation, accelerating the grounding of international frameworks within domestic enterprises.

III. Optimizing Resource Allocation in the ESG Ecosystem

Two lines of effort can enhance resource allocation. The first is to construct a tiered and categorized support system. Government agencies and industry associations can differentiate management and support according to firm size, development stage, and ESG maturity. For SMEs and local financial institutions, dedicated support funds could lower the cost barriers to participation in international ESG training and study programmes. At the same time, an online ESG resource-sharing platform could consolidate frontier insights, success cases, and training materials for SME use, thereby promoting a more balanced distribution of resources. The second is to standardize and replicate successful practices. Shanghai's proven ESG models can be codified into templates and guidelines. When promoting these models in other regions, targeted adaptations should reflect local endowments and industrial characteristics. Experience-sharing events and online forums can accelerate demonstration effects, improving

the generalizability and influence of Shanghai's ESG practice.

Shanghai has already formed a three-dimensional development pattern for international ESG cooperation, with a policy framework as the foundation and practical innovation as the wings, creating a pathway that combines local distinctiveness with international compatibility. The city is evolving from a "taker" of international ESG rules to a "co-builder." Looking ahead, institutional openness should serve as the engine, with standard coordination and ecosystem optimization as dual drivers, embedding ESG cooperation more deeply within global sustainability governance. Through coordinated progress in policy, markets, and talent, Shanghai can both help Chinese enterprises integrate more fully into global sustainability networks and contribute "Chinese wisdom" to global ESG governance, ultimately advancing toward the role of an "ESG ecosystem leader."

Chapter 8 The Current State of ESG Practices of Shanghai's Foreign-Related Enterprises

Against the backdrop of an accelerating global march toward carbon neutrality and the rising salience of green trade barriers, Shanghai—China's front line for high-level opening-up—has become a core arena in which Chinese and international firms explore ESG practice. Multinational enterprises such as Bosch, Siemens, Apple, Sony, and Danone are advancing technological innovation and localizing standards to adapt international ESG frameworks to the Chinese market, thereby building sustainable development systems that span R&D, manufacturing, and supply chains. In parallel, Chinese companies represented by Baowu Group and Envision Group are leveraging digital tools and supply-chain collaboration to "export" green capabilities while addressing international compliance challenges.

These practices demonstrate the global trend of ESG evolving from a compliance obligation into a source of core competitiveness. Centered on Shanghai, they are coalescing into replicable and scalable transformation models that blend local characteristics with a global outlook, offering a "China solution" for the world's net-zero transition.

Section I: ESG Practice Cases among Foreign-Invested Enterprises in Shanghai

I. Innovative Practices and Measures: Building a Full-Value-Chain ESG Closed Loop

The ESG practices of Bosch China, Siemens (China), Apple, Danone, and Sony exhibit systematic, full-value-chain innovation. Core measures focus on technology-driven circularity, digital enablement for energy-and-carbon management, and the localized implementation of international standards in Shanghai, together forming a closed loop for sustainability across the entire value chain.

All **Bosch** plants in Shanghai have achieved carbon neutrality in their operations, and purchased electricity is now covered 100 percent by green power. Building on this, the company is enhancing product sustainability across the full life cycle and follows a waste-

management hierarchy of “avoid generation, reuse, and then treatment.” By combining an intelligent internal closed-loop manufacturing system with external professional recycling networks, Bosch continuously raises resource-circulation efficiency. In material regeneration and innovation, Bosch China has developed precise proprietary formulations and process optimizations to incorporate high-performance recycled flame-retardant materials into Bosch water-heater products; compared with virgin materials, this reduces carbon emissions by more than 45 percent. In parallel, Bosch is advancing digitalization by deploying an intelligent closed loop for waste in production, enabling real-time tracking of solid, liquid, and gaseous wastes and using big-data analytics to improve recognition and utilization of renewable materials, while exploring innovative business models that valorize production residues.

Under its global “DEGREE” sustainability framework, **Siemens** launched the “Zero-Carbon Pioneer” initiative in China, using technological innovation and cross-domain expertise to co-create a green ecosystem with partners, empower end-to-end zero-carbon industrial chains, and support China’s dual-carbon goals. The program has produced notable results. In enabling customers’ low-carbon transitions, Siemens aims to help more than 10,000 clients in China achieve energy-saving and efficiency gains by 2025. In decarbonizing its own operations, eleven Siemens plants have been recognized by the Ministry of Industry and Information Technology as national-level Green Factories; one plant has been named a “Sustainability Lighthouse” by the World Economic Forum; and three plants have received TÜV SÜD “carbon-neutral achievement verification statements.” Eighteen operating companies and five offices in China are fully connected to Siemens’ global energy-management system for real-time monitoring. In sustainable supply chains, Siemens has helped more than 500 key suppliers in China accelerate decarbonization and has established a carbon-reduction information-management system covering nearly 7,000 suppliers. The company has run an annual “supplier sustainability training month” for three consecutive years, with roughly 3,000 total participants, and uses green digital-twin tools to improve transparency in product carbon footprints among strategic suppliers while offering reduction recommendations.

Apple is committed to managing its overall carbon footprint and driving deep decarbonization across its entire value chain. On materials innovation, Apple continues to use

100 percent recycled aluminum in enclosures for multiple products, cutting aluminum-related emissions by 76 percent versus 2015 and reducing aluminum's share of manufacturing-related emissions from 27 percent to below 7 percent. Based on a comprehensive assessment of environmental, social, and supply-chain impacts, Apple has prioritized 15 materials and, following its standards for recycled and renewable inputs, is building a circular supply chain. In products shipped in 2024, 24 percent of materials came from recycled or renewable sources. On clean energy, Apple has achieved 100 percent clean electricity across its operations and actively supports suppliers in switching to renewables. In 2024, Apple's Clean Energy Academy trained nearly 300 suppliers in China on green-power procurement. In 2025, Apple launched a second China Clean Energy Fund to support renewable-energy development in the country.

Danone's ESG practice in Shanghai centers on deep integration between global strategy and local innovation. In 2020, the company invested EUR 100 million to establish the Open Science Research Center for Life Nutrition in Shanghai, focusing on human milk and gut-health research and directly aligning with the "Healthy China 2030" strategy—closely linking nutrition innovation to the social dimension of ESG. In manufacturing, Danone plants reduce Scope 1 and 2 emissions via high-efficiency steam recovery, photovoltaic generation, and cold-chain energy-saving retrofits; in packaging and logistics, lightweighting and low-carbon transport significantly cut supply-chain emissions. In governance tools, Danone advances B Corp certification, with its Early Life Nutrition (ELN) unit certified in 2020 with a score of 88.2 (above the 80-point threshold), Danone China Beverages (DWC) certified in 2021 with 94.4, and the Adult Medical Nutrition (AMN) business certified in 2022 with 96.9. Rather than a "one-size-fits-all" approach, Danone uses a continuous-improvement mechanism to motivate business units to enhance employee well-being, community engagement, and environmental performance.

Sony has long pursued its mission of "moving people through the power of technology and creativity," extending technological innovation beyond consumer electronics into environmental domains. Synecoculture™—a core Sony innovation—seeks to reconstruct ecosystems through the high-density mixed cultivation of hundreds of plant species that

harness plants' self-organizing capacities ("expansion ecology") to achieve pesticide-free, fertilizer-free, and tillage-free ecological agriculture. In 2023, Sony worked with Xinhua Subdistrict in Changning District to build a community garden that embeds Synecoculture™ into the city's "15-minute community life circle" planning, cutting landscaping costs through "no pesticides, low maintenance" while boosting resident participation. Technically, Sony is exploring the use of Synecoculture™ for carbon-sink certification (e.g., greening deserts to sequester carbon) and introducing the approach to suppliers; it is also developing applications to high-nutrition crops such as Chinese medicinal herbs and tea. For example, the technique increases allelochemical content in green tea; its deployment at an eldercare center in Hachioji, Tokyo, has yielded preliminary improvements in seniors' physical and cognitive performance, suggesting potential solutions for Shanghai's aging society. Synecoculture™ has also been brought into the Yuyuan Elderly Care Center in Huangpu District, providing a green activity space for older residents.

II. Drivers and Thematic Responses: A Triple Engine of Policy Compliance, Market Transition, and Supply-Chain Resilience

The primary drivers behind foreign enterprises' ESG practices are the tightening of global policy regimes, the upgrading of green preferences on the demand side, and the need to manage supply-chain risk. The corresponding responses concentrate on localized compliance, technological adaptation, and value-chain collaboration.

Bosch China's ESG advancement is propelled by a dual impetus from international environmental regulation and China's domestic environmental policy. Committed to applying standards that exceed formal requirements, Bosch has built an intelligent waste-management system designed to meet the EU Waste Framework Directive, enabling precise tracking of multiple waste streams. In parallel, China's "Zero-Waste City" pilot policy has encouraged Bosch to develop production-side closed-loop systems in its Chinese plants, materially reducing input purchases; optimized packaging design and digitalized oversight have further lowered materials losses. On the market front, rising consumer preference for environmentally friendly products has pushed Bosch to expand the use of recycled plastics in manufacturing, with meaningful emissions-reduction gains anticipated.

Siemens is addressing the challenge of localizing international ESG standards. In the face of pressure from the EU Carbon Border Adjustment Mechanism, Siemens released its EcoTech product declaration, which not only highlights green performance across the full product life cycle but also emphasizes transparency and multi-dimensional evaluation—both directly relevant to Chinese firms navigating green barriers such as "carbon tariffs" and ecolabel certifications. By fiscal year 2024, more than 25,000 Siemens products globally had obtained EcoTech declarations. Siemens also provides a suite of solutions for Chinese firms "going global." Through the X-CarbonTrace (X-CT) carbon-footprint ecosystem solution, for example, it enables data exchange among outbound firms, their upstream and downstream partners, and third-party verifiers, thereby improving the authenticity, accuracy, and broad acceptance of emissions data, achieving full-chain carbon-footprint transparency and more efficient value-chain coordination, and strengthening green competitive advantage. Leveraging AI, Siemens' Smart ECX energy-and-carbon management platform and the "Smart Cooling Cube" AI Box support energy saving and decarbonization in data centers, industrial parks, and logistics warehousing. In supply-chain governance, the Siemens Supply Chain Management function, operating under the global DEGREE framework, has clarified two strategic thrusts—"compliance assurance for sustainability" and "sustainability performance." Sustainability requirements are embedded in supplier selection and procurement decisions, with CO_2 reduction treated as a core assessment focus. Siemens deploys its own resources to help suppliers save energy and cut emissions, enhance their sustainability capabilities, and collectively advance the "Zero-Carbon Pioneer" commitment.

Apple's ESG practice focuses on climate responsibility and the construction of supply-chain resilience. Its 2030 carbon-neutral target adheres closely to international climate agreements, driving the implementation in China of materials-innovation initiatives that prioritize key materials and significantly reduce product footprints through circular use. In tandem, large-scale investments in renewable energy and supplier capability-building programs help Chinese supply-chain partners upgrade green-manufacturing performance and jointly address value-chain emissions.

Danone's ESG actions reflect dual drivers of global compliance and domestic policy. The

group has set 2030 reduction targets—Scope 1 and 2 by 46.3 percent and non-FLAG Scope 3 by 42 percent—and links 20 percent of executive remuneration to ESG performance, pressing the Shanghai team to implement concrete abatement measures. To navigate EU carbon barriers and China's "dual-carbon" goals, Shanghai-based R&D collaborates with local dairy suppliers to optimize feed and manure management, curbing methane emissions along the chain; a green-procurement policy requires suppliers to observe environmental and labor standards, thereby reinforcing supply-chain resilience. On the health agenda, the Shanghai research center integrates business innovation with public-health objectives, addressing the food industry's longstanding challenge of aligning "nutrition" with "sustainability."

Sony's ESG practice contributes not only to sustainable agriculture but also to the global agenda of healthy aging. The high-diversity, high-density planting model of Synecoculture™ directly mitigates biodiversity loss and pollution associated with chemical agriculture. Its introduction into Shanghai communities advances urban decarbonization and greening while enhancing the resilience of community infrastructure. In the health domain, Sony's R&D teams have piloted Synecoculture™ in Japan to create diverse living environments that help reduce inflammation and proactively support Alzheimer's prevention; as a form of "horticultural therapy," it can lower medical and long-term-care expenditures, closely aligning with China's strategy for healthy aging. In building supply-chain resilience, Sony is partnering with pharmaceutical companies in Bozhou, Anhui, to establish ecological cultivation pilots for traditional Chinese medicinal plants, promoting greener production, addressing food and drug safety concerns, and helping to ease the decarbonization burden within agricultural supply chains.

III. Insights and Transferable Value: Digital Tools, Ecosystem Collaboration, and Standardized Outputs

Bosch China's innovative practice underscores the broad-based value of digital management tools in resource circularity. Its intelligent waste-management platform not only enables precise internal control over corporate waste streams, but also constitutes a standardized solution that can be exported to small and medium-sized enterprises. By using Internet-of-Things technologies to track material flows in real time and applying big-data

analytics to optimize recovery efficiency, this lightweight digital tool effectively lowers the implementation threshold for SMEs undertaking ESG initiatives.

Siemens' practice demonstrates leading capability in deeply integrating international standards with local needs. Using its Chinese plants as pilot grounds, Siemens aligns advanced global green-manufacturing concepts with China's "dual-carbon" objectives and deploys its own portfolio of digital and intelligent products and solutions to drive intelligent, fine-grained factory management. At the ecosystem level, Siemens formally launched the open digital business platform Siemens Xcelerator in 2022 to help enterprises of different industries and scales accelerate digital transformation, reduce transition complexity, and support scaled implementation. Integrating a curated digital offering, an open partner ecosystem, and continuously updated online services, the platform delivers three core values to clients: convenience, flexibility, and openness.

Apple's case illustrates the collaborative value of systematically empowering the supply chain. Its Clean Energy Academy goes beyond theory to provide highly practical implementation playbooks for green-power procurement and carbon management, a "knowledge transfer + tool enablement" model that enabled nearly 300 Chinese suppliers to markedly improve ESG management capabilities within a year. Through the China Clean Energy Fund's innovative investment structure, Apple offers supply-chain firms a low-cost pathway to participate in renewable-energy projects, thereby addressing the financing bottlenecks SMEs face in green-power transitions. Its materials-management methodology—especially the material prioritization mechanism and standards for recycled-material adoption—provides a directly applicable emissions-reduction framework for the consumer-electronics sector.

Danone's core contribution lies in a replicable model that couples "institutionalized incentives" with "localized innovation." The B Corp certification mechanism supplies business units with differing starting points a graduated pathway for improvement, avoiding the pitfalls of rigid, compliance-only targets—an approach particularly suitable for diversified enterprises. In Shanghai, the integration of health-nutrition R&D with decarbonization practices exemplifies deep alignment between ESG and core business strategy. Danone's supply-chain

strategy—training and supporting suppliers to meet targets (for example, deploying low-carbon technologies)—is transferable across fast-moving consumer goods, addressing the common challenge of weak "anchor-firm pull." Moreover, by opening its playbooks (such as water-resource management practices), Danone catalyzes the formation of regional ESG ecosystems and highlights the "demonstration window" function of foreign-invested enterprises.

Sony's Synecoculture™ offers a transferable framework of "ecological technology – community empowerment – industrial collaboration." Community gardens in Shanghai verify the technique's applicability in micro-spaces and supply new ideas for greening high-density cities, including rooftop farms and the regeneration of marginal plots. Its cross-industry collaboration model—such as partnering with Syngenta Group and Bozhou-based TCM firms on medicinal-herb cultivation—can be replicated to other regional specialty agricultures (e.g., Pu'er tea in Yunnan, wolfberry in Ningxia), fostering industrial chains that combine ecological cultivation with high value-added products. In terms of medical value, observed improvements in cognitive function point to tighter integration between eldercare institutions and community health services, forming a "cultivation – diet – health management" loop and opening innovative pathways for the silver economy.

IV. Analysis of Implementation Barriers and Obstacles: Technological Bottlenecks, Cost Pressures, and Regulatory Divergences

Although multinational enterprises have achieved notable results in ESG, implementation still encounters systemic obstacles across three main dimensions: core technological bottlenecks, economic cost pressures, and divergences in regulatory regimes and standards. These challenges not only constrain firms' own ESG execution efficiency but also pose serious difficulties for value-chain-wide transition.

Technological constraints constitute the foremost obstacle. In advanced materials circularity, Bosch is constrained by the relative immaturity of recovery technologies in the recycling market; efficient separation and regeneration of complex composite materials have yet to see a breakthrough, which depresses recovery rates for certain high-value waste streams. Bosch's production-side material closed-loop system has performed well, but it depends on specific equipment and processes that are difficult for SMEs to replicate at scale. Danone faces

similar technical challenges in supply-chain decarbonization; its initiative to valorize livestock manure requires cross-firm collaboration, while many small suppliers lack the necessary technical capacity. Sony's Synecoculture™, though innovative, demands interdisciplinary expertise to design species-mixing schemes; qualified talent is scarce and time-consuming to train. Once project areas exceed five hectares, management complexity rises sharply and labor costs escalate. Siemens' X-CarbonTrace carbon-footprint ecosystem likewise presupposes robust data-collection capabilities and a solid digital foundation. For many SME suppliers, IoT deployment and data-processing capabilities remain underdeveloped, which reveals both a constraint and an opportunity to accelerate ecosystem-wide digital capacity building.

Cost pressure is the most immediate challenge. Bosch's intelligent waste-management system requires significant upfront investment in sensor deployment, platform development, and ongoing operations and maintenance—burdensome for SMEs that already operate with thin margins. Danone faces green-power premiums and capex for equipment retrofits that elevate operating costs, while many suppliers have no dedicated ESG budgets, compounding financing constraints. Siemens' work with suppliers on carbon management shows that some SMEs allocate limited funds to ESG and are concerned about long payback periods, which dampens participation incentives.

Divergent regulations and standards generate substantial compliance frictions. A salient issue is the interface between international standards and domestic certification systems. In practice, Siemens observes methodological differences between international carbon-accounting standards and China's current accounting guidance, forcing firms to recalculate and re-verify the same datasets to meet both sets of requirements and thereby increasing procedural complexity. Apple encounters heterogeneous certification standards for recycled materials across markets, such that a single product may need to satisfy multiple regimes. Local policy constraints also impede implementation; in some regions, grid-connection approvals for distributed PV projects are restrictive, slowing the rollout of green-power initiatives. In scaling circular-economy models, Bosch finds that national standards for key parameters of recycled inputs—such as purity and composition—are not yet established, with inevitable implications for product stability. Danone likewise confronts incompatibilities between international

carbon-accounting standards and domestic guidelines, for example divergent Scope 3 boundary definitions that trigger redundant verification, while the lack of a unified certification system for recycled materials materially raises compliance complexity. Sony faces inadequate policy support: ecological agriculture lacks dedicated subsidies, carbon-sink certification pathways are not fully open, and premium products confront constrained market channels, all of which hinder commercialization.

V. Pathways to Breakthrough and Implementation Recommendations: Cost-Reducing Technologies, Financial Innovation, and Policy Coordination

Overcoming common obstacles in multinational ESG practice calls for an integrated "technology–finance–policy" solution set. **On the technology front**, an industry-level technology-sharing platform should be established, with leading enterprises opening core technologies and solution blueprints. Bosch, for example, could drive the standardization of materials-recycling processes and the miniaturization of equipment, thereby lowering replication costs through technology transfer. Joint R&D alliances should be formed to tackle shared technical challenges such as the recycling of composite materials and high-precision product carbon accounting.

In financial support, innovative green-finance instruments are needed to relieve cost pressures. Supply-chain green finance should be developed whereby anchor firms provide guarantees or interest subsidies to help SMEs secure funding for low-carbon retrofits. ESG-linked lending products can be explored to connect borrowing rates with verifiable ESG performance, alongside mechanisms such as emissions-allowance–backed collateralized financing. Shanghai can take the lead in piloting an ESG transition fund to provide SMEs with low-cost capital.

Policy coordination is the crucial lever. Shanghai should pilot mutual recognition and conversion mechanisms between EU carbon-accounting standards and Chinese standards to reduce duplicative calculations. Cross-border mutual recognition of green-power consumption should be pursued so that Chinese green-electricity usage can be incorporated into international carbon-footprint accounting. The circular-economy policy framework needs to be strengthened with clear market-access rules and technical specifications for recycled materials. Through

government–enterprise collaboration, ESG transition demonstration zones can be established to furnish practical platforms and evidence bases for institutional innovation.

Section II: Chinese Enterprises' Overseas ESG Practice Exploration

I. Innovative Practices and Core Measures: Digital Enablement and Value-Chain Collaboration

Chinese enterprises' ESG innovations are characterized by a clear combination of digital tools and industry-chain collaboration. The **EPD Platform for the Entire Steel Value Chain** has built the first environmental product declaration system for the industrial sector, while **Envision Group** has developed an AIoT-based carbon-management system to deliver intelligent abatement. Both organizations use digitalization as the primary lever, embedding environmental governance deeply into core industrial processes and forming replicable, scalable models.

The EPD Platform for the Entire Steel Value Chain represents a breakthrough for China's industrial ecosystem. It establishes a standardized workflow covering user registration, data verification, and report release. The platform extends product category rules (PCRs) from steel into upstream domains such as coal and metal recycling, builds a proprietary LCA database and algorithmic toolkit, and—through mutual recognition with systems in Sweden, Italy, and other countries—helps firms address the EU Carbon Border Adjustment Mechanism (CBAM). As a non-profit infrastructure, it has become a foundational vehicle for elevating China's international voice in green standards.

AIoT carbon-management system captures global energy-use data in real time via IoT devices and integrates multi-source information using natural-language processing. On the factory floor it enables green-power dispatch and process optimization, reducing emissions intensity at the Shanghai base by 30%–50%; on the supply-chain side it builds carbon ledgers for partners and automatically generates reports aligned with European and U.S. requirements. By turning traditional carbon accounting into a dynamic decision engine, the system offers process-optimization pathways for battery suppliers and others, creating a closed-loop data ecosystem from manufacturing to the customer interface.

II. Drivers and Thematic Responses: Dual Impulses of Policy Compliance and Industrial Transformation

Chinese enterprises are propelled by two reinforcing forces: external compliance pressure

from policies such as the EU's CBAM and CSRD, and internal momentum from China's dual-carbon goals and industrial upgrading. The two organizations convert constraints into opportunities through differentiated strategies addressing carbon tariffs, supply-chain transparency, and circular economy.

The EPD Platform for the Entire Steel Value Chain directly targets international carbon-tariff challenges. With steel included within CBAM's scope, the platform supplies internationally aligned carbon-footprint tools that mitigate trade barriers. It has developed fifteen PCRs spanning the steel value chain and secured mutual recognition with the Swedish Environmental Management Council, thereby facilitating international acceptance of Chinese firms' carbon data. Beyond lowering costs for any single firm, it creates a low-cost compliance pathway for the entire industry. To date, thirty EPD reports have been completed, covering leading groups such as Baowu and Ansteel.

AIoT carbon-management system focuses on the problem of supply-chain carbon management. In response to CSRD's emphasis on Scope 3 disclosure, the system equips suppliers with end-to-end digital tools, automating the full process from data capture to report generation. At the Shanghai base, real-time monitoring across more than two hundred energy-use nodes pinpoints hotspots and has delivered annual emissions reductions of roughly 23,000 tonnes. An embedded EU carbon-tariff calculator allows firms to estimate compliance costs; forty-seven suppliers have used this feature, materially reducing cross-border trade risk.

III. Insights and Transferable Value: Standardization, Digitalization, and Collaborative Enablement

Chinese enterprises offer replicable solutions for sectoral upgrading, with core value in three dimensions: building standardized systems, democratizing digital tools, and catalyzing industry-chain collaboration. The steel value-chain EPD Platform lowers compliance costs through internationally recognized standards, while Envision's AIoT system provides a lightweight pathway to carbon-management capability.

The EPD Platform for the Entire Steel Value Chain standardized architecture has clear cross-industry applicability. Its fifteen product-level carbon-footprint rules not only serve steel but can be adapted to other high-emissions sectors such as non-ferrous metals and building

materials. The platform's mutual-recognition arrangements with international standards save domestic enterprises over RMB 2 million per year, on average, in certification costs. Its operating model—government guidance, industry leadership, and enterprise participation—has begun to scale into cement and is expected to lower sector-wide decarbonization costs by roughly 30 percent. This standardized approach provides a feasible, low-cost response to international carbon barriers across traditional industries.

AIoT carbon-management system demonstrates the inclusive potential of digital tools. Through modular design, SMEs can onboard the platform with only basic IoT deployment, dramatically reducing initial investment. Automated report generation compresses tasks that once took two weeks into a single day, and forty-seven small and medium-sized suppliers have already adopted the system. This lightweight deployment model offers a practical, affordable digital solution to the common SME hurdles of reluctance, capability gaps, and budget constraints.

IV. Analysis of Implementation Barriers and Obstacles: Technical Bottlenecks and Coordination Challenges

Chinese enterprises face systemic obstacles in four areas: divergences in technical standards, weak data foundations, difficulties in industry-chain coordination, and cost pressures. These challenges not only diminish firm-level implementation efficiency but also constrain the value chain's overall green transition.

For **the EPD Platform for the Entire Steel Value Chain**, international mutual recognition remains a hurdle. Although it has an agreement with the Swedish Environmental Management Council, methodological differences in carbon-footprint accounting persist across jurisdictions, forcing firms to duplicate verification and calculations. For example, EU practices for Scope 3 differ significantly from current Chinese guidance, compelling exporters to maintain parallel carbon-management systems with higher operating and compliance costs. Moreover, SMEs often lack trained carbon-management professionals, slowing mastery of complex accounting protocols and impeding platform penetration.

AIoT carbon-management system encounters data-quality and connectivity issues. Many small suppliers lack robust metering at critical process steps, resulting in incomplete or

inaccurate data. Integration also reveals heterogeneous data formats and transmission protocols, necessitating resource-intensive custom development. Data-security concerns further constrain sharing of core production information, creating breaks in carbon-footprint traceability along the chain. These barriers limit end-to-end carbon-flow visibility and undermine the precision of abatement strategies.

V. Pathways to Breakthrough and Implementation Recommendations: Building a Collaborative ESG Co-Governance Ecosystem

Overcoming current systemic constraints requires a multi-level solution built on government guidance, enterprise leadership, and industry collaboration. The priorities are to create standardized public-service platforms to lower compliance costs, pilot policy innovations to resolve institutional bottlenecks, develop green-finance instruments to ease funding pressures, and strengthen talent development to enhance execution capacity—together forming a durable mechanism for sustainable progress.

At the level of technical standards, a national public platform for carbon-footprint accounting should be established to integrate existing EPD resources and provide unified methodologies and data standards. The platform ought to prioritise SME-oriented modules, including standardized data-capture tools and automated report generation, to reduce adoption barriers. International alignment should be deepened by promoting mutual recognition between Chinese and European methodologies, thereby cutting duplicative accounting costs. The cooperation model pioneered by the steel value-chain EPD Platform and the Swedish Environmental Management Council can be extended to additional sectors.

On policy coordination, pilot programmes should be launched in advanced manufacturing clusters such as the Yangtze River Delta to build regional carbon-data sharing mechanisms. By setting exchange standards and robust security safeguards, these pilots can resolve corporate data-sharing frictions. The green-power tracking and certification system should be strengthened, and international recognition of Chinese green-power consumption should be pursued within global footprint accounting.

On financing, innovative green-finance models are needed. Supply-chain green finance—anchored by core enterprises offering guarantees for upstream and downstream partners—can

unlock funding for abatement projects. An ESG transition fund should subsidise SMEs' investment in digital carbon-management equipment. "Carbon-efficiency loans," which link lending rates to verified improvements in carbon intensity, can be promoted. Large enterprises should embed ESG performance in supplier selection to create market-based incentives and accelerate ecosystem-wide upgrading.

Chapter 9 Action Recommendations

Building on the preceding analysis of the current state and optimization pathways of ESG practice among Shanghai stakeholders, this chapter proposes a systematic set of recommendations to further advance ESG development in the city. The recommendations revolve around a "Fourfold ESG Framework," namely the internalization of ESG within business operations, the standardization of ESG information disclosure, the systematization of ESG evaluation frameworks, and the materialization of ESG value creation. The intent is to translate analytical insights into actionable strategies by forming a closed loop in which concepts, data, evaluation, and value reinforce one another, while enhancing the coherence and implementability of actions through multi-stakeholder collaboration.

The Fourfold ESG Framework constitutes a mutually reinforcing cycle. **Internalization of ESG within business operations** provides the practical foundation and supplies authentic, traceable data for disclosure. **Standardization of information disclosure** converts these practice outcomes into transparent, comparable, and reliable decision-useful information for financial institutions, regulators, and markets, and—through feedback mechanisms—promotes continuous improvement in corporate governance and operational processes. **Systematization of evaluation frameworks** uses quantitative indicators and performance feedback to assess corporate ESG performance, inform improvements to internalization efforts, and guide financial institutions in optimizing investment strategies and regulators in calibrating oversight, thereby creating healthy market incentives. **Materialization of ESG value creation** translates concepts, disclosure, and evaluation into tangible economic, social, and ecological benefits, providing positive incentives for internalization while also testing the effectiveness of disclosure and evaluation systems.

Within this architecture, **government and regulatory departments** assume a coordinating and guiding role: clarifying ESG red lines and development directions through legislation and policy, and thereby providing a clear compliance framework; advancing the construction of standards and evaluation systems while strengthening international alignment and enhancing transparency; creating environments in which incentives and constraints operate

in tandem by combining fiscal support, green-finance preferences, and supervisory accountability; and building collaborative platforms that facilitate interaction among stakeholders and foster social consensus.

In terms of key actions by stakeholder groups, **enterprises** should embed ESG concepts in routine management and decision-making through internal governance, strategic planning, and operational practices, effecting a transition from mere compliance to endogenous motivation. **Financial institutions and market infrastructures** should provide capital, instruments, and market-oriented support so that corporate actions are directly linked to economic incentives. **Third-party organizations** should, through standardized services, professional training, and evaluation tools, enhance the executability and replicability of ESG practices across stakeholders. **The public awareness building system**—via curricula and training, public communication, and mass-participation activities such as sports events—should deepen social internalization of ESG concepts, enabling the public to form an intrinsic sense of ESG responsibility through practice. International cooperation should introduce advanced global experience and standards, supplying tools for local implementation, facilitating rule alignment, and enabling cross-border benchmarking.

Through this systematized approach to ESG practice, the objectives of the Fourfold Framework can be realized not only within individual stakeholders but also across stakeholder interfaces, forming a closed loop in which concepts, data, evaluation, and value creation are mutually supportive. This will help Shanghai establish a demonstrable and replicable ESG practice system that underpins urban sustainable development and enhances the city's voice and leadership in global ESG governance.

Section I: Internalization of ESG within Business Operations

The core objective of internalization is to transform environmental, social, and governance precepts from external pressures into endogenous organizational drivers, such that ESG not only satisfies compliance requirements but becomes a central mechanism propelling strategy, management, and business development. Achieving this objective requires each stakeholder to embed ESG principles into its own actions and to ensure, through cross-stakeholder

collaboration, sustained and deep implementation across the broader ecosystem. Enterprises integrate ESG into strategy and business processes; financial institutions and market infrastructures bake ESG into rule-making, risk management, and investment decisions; government and regulators provide institutional and policy scaffolding; third-party organizations and industry associations deliver professional guidance and capacity building; education, media, and public-participation systems cultivate societal recognition at the level of values; and international cooperation brings in mature approaches and rule alignment. This networked collaboration not only enhances each stakeholder's capabilities but also ensures that ESG is internalized at a systemic level, effecting a robust shift from concept to conduct.

For enterprises, the key is to construct internal ESG governance and coordination mechanisms. ESG should be integrated into board decision-making, with a dedicated committee or as a standing agenda of the strategy committee, thereby anchoring senior-level understanding and resource commitment. Cross-functional ESG working groups should embed performance indicators in technology, production, and human resources so that metrics such as decarbonization, employee safety, and social contribution are linked to business outcomes, turning ESG from a cost center into an efficiency engine. Through clear accountability and long-term incentive mechanisms, firms can align behavior at every organizational level with ESG targets and generate endogenous momentum. Resource integration can proceed in stages: start-ups may draw on university technology networks to reduce R&D costs; growth-stage firms can accelerate market validation via industry partnerships; and mature enterprises can take the lead in building ESG certification networks, creating demonstration effects and leveraging industrial-park ecosystems to lower adoption barriers for SMEs.

Financial institutions guide corporate behavior by embedding ESG in the core logic of credit, investment, and insurance underwriting. They should strengthen data foundations, expand multi-dimensional ESG data sources, and apply big data, artificial intelligence, and blockchain to enhance data processing and use. ESG information must be integrated deeply into risk assessment, loan approval, and investment decision workflows. On product innovation, institutions should design tailored ESG financial products for different enterprise types—such as green bonds, asset-light green credit, and sustainability-linked bonds or loans—and provide

value-added services such as carbon-asset management, green certification, and technical advisory, so that financial intermediation itself becomes a lever for ESG internalization.

Market infrastructures contribute primarily through institution- and capability-building. By refining listing reviews and disclosure requirements and embedding ESG standards into equity financing, bond issuance, and index construction, they generate market-based, institutional incentives for firms. Unified data platforms that integrate emissions, supply-chain, and governance information can reduce participation costs for SMEs. Innovative instruments—such as ESG-themed ETFs and products linked to carbon price indices—create market-oriented endogenous incentives that encourage companies to practice ESG proactively in their financing and trading behaviors.

Third-party organizations support internalization through advisory services, standardized practice guides, and professional training. They should develop differentiated service offerings and technical tools to help firms build internal systems for data collection, analysis, and reporting. Through industry self-regulatory codes, alliances, and certification schemes, they can guide stakeholders toward consistent practice standards and enable replicable execution models for enterprises and financial institutions.

The public awareness building system internalizes ESG values at the societal level by elevating public and practitioner understanding. Educational institutions can deploy modular curricula, interdisciplinary training, and university-industry collaboration to embed ESG in talent development. Media can disseminate ESG values through diverse formats, interactive programming, and public-engagement activities, translating corporate and societal practices into broader recognition. The sports sector can connect everyday behaviors with ESG principles via green events, low-carbon venue management, and community activities, cultivating participation and buy-in and turning public opinion and habits into endogenous drivers.

International cooperation accelerates internalization by importing proven methodologies and aligning rules. Partnerships with multinational companies and international third-party institutions provide standardized tools, technical solutions, and evaluation models that domestic firms and financial institutions can adapt, while also amplifying leading local

practices abroad and strengthening Shanghai's influence in global sustainability agendas.

In sum, internalizing ESG within business operations depends on a collaborative network. Each stakeholder deepens practice within its remit; together, institutional, technological, financial, human-capital, and awareness-building supports convert concept into action. The integration of enterprise conduct, financial support, market mechanisms, professional services, awareness cultivation, and international experience ensures that ESG ceases to be a paper-based compliance requirement and instead becomes an intrinsic driver of sustainable corporate and institutional development.

Section II: Standardization of ESG Information Disclosure

The essence of disclosure standardization is to construct a unified, comparable, and credible reporting system so that environmental, social, and governance data are not only transparent but also useful for decision-making. This is not merely a set of technical requirements for corporate reporting; it is the informational foundation that enables coordinated action by markets, financial institutions, regulators, and society through transparency. Standardized disclosure allows investors, financial institutions, and the public to understand the effectiveness of ESG practices, thereby generating market incentives, while simultaneously prompting firms to improve governance, social responsibility, and environmental management on an ongoing basis. Achieving standardization requires joint effort: enterprises must provide truthful, complete data; financial institutions and market infrastructures must use the data for risk assessment and investment decisions; third-party service providers must offer evaluation tools and assurance; public awareness-building systems must enhance society's capacity to interpret and use information; and international cooperation must connect domestic practice with global norms. Through collaboration, disclosure becomes more than a report—it becomes an endogenous driver that guides behavior and improves resource allocation.

For enterprises, the first priority is to establish robust internal data-management and reporting systems. Firms should define the scope, indicator sets, and timelines for disclosure and integrate data across production, supply chain, finance, and governance to ensure traceability, verifiability, and comparability. By leveraging information systems and ERP

platforms, companies can incorporate ESG data into day-to-day management and create a closed loop spanning collection, analysis, review, and publication. Senior leadership should participate in designing disclosure policies to ensure that content both meets regulatory requirements and reflects corporate strategy and performance. Digital disclosure methods—such as blockchain or smart-contract-based approaches—can further enhance transparency and credibility.

Financial institutions enable risk identification, investment decision-making, and product design through standardized disclosure. They should develop rating frameworks, due-diligence procedures, and analytical models tailored to corporate ESG information, translating disclosures into credit assessments, portfolio optimization, and early-warning tools. Banks, asset managers, and insurers should harmonize data interfaces so that disclosed information can be ingested directly into lending, investment, underwriting, and asset-management processes, thereby incentivizing firms to produce higher-quality data. Institutions can also develop ESG indices, green-bond ratings, and portfolio tools grounded in standardized disclosures to guide market participants.

Market infrastructures bear responsibility for rulemaking, information integration, and market supervision. By unifying ESG report formats, disclosure calendars, and core indicators for listed companies, exchanges can build transparent, comparable databases for investors and regulators. Exchanges should also institute review mechanisms for completeness, accuracy, and compliance, and provide public platforms and technical tools that lower reporting costs and raise SME participation. Innovative market products—such as ESG-themed indices and green bonds—can further reinforce the market value of disclosure and create institutional incentives for compliant, high-quality reporting.

Third-party organizations supply standards, technical support, and professional assurance that are essential for implementation. Assurance providers can verify disclosed data and enhance credibility. Industry associations and standard-setting bodies can issue practical guides, evaluation models, and training curricula so that firms and financial institutions follow consistent methodologies when generating and using information. Professional service firms can build disclosure software to improve processing efficiency, reduce labor costs, and promote

standardized operations.

The public awareness building system increases the market impact of disclosure by improving information literacy. Educational institutions can offer courses and training so that corporate staff, investors, and analysts master disclosure techniques and evaluation standards. Media can translate disclosures into public knowledge and opinion pressure through expert reporting, analytical commentary, and case-based storytelling, prompting firms to sustain high-quality reporting and raising society's overall engagement with ESG issues.

International cooperation facilitates alignment with global practice and standards. By referencing frameworks such as GRI, ISSB, and TCFD, firms and financial institutions can adopt globally comparable disclosure structures that hold up in cross-border investment, international financing, and supply-chain collaboration. International experience also informs local standard optimization, from indicator design and data assurance to report formats, helping domestic practice converge toward the global frontier.

Overall, the standardization of ESG information disclosure depends on systemic coordination. Enterprises provide high-quality, comparable, and credible data; financial institutions and market infrastructures convert those data into market behavior and decision inputs; third-party organizations furnish professional safeguards; public awareness-building systems strengthen information-use capabilities; and international cooperation brings methodological alignment. Through coordinated action, standardized disclosure not only satisfies compliance but becomes an intrinsic driver of strategic optimization, efficient resource allocation, and healthy market development.

Section III: Systematization of ESG Evaluation Frameworks

The purpose of establishing a systematized ESG evaluation framework is to conduct comprehensive assessment of corporate environmental, social, and governance performance through unified, rigorous, and quantifiable indicators and methodologies. Systematized evaluation is not only about defining objective standards; more importantly, it uses comparable and traceable data to propel managerial improvement within firms, support informed decision-making by financial institutions, enable evidence-based oversight by regulators, and nurture

sound incentives in the market. Effective implementation depends on coordinated action among all stakeholders. Enterprises supply foundational data and iteratively optimize managerial practice; financial institutions and investors employ evaluation outputs for risk–return analysis; market infrastructures and third-party providers furnish ratings, indices, and assessment tools; government and regulatory agencies harmonize methods and appraisal mechanisms; public awareness-building systems deepen understanding and interpretive capacity; and international cooperation ensures alignment with leading global standards. Taken together, these efforts lift ESG performance.

Enterprises should build internal evaluation and management mechanisms that embed ESG indicator sets into strategy and operations. They need to identify key metrics for environmental impact, social responsibility, and governance performance; collect and analyze data on a regular cadence; and derive internal controls and improvement plans so that evaluation outputs faithfully reflect operating realities. By linking internal ratings to incentive structures, firms can tie ESG performance to strategic objectives, managerial appraisal, and remuneration, thereby creating persistent momentum for continuous improvement.

Financial institutions identify risks and opportunities through robust evaluation frameworks and integrate these insights into decision processes. Banks, asset managers, and insurers can apply harmonized metrics to credit assessment, risk early-warning, and portfolio optimization. Systematized evaluation enables precise estimation of the relationship between a firm's ESG performance and its financial outcomes and credit risk, furnishing the data backbone and decision basis for green finance and sustainable investment.

Market infrastructures and third-party organizations undertake data integration, standard-setting, and the publication of ratings within the evaluation system. Exchanges can provide unified ESG scoring platforms that transform disclosed corporate data into comparable indices. Independent rating agencies supply assurance, analytical tools, and methodological frameworks to keep scoring scientific and reproducible. Industry bodies and standard-setting organizations issue technical specifications, indicator guides, and training programs, lowering adoption costs for firms and financial institutions and facilitating effective use of evaluation outputs in the marketplace.

The public awareness building system amplifies the influence of the framework by improving literacy in reading and applying results. Educational institutions offer courses and training so that corporate practitioners, financial analysts, and other users can master evaluation methods and data applications. Media interpret ratings, disseminate cases, and—together with the public—exert oversight through information access and opinion formation.

International cooperation provides reference experience and standard alignment for local frameworks. By introducing international standards and models such as GRI, ISSB, and SASB, local firms and financial institutions can achieve cross-border comparability, smoother investment, and broader recognition. Global experience also informs improvements to indicator design, scoring methods, and assurance processes, enabling local systems to converge with international best practice in rigor and comparability.

In sum, systematizing ESG evaluation depends on tight inter-stakeholder collaboration: enterprises contribute authentic performance data, financial institutions and market infrastructures design methods and put results to use, third-party organizations provide scientific tools and verification, education and media enhance application capabilities, and international cooperation ensures methodological alignment. This concerted effort does more than remedy fragmented information and divergent outcomes; it turns evaluation into an endogenous mechanism that sharpens corporate strategy, guides markets, and improves the scientific allocation of resources.

Section IV: Materialization of ESG Value Creation

Materializing ESG value creation means translating ESG conduct into specific economic returns, social recognition, and ecological improvements, thereby creating durable endogenous incentives. Built upon the prior pillars—internalized operations, standardized disclosure, and systematized evaluation—this stage emphasizes the implementation of practice outcomes and the creation of measurable value. Realization reflects not only the alignment of corporate strategy with market returns but also the recognition and support of investors, consumers, and society; although such benefits typically accrue over the long term, they underpin sustainable development trajectories.

Enterprises act as direct implementers by converting ESG actions into tangible value through instruments such as carbon asset management, low-carbon technology investment, and impact-oriented capital deployment. Emissions trading and low-carbon technology upgrades generate direct economic gains and cost savings; green loans, green bonds, and sustainability-linked financing lower funding costs, optimize capital structure, and signal external market recognition. Heightened attention from investors and consumers enhances brand reputation, competitive positioning, and customer loyalty. While not instantaneous, these effects provide resilient drivers for long-term corporate sustainability.

Financial institutions function as providers of economic incentives and risk management. Through green credit, green bonds, and ESG-linked financing, they directly connect corporate ESG performance with the cost of capital, financing terms, and investment returns. Beyond capital provision, institutions guide firms toward optimized resource allocation and strategic direction. By applying carbon-asset analytics, ESG data modeling, and risk tools, they translate environmental, social, and governance value into quantifiable economic signals, tightening the linkage between practice and financial outcomes.

Market infrastructures primarily supply the mechanisms for value realization. ESG-themed indices, green bonds, and carbon-price-linked products tie corporate ESG actions to market returns, while unified data platforms and disclosure standards improve transparency and comparability. Through rule design and information integration, exchanges institutionalize incentives around disclosure and evaluation, encouraging firms to embed ESG principles in capital markets.

Third-party organizations provide methodological and standardization support that enables value capture. Through professional consulting, project appraisal, certification, and performance tracking, they quantify outcomes, verify credibility, and refine execution pathways. This builds internal capacities for monitoring and improvement, while making best practices transferable and scalable across the industry. With digital tools, implementation frameworks, and training programs, third parties help firms manage and elevate environmental, social, and governance value in a disciplined manner, thereby improving ecosystem-wide ESG performance and value creation.

The public awareness building system strengthens social cognition and public participation, converting corporate practice into enduring societal effects through education, media, and everyday activities such as sports. It fosters identification with ESG responsibility and sustained engagement, and channels that recognition into preference for the products and services of ESG-committed entities, enhancing social value and, in turn, economic returns.

International cooperation supplies cross-border experience and standard linkages that optimize strategy and execution. Collaboration with multinational enterprises and international third-party organizations delivers applicable tools, assessment models, and management methods, raising scientific rigor and effectiveness; it also supports recognition in cross-border investment, supply-chain collaboration, and international certification—important for responding to existing or prospective border tax regimes and trade constraints—thereby amplifying the international influence and value-realization capacity of ESG actions.

Through coordinated action, internal corporate practice generates value; financial and market mechanisms convert it into economic returns; third-party and societal forces ensure scientific integrity and impact; and international cooperation provides standards and experiential alignment. Together they form a multi-stakeholder ESG value-creation system that delivers measurable, durable, and market- and society-recognized outcomes.

Appendix: Glossary of Reference Terms

Full Name	Abbreviation
Carbon Border Adjustment Mechanism	CBAM
China Certified Emission Reduction	CCER
Carbon Disclosure Project	CDP
Corporate Sustainability Due Diligence Directive	CSDDD
Corporate social responsibility	CSR
Corporate Sustainability Reporting Directive	CSRD
European Sustainability Reporting Standards	ESRS
European Union Emission Trading System	EU ETS
Non-Listed Companies Share Transfer System	E-board
Formula 1	F1
Fédération Internationale de Football Association	FIFA
Global Reporting Initiative	GRI
International Emission Trading Association	IETA
International Financial Reporting Standards	IFRS
IFRS General Requirements for Disclosure of Sustainability-related Financial Information	IFRS S1
IFRS Climate-related Sustainability Disclosure Standards	IFRS S2
International Maritime Organization	IMO
International Olympic Committee	IOC
Intergovernmental Panel on Climate Change	IPCC
International Organization for Standardization	ISO
International Sustainability Standards Board	ISSB
Key Performance Indicator	KPI
Central Banks and Supervisors Network for Greening the Financial System	NGFS
National Equities Exchange and Quotations	N-board
Principles for Responsible Investment	PRI
Small and Medium Enterprises Equity Quotation System	Q-board
Retrieval-Augmented Generation	RAG
Real Estate Investment Trusts	REITs
Science Based Targets initiative	SBTi
Sustainable Development Goals	SDGs

Task Force on Climate Related Financial Disclosures	TCFD
United Nations Principles for Responsible Investment	UN PRI
United Nations Sustainable Stock Exchanges Initiative	UNSSE
Shanghai Equity Exchange	SEE
Shanghai Environment and Energy Exchange	SEEE
Shanghai Data Exchange	SDE
Shanghai Stock Exchange	SSE
Shanghai Futures Exchange	SHFE

Afterword

This report was a joint effort of the people from multiple financial institutions, enterprises, and service organizations, as well as those from Shanghai Advanced Institute of Finance (SAIF) at Shanghai Jiao Tong University. The working group was headed by Tu Guangshao, Founding Chairman of SAIF's Board, and Yan Hong, Chair Professor of Finance and Director of the Center for Sustainable Investment at SAIF.

During the compilation process, various organizations and professionals actively participated and made important contributions to different chapters. A team from Shanghai Exchange Group Co., Ltd. played a key role in drafting Chapters Two and Four. Contributors included: Shi Qiwei, Wu Lieyi, Chen Yanyan, Li Jin, Chang Zheng (SEEE), Wu Lin (Finance Headquarters), Zhang Xuelai (SEEE), Wu Duanping (SEEE), Shi Haofeng (Shanghai Headquarters), Chen Kun (SEE), Yuan Jing (SEE), Gong Xinyue (SEE), Yu Baicheng (SDE), and Jin Xi (SDE). From Orient Securities Co., Ltd., Xue Jun and Duan Yiqian made important contributions to Chapters Two and Three. A team from State Grid Yingda Carbon Asset Management (Shanghai) Co., Ltd. provided expertise for Chapters Two and Five. From Yingtou Information Technology (Shanghai) Co., Ltd. (MioTech), Huang Qiaolong, Li Li, Yuan Dongxin, Zhu Wenjie, and Jiang Mingzhao participated in drafting Chapters Two and Five, and the company also provided robust data support for the report. For Chapter Three, contributors included Liu Ling, Gu Jiong, Li Rui, and Wang Liping from Shanghai Pudong Development Bank Co., Ltd.; Zhao Zijian and Qi Xinzhou from Guotai Haitong Securities Co., Ltd.; Su Shaojun, Wang Qian, Yang Xi, and Zhang Bei from China Pacific Insurance (Group) Co., Ltd.; Huang Aobo, Ji Qing, and Lou Shengrui from Fullgoal Fund Management Co., Ltd.; and Han Xiaoyan and Song Aolin from Harvest Fund Management Co., Ltd. Ernst & Young Hua Ming LLP's Li Jing and Zhang Shengzhu, China Securities Index Co., Ltd.'s Sun Tao and Zhang Fan, and Hiways Law Firm's Fu Yubin and Qiu Yunqi jointly contributed to Chapter Five with professional support. The drafting of Chapter Six benefited from the professional contribution of Li Tao and Fan Chengcheng at the Sina Finance ESG Rating Center, as well as a team from Shanghai Juss Sports Industry Development (Group) Co., Ltd. Chapter Seven was

prepared with the participation of Wang Xiaomeng and Xin Yu from Prestige and Fortune Fintech (Beijing) Co. Ltd. The SAIF team coordinated the drafting process of this report, contributed to selected chapters, and handled the compilation and editorial work. Team members included Wu Yujun, Wang Yangzi, Lin Longzhun, Sun Yuanchi, Wang Jiayun, Shen Yifan, Qi Xing, and Zhang Rina. Professor Wang Tan and Professor CHIU Tzu-Kuan also provided guidance for certain chapters.

We express our sincere gratitude to all members of the working group for their dedication and selfless contribution, and we are deeply appreciative of the strong support from the leadership of participating organizations. We also thank the CN100 Green and Low-Carbon Supply Chain Anchor Enterprise Alliance and the Shanghai Bar Association for their important contributions to this report. Finally, the cases cited in this report were compiled from public sources and supplemented by information from relevant entities. The working group extends special thanks (in no particular order) to the following entities for their contributions of the case materials: China Baowu Steel Group Corporation Limited, SAIC Motor Corporation Limited, Shenergy (Group) Co., Ltd., Shanghai Jin Jiang International Hotels Co., Ltd., Envision Group, Apple, Siemens China, Sony China, Danone China, Bosch China and Wind.

Sustainable development and ESG practice continue to evolve and improve. As a bellwether city for China’s economic development, Shanghai plays a leading role in ESG institution building. We hope this report will serve as a reference for policymaking, industry practice, and academic research. We also welcome feedback and suggestions from all sectors of society to continually enrich and refine the Shanghai ESG Report, so that it can continually make a positive contribution to advancing Shanghai’s sustainable development.

SAIF
ThinkTank
高金智库