



# Tracking the Low-Carbon Transition of Enterprises in China

Business and Sustainability in China 2022/2023



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### Contact Information:

United Nations Development Programme in China: [communication.cn@undp.org](mailto:communication.cn@undp.org)  
PricewaterhouseCoopers China: [kerry.j.gong@en.pwc.com](mailto:kerry.j.gong@en.pwc.com)  
China Chamber of International Commerce: [lixinhe@ccoic.cn](mailto:lixinhe@ccoic.cn)



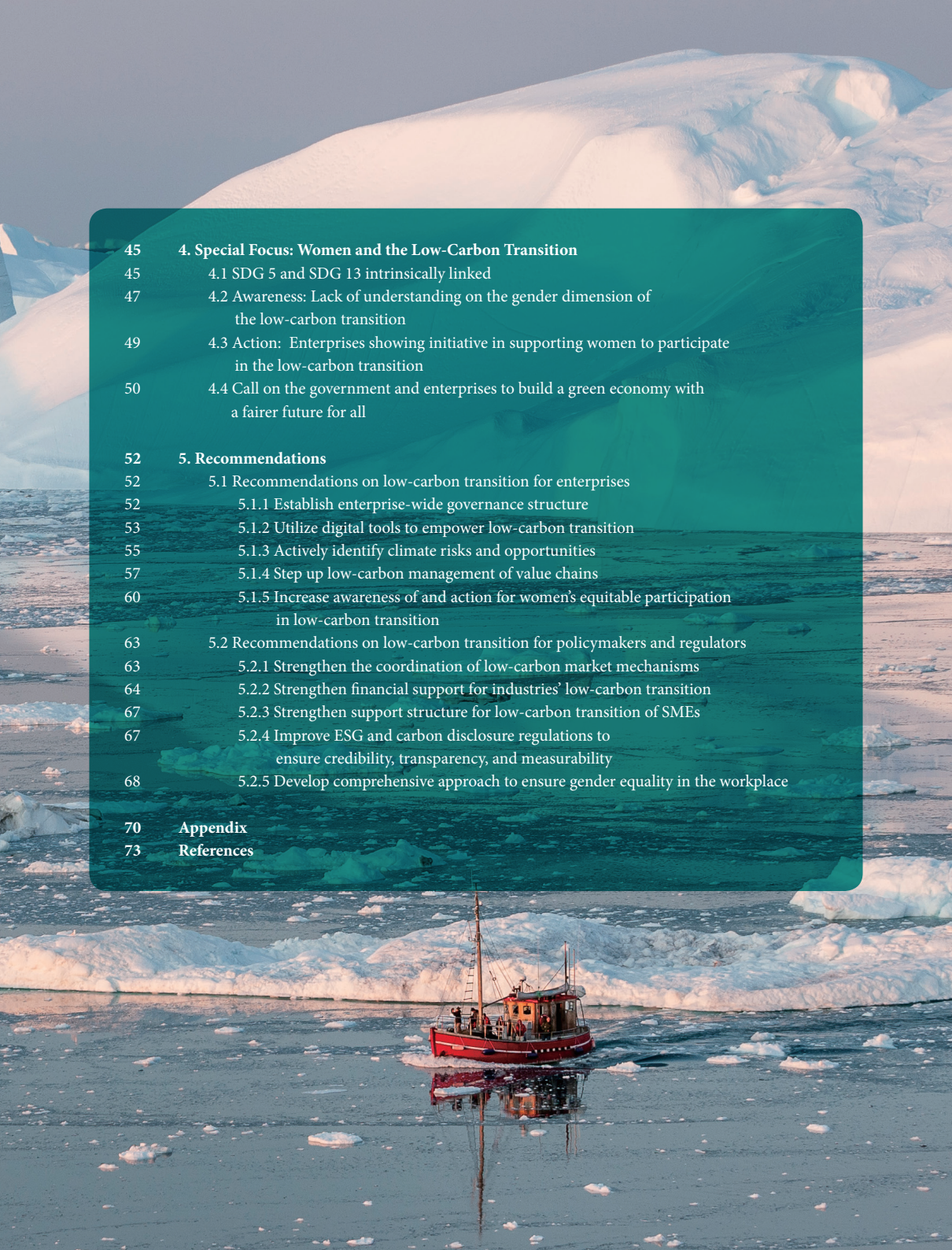




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## // Foreword

Over the past year, the world has faced a series of dire crises. The continued effects of the COVID-19 pandemic, food and energy shortages, and extreme weather events resulting from climate change, have all had devastating consequences. Economic growth, social stability, and the livelihoods of people around the world have been significantly impacted, setting back years of development progress

The natural world is also being pushed to the brink, with rapid biodiversity loss and higher levels of carbon emissions than ever before. We are on track to overshoot the 1.5 degrees Celsius Paris Agreement target by more than double – which would leave much of our planet uninhabitable.

All together, these crises have put our ability to achieve the Sustainable Development Goals (SDGs) – global goals to secure the future of both people and planet by 2030 – in serious jeopardy.

To reverse these disastrous trends and ensure a sustainable future for humanity and our planet, the actions of private sector enterprises are critical. This isn't just a moral responsibility. It also makes economic sense. Achieving the SDGs would open USD \$12 trillion of global business opportunities, and by prioritizing nature, businesses could unlock USD \$10 trillion in opportunities globally and create 395 million jobs by 2030.

Since 2020, our report series Business and Sustainability in China has looked at the contributions of enterprises in China towards achieving the SDGs based on survey data across a range of sectors. This year, the third iteration focuses in particular on enterprises' awareness of the low carbon transition and the actions they have taken towards this goal. It is encouraging to see that a majority (55.5%) of surveyed businesses are now carrying out emissions reduction measures, which indicates a growing recognition of the opportunities that SDG-oriented actions can open up.





This year's report also has a special focus on women participating in and benefitting from the low-carbon transition of enterprises. In particular, our survey examined the link between gender and climate action and looked at how aware enterprises in China are of the implications of gender equality on their carbon footprint. Indeed, the involvement of women is critical to ensure a low-carbon transition that is not just inclusive, but also as effective as possible. Research has shown that there is a direct correlation between female managers within an enterprise and a decrease in its carbon emissions.

At UNDP, we remain committed to working with the private sector to advance sustainable business. We hope that the findings and recommendations from this year's report continue to shed light on the progress, trends, and challenges of enterprises in China in aligning with the SDGs and provide insights into how businesses can further accelerate and build upon their efforts to reduce carbon footprints.

We would like to thank our partners PwC and the China Chamber of International Commerce (CCOIC) for their invaluable support in developing this joint report as part of our continued cooperation in understanding opportunities to advance sustainable, SDG-oriented business practices in China. We also want to express our appreciation to UN Global Compact whose platform was instrumental in engaging companies in this survey.

With just seven years remaining to fulfill the promise of the SDGs, time is running out. In responding to and rebuilding from the current global crises, the world is at a pivotal juncture. We have an opportunity to chart a new, more sustainable course forward, but this may very well be our last chance. To put the SDGs back on track will require transformative actions from all of society, and companies and enterprises will be critical to help lead the way.

Beate Trankmann  
UNDP Resident Representative in China





## // Foreword

Firstly, I wish to extend my heartfelt congratulations on the publication of the Survey Report on Business and Sustainability in China 2022/2023.

Green and low-carbon transformation is the surest way to achieve a global economic recovery, a key factor for the high quality development of enterprises and an important condition for achieving sustainable development. Acting on the philosophy that ‘lucid waters and lush mountains are invaluable assets’, the Chinese business community, while seeking development, is also contributing its wisdom and strength to the realization of the ‘dual carbon goals’ and global sustainable development.

Based on responses from over 200 enterprises in China, the report analyzes measures taken by enterprises towards the SDGs, climate governance and their strategic plans for a low carbon transition. It also explores opportunities and challenges faced by enterprises in a low carbon transition, with a special focus on women’s participation in the transition and the dilemmas they are faced with. In addition, the report provides important recommendations to enterprises on how to make strategic plans on sustainable development, which will help companies incorporate the SDGs into their own development strategy and decision-making, thus promoting a green transition of socio-economic development.

The business community is a contributor to and beneficiary of sustainable development, as well as a constructive force to promote green development. The China International Chamber of Commerce (CCOIC) takes serving enterprises as its mission, acting as an open window and a bridge connecting government and enterprises, China and the rest of the world, and smoothing supply and demand. The CCOIC is strengthening its service network for businesses and expanding its international circle of friends.

In recent years, by establishing cooperation mechanisms, the CCOIC has actively guided the Chinese business community to engage in international exchanges and cooperation on sustainable development to broaden cooperation channels and improve cooperation. We have established important cooperation platforms, such as the CCOIC Sustainable



Development Committee and the Sustainable Markets Initiative China Council, to deepen and broaden the Chinese business community's participation in global sustainable development. These mechanisms also provide better conditions for the business community to participate in and cooperate on low-carbon transformation and sustainable development.

In the future, we are ready to work closely with UNDP and PwC China to call on enterprises to work together on the goals of climate governance and low-carbon transformation, build more results-oriented exchange platforms, and contribute more to promoting sustainable development and building a community with a shared future for mankind.

SUN Xiao  
Secretary General  
China Chamber of International Commerce





## // Foreword

In recent years, problems such as climate change, environmental pollution, and resource scarcity continue to be increasingly prominent, bringing enormous negative impacts and unprecedented pressure to business development. It is becoming a clear responsibility for all business organizations to participate in compliance with implementing the United Nations Framework Convention on Climate Change and promoting the 2030 Agenda for Sustainable Development.

It is also a starting point for enterprises to help improve climate and environmental issues in line with their long-term interests. Indeed, enterprises are integrating green and sustainable development into business strategies as a breakthrough to solve the current crisis in enterprises and innovate the path for future growth.

Enterprises in China are increasingly aware of the importance of environmental and climate issues, and are actively participating in various environmental action plans, taking initiatives to act on environmental and social issues. Encouraged by China's proposal for the "dual carbon" goal in 2020, enterprises have actively drawn blueprints for green development and accelerated the pace of the low-carbon transition. Henceforth, in the process of promoting green development, enterprises in China are starting to comprehensively explore the economic opportunities of low-carbon economy investment, creating a driving force for innovation. Additionally, they possess increasing awareness of the trend for non-financial disclosures, including environmental, social, and governance (ESG) information.

With the vision to create sustained outcomes, PwC actively contributes to promoting and achieving the Sustainable Development Goals (SDGs). In July 2021, as one of the executive directors of the Carbon Neutral Action Alliance, PwC China made a joint commitment with other leading domestic enterprises to promote the low-carbon economy transition in China. PwC is committed to implementing its science-based emissions reduction targets aligned to the 1.5°C warming limit in the Paris Agreement. This includes a 50% absolute reduction in Scope 1 and 2 emissions and a 50% reduction in Scope 3 business travel emissions by 2030 against the 2019 baseline. PwC aims to develop decarbonization action plans relevant to



specific industry markets, assisting clients in developing science-based targets for emissions reductions that are publicly available, and shifting to lower carbon and nature-positive business models.

This year, PwC is honored to continue collaborating with UNDP China and the China Chamber of International Commerce in this third report in our series on Business and Sustainability in China. We analyzed the performance of more than 150 enterprises in China in implementing the SDGs, as well as their climate governance and strategic planning on the road to the low-carbon transition.

Meanwhile, an additional focus on SDG 5: gender equality was applied through researching and analyzing women's comprehension and participation in sustainable development and climate change. In concluding the report, recommendations are shared for low-carbon transition actions for enterprises in China. PwC is committed to continuing working with partners to support enterprises in China to implement the dual carbon goals, assisting in achieving sustainable development for society.

Qing Ni  
PwC China, ESG Markets Leader





## // Abbreviations

|                 |   |
|-----------------|---|
| CCOIC           | China Chamber of International Commerce               |
| CMA             | China Meteorological Administration                   |
| CO <sub>2</sub> | Carbon Dioxide  |
| COVID-19        | Corona Virus Disease 2019                             |
| CREEI           | Renewable Energy Engineering Institute                |
| CSR             | Corporate Social Responsibility                       |
| ECB             | European Central Bank                                 |
| EC&M            | Energy, Construction, and Mining                      |
| ESG             | Environmental, Social, and Governance                 |
| ETS             | Emissions Trading Scheme                              |
| FIE             | Foreign-Invested Enterprise                           |
| FiT             | Feed-in Tariff  |
| FYP             | Five-Year Plan  |
| GEC             | Green Energy Certificate                              |
| GHGs            | Greenhouse Gas  |
| ILO             | International Labor Organization                      |
| IPCC            | Intergovernmental Panel on Climate Change             |
| I-REC           | International Renewable Energy Certificate            |
| NDCs            | Nationally Determined Contributions                   |
| NDRC            | National Development Reform Commission                |
| POE             | Private-Owned Enterprise                              |
| PPA             | Power Purchase Agreement                              |
| PV              | Photovoltaic  |
| PwC             | PricewaterhouseCoopers                                |
| R&D             | Research and Development                              |
| REC             | Renewable Energy Certificate                          |
| RPS             | Renewable Energy Portfolio Standard                   |
| SBT             | Science-Based Target                                  |
| SDG             | Sustainable Development Goals                         |
| SME             | Small-Medium Enterprise                               |
| SOE             | State-Owned Enterprise                                |
| STAR            | Situation, Target, Action, and Result                 |
| TCFD            | Task Force on Climate-related Financial Disclosure    |
| TIGR            | Tradable Instrument for Global Renewables             |
| T&L             | Transportation and Logistics                          |
| TMT             | Technology, Media, Telecom                            |
| UN              | United Nations  |
| UNDP            | United Nations Development Programme                  |
| UNFCCC          | United Nations Framework Convention on Climate Change |
| UNGC            | United Nations Global Compact                         |
| VCM             | Voluntary Carbon Market                               |
| WEP             | Women's Empowerment Principles                        |





## // Executive Summary

This report is the third in the annual Business and Sustainability in China series produced by the United Nations Development Programme (UNDP), PwC, and the China Chamber of International Commerce (CCOIC). Since 2020, the series has examined the private sector's awareness of and contributions to achieving the Sustainable Development Goals (SDGs).

This latest iteration, based on responses to a combination of online questionnaires and in-depth interviews, provides insight and analysis on the carbon emissions reduction activities of enterprises operating in China across a range of different sectors. It also includes case studies, and recommendations on how companies can accelerate their low-carbon transitions, as well as a special focus section, looking specifically at the participation of women in this process.

### Key findings

Among the Sustainable Development Goals (SDGs) prioritized by enterprises in China this year, SDG 9: industry, innovation and infrastructure is rated as having the greatest impact on enterprises' business operations. This may indicate enterprises are shifting priorities towards infrastructure investment, sustainable industrial development, and innovation - all key elements to boost economic growth.

SDG 7: affordable and clean energy and the Partnership Goal, SDG 17, have both entered the top 5 for the first time. This could be explained by the release of more stringent climate policies and guidelines, the global energy crisis and supply chain disruption in the shadow of the COVID-19 pandemic.

In terms of the industrial sector, SDG 9 is particularly relevant for the technology, media, and telecom (TMT) sector, with 23.8% of enterprises within the sector ranking it as the top priority. Respondents from high emissions sectors have demonstrated greater focus on SDG 17 compared to other sectors, possibly reflecting the importance of cooperation with companies along the supply chain to reduce Scope 3 emissions.

A lack of internal management documents and regulatory support for implementing the SDGs have become fundamental obstacles for enterprises pursuing the SDGs.



China's promulgation of its 2030-2060 carbon peaking and neutrality goals has already made an impact on the majority of the enterprises surveyed. In particular, as many as 86.7% of respondents believe that the dual carbon goals have an impact on their operations and revenue, of which 44.5% believe the impact to be "significant". Inspired by more stringent climate policies released by the Chinese government, the importance of a low-carbon transition has been recognized at the director, managerial and executive levels in most enterprises. However, a lack of clear corporate governance structures appears to be limiting sustainable development to words rather than action, with 61.0% of surveyed enterprises stating they have included low-carbon transition in their board discussions, but only 30.3% setting carbon targets.

At a practical level, 55.5% of respondents reported carrying out emissions reduction measures. Among all the measures taken by enterprises, improving resource utilization and energy efficiency are the most common measures to reduce emissions, both of which are well aligned with China's Action Plan for Carbon Peaking before 2030. Market-based mechanisms for emissions reduction, such as green electricity certificate trading and green power trading, are less frequently adopted by enterprises. It falls to policymakers to make the existing market-based low-carbon mechanisms more effective and compelling.

Enterprises in China are gradually identifying risks and opportunities relating to a low-carbon transition, according to the TCFD framework, with the survey showing 55.5% of enterprises having already carried out exercises to identify and assess climate-related risks. Market and technological risks were selected as the top concerns by most surveyed enterprises, followed by emissions restriction policies and regulations.

Of the enterprises surveyed, 64.2% have carried out opportunity identification exercises regarding the low-carbon transition and carbon neutrality. The top three opportunities identified are: (1) improving resource efficiency to reduce costs and increase business efficiency (82.1%); (2) offering low-carbon products and/or services to adapt to shifting consumer preferences and enhance competitiveness and revenue (77.9%); and (3) clean energy replacement to reduce dependence on fossil fuels and increase diversification and cleanliness of corporate energy use (66.4%).

Common challenges and difficulties enterprises in China face in the low-carbon transformation include a lack of industry standards and guidelines, difficulties in promoting transitions along the industry value chain, insufficient carbon accounting capacity (especially for Scope 3 emissions), limited policy support and the perceived high costs associated with



the low-carbon transition. It is worth emphasizing that SMEs experience greater challenges in implementing a low-carbon transition at all levels of corporate governance.

For this report's special thematic focus on the role of women in the low-carbon transition, the survey finds that the link between gender equality and climate action has been neglected by the majority of surveyed enterprises. SDG 5: gender equality ranks sixth from the bottom in the ranking of SDGs that enterprises prioritize, and enterprises have little awareness on the gender perspectives impacting the low-carbon transition. At the executive level, the survey also shows a lack of initiatives for enterprises to encourage female employees to participate in the low-carbon transition.

## Recommendations

For enterprises, the first step to an effective low-carbon transition should be establishing a low-carbon governance structure consisting of the board of directors and relevant personnel at the managerial and executive levels. The report also advocates for enterprises to develop digital technologies to empower efficient low-carbon transitions.

Additionally, enterprises should actively identify climate risks and opportunities, and prioritize a low-carbon transition within management processes. It is also recommended that companies step up the end-to-end low-carbon management of their value chains by improving suppliers' capacities, carrying out value chain management at all stages of the product life cycle, formulating green and low-carbon standards and investing in relevant data collection and databases. All of this would help to strengthen the ability of enterprises to measure and manage carbon emissions data across the entire supply chain. Finally, to ensure gender equality in their low carbon transition efforts, enterprises need to integrate gender empowerment principles into their transition strategies. For guidance, they can refer to the Women's Empowerment Principles and on which a list of relevant resources can be found in this report.

For policy makers and regulators, the report recommends strengthening the coordination of existing market-based low-carbon mechanisms, strengthening financial support for the low-carbon transformation of industries and strengthening the support structure for SMEs to aid their transitioning efforts. Attention must also be paid to improving ESG and carbon disclosure regulations and requirements, while strengthening policies to ensure gender equality at the workplace, in order to reach a just transition as envisioned by the Paris Climate Agreement.

# // 1. Introduction

## 1.1 China's progress on SDGs implementation

The SDGs were adopted by the United Nations in 2015, under the 2030 Agenda for Sustainable Development, as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity.

However, with just seven years left to meet the goals, many difficulties and challenges remain. In 2022, the global community faced the impact of multiple intersecting crises: the effects of climate change led to unprecedented heatwaves and severe droughts in Europe and North America, while parts of Asia were hit by devastating floods; the negative impacts of the COVID-19 pandemic on the economy and society persist and energy prices have soared, adding uncertainty to the post-pandemic green recovery.

As the second biggest economy and largest developing country in the world, China has made steady progress in implementing the SDGs. The country's efforts in poverty reduction, energy conservation and emissions reduction have also contributed to progress on global SDGs attainment. As the largest deployer of solar and wind energy in the world, China is building a low-carbon energy system, guided by its 2030-2060 carbon peaking and carbon neutrality goals. Following the announcement of these climate targets, China issued around 60 policy documents at both the national and local level, providing detailed guidance on the low carbon transition of key industrial sectors and areas, gradually forming the '1+N' policy framework.<sup>1</sup> As of July 15, 2022, the national carbon market has been online for one year, with a total transaction value of 194 million tons of carbon allowances and a cumulative transaction value of CNY 8.492 billion (USD \$1.25 billion).<sup>2</sup> In addition, China is currently pursuing the concept of ecological civilization<sup>3</sup> and advancing biodiversity conservation, including at its core, establishing a protected areas system that currently features five National Parks enjoying the highest protection status.

With the ongoing efforts of international organizations and the Chinese government, more and more enterprises in China have realized that sustainable development is a necessary prerequisite for a better future - for their business and the planet. As critical market players influencing economic growth, job creation and the production of goods and services, enterprises can play a significant role in promoting sustainable development both in China





and around the world. The 17 SDGs serve as useful frameworks to guide enterprises in China in exploring sustainable practices and identifying opportunities for innovative development.

## 1.2 About this report

Business and Sustainability in China 2022-2023, the third survey report in this series, shares the same research objectives as the previous two reports. The first report<sup>4</sup> released in 2020 provided a baseline assessment of the SDG awareness and practices of business in China. The second edition of the report<sup>5</sup>, released in 2021, continued to track their progress in pursuing the SDGs, with an additional special section looking at how enterprises in China are responding to the country's dual carbon goals.

Building upon this previous analysis, the 2022-2023 report includes an in-depth discussion on the low-carbon transition of enterprises in China, examining their awareness and readiness while identifying opportunities and risks during the process. In addition, the 2022-2023 report also includes two new segments:

- A discussion on "Women and the Low-Carbon Transition". This combines SDG 5: gender equality and SDG 13: climate action to understand enterprises' awareness of the interlinkages between these two issues, and to suggest ways to integrate gender equality into low-carbon transition practices.
- A special focus on how small-medium enterprises (SMEs<sup>6</sup>) and large enterprises differ in their low-carbon transition approaches and their unique challenges.

The report, written in 2022 and 2023, includes surveys and public statistics from 2022 and current progress on some case studies in 2023. To ensure consistency and comparability across the series, the 2022-2023 report follows the methodology of the previous two editions, using a combination of online surveys and in-depth follow-up interviews to collect data.

The survey consists of 41 questions covering three areas, namely (1) enterprises' SDG awareness and practices (2) enterprises' low-carbon transition efforts, and (3) the role of

women in enterprises' low-carbon transitions. The survey was distributed online by UNDP, UN Global Compact (UNGC), Pricewaterhouse Coopers (PwC), and China Chamber of International Commerce (CCOIC) through their respective networks from June to August 2022. Survey participants were selected independent of selections in the 2020 and 2021 report. As of August 12, 2022, 218 enterprises were surveyed. Regarding industry types, the primary industry accounted for 4.3% of the surveyed enterprises, the secondary industry 28%, and the tertiary industry 67.7%; as for entity type, private-owned enterprises (POEs) accounted for 71.9%, foreign-invested enterprises (FIEs) 11.0%, and state-owned enterprises (SOEs) 8.8%. In terms of the enterprise size, large enterprises account for 34.1% and SMEs for 65.9%.

To showcase leading practices in SDG engagement, low-carbon transition and gender equality, enterprises were selected for in-depth interviews based on the '3A' criteria: namely companies that had demonstrated Awareness, Action and Ambition towards the SDGs and a low-carbon transition in their online survey responses. In total, 14 enterprises were selected for in-depth interviews, among which 8 examples of best practices were chosen as case studies based on ratings against four dimensions: Situation, Target, Awareness and Result (STAR). A detailed description of methodology and potential limitations can be found in the Appendix.

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1. <https://ccnt.igdp.cn/en/all-actions>

For a read-out of the 1+N policy system, please see the UNDP issue brief: <https://www.undp.org/china/publications/issue-brief-chinas-climate-policy-documents-1n-and-updated-ndc>

2. “生态环境部：全国碳市场启动一年来总体运行平稳 累计成交额 84.92 亿元”，People's Daily Online, accessed Sep03, 2022, <http://finance.people.com.cn/n1/2022/0721/c1004-32482376.html>

3. Ecological civilization is a concept promoted by President Xi Jinping for balanced and sustainable development that works towards the harmonious coexistence of man and nature by addressing production and consumption methods with large-scale output and emissions and keeping human activities within the limits of the ecosystem and environment.

4. Private Sector Awareness of the Sustainable Development Goals, PwC, Jul 2020, <https://www.pwccn.com/zh/consulting/private-sector-awareness-of-the-sustainable-development-goals-jul2020-chi.pdf>

5. Pathway to Net Zero: SDG Practices of Enterprises in China, PwC, Dec 2021, <https://www.pwccn.com/zh/issues-based/pathway-to-net-zero-report-dec2021.pdf>

6. On June 18, 2011, the Ministry of Industry and Information Technology, the National Bureau of Statistics, the National Development and Reform Commission and the Ministry of Finance jointly issued the "Notice on the Issuance of the Standard Provisions for the Classification of Small and Medium-sized Enterprises". Specific classification criteria can be referred to at [http://www.ccg.gov.cn/specialtopic/htrz/xggn/201808/t20180806\\_10418081.htm](http://www.ccg.gov.cn/specialtopic/htrz/xggn/201808/t20180806_10418081.htm)

## // 2. Overview of SDG Implementation

### Key Findings



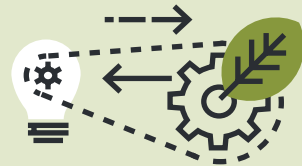
SDG 9: industry, innovation and infrastructure has replaced SDG 12 as the top SDG priority.



SDG 7: affordable and clean energy and SDG 17: partnerships for the goals have entered the Top 5 **for the first time**.

**82.4%** of the surveyed enterprises consider enhancing brand influence to be one of their most important objectives in undertaking SDG initiatives.

About **50.9%** indicated a lack of internal management documents and regulatory support for implementing SDGs.



“

The recommendations provided in this report stem from the key findings of a dedicated survey of enterprises, but also look beyond this to address tangible challenges and opportunities faced in a low carbon transition. They serve well as a rulebook for enterprises to scope out their low carbon strategy and remind us of the gaps to be filled in policymaking.

—Wang Shu  
ICF Senior Manager, Climate Specialist

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## 2.1 Change in priority of the 17 SDGs

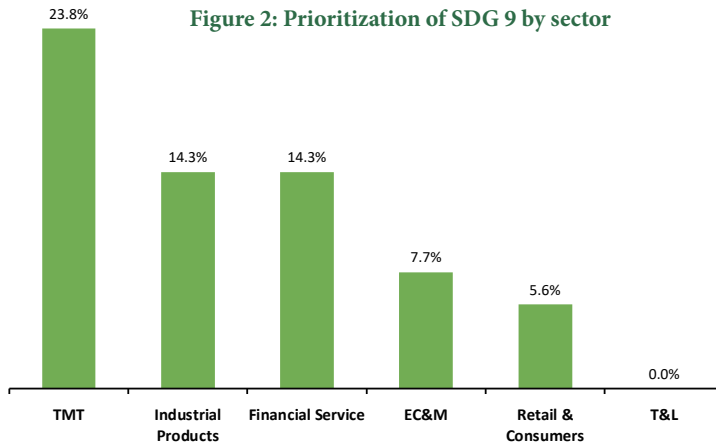
Figure 1: Prioritization of SDGs by enterprises in China<sup>7</sup>



Over the past three years, there have been significant changes in the SDGs that enterprises are prioritizing. SDG 9: industry, innovation and infrastructure and SDG 11: sustainable cities and communities have continued to rise in ranking for two years in a row and have now become the most prioritized SDGs. This may indicate enterprises are shifting their priorities towards infrastructure investment, sustainable industrial development, and innovation - all key elements to boost economic growth. Furthermore, it may also reflect the domestic context during the summer of 2022, with companies adjusting to a resurgence of domestic and international economic risks, as well as an economic slowdown.

While economic-focused SDGs (Goal 9 and 11) still dominate, SDG 3: good health and wellbeing has regained attention, possibly due to the resurgence of COVID-19 and the impact of prevention and control measures.

Enterprises in different industries prioritize different SDGs. SDG 9 is particularly relevant for the technology, media, and telecom (TMT) sector, with 23.8% of enterprises within the sector ranking it as the top priority (as shown in Figure 2). This is expected, as the main theme of SDG 9 - innovation and infrastructure - is closely linked with the TMT sector.





## 2.2 Enterprises reinforcing partnerships to implement SDGs

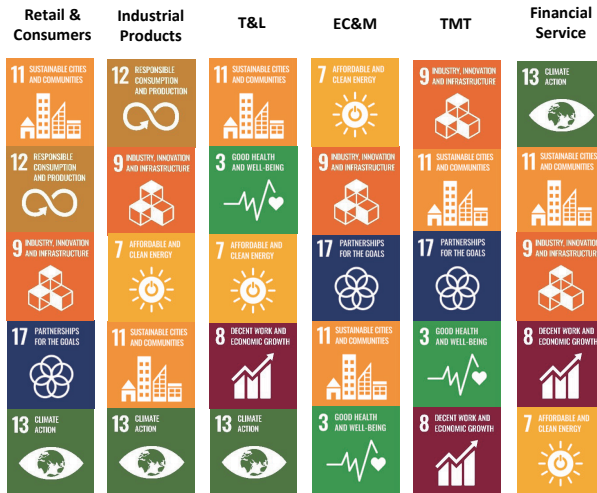
SDG 17: partnerships for the goals has risen by four positions and entered the top 3 for the first time. This suggests that enterprises are placing more emphasis on partnerships this year, in light of destabilizing factors such as the COVID-19 pandemic, as well as the impact of climate change and nature-negative investment.

Respondents from high emission sectors (EC&M, TMT) have demonstrated greater focus on SDG 17 compared to other sectors. This may be partially explained by the fact that a low-carbon transition requires efforts not only by individual companies, but also by their whole supply chain. Interviews with survey respondents show that these enterprises have emphasized the importance of cooperating with companies along the supply chain to reduce their scope three emissions. Many have also expressed a willingness to cultivate awareness of sustainability among upstream and downstream stakeholders and to provide them with the necessary technical assistance.



Please rank five SDGs that have the greatest impact on your business (including your value chain)

Figure 3: SDG priorities across six sectors



## 2.3 Increasing priority of SDG 7: affordable and clean energy

SDG 7: affordable and clean energy has for the first time become one of the top 5 SDGs that

enterprises are most concerned about, reflecting a growing demand for clean and affordable energy under the compounding influence of the carbon targets and the energy crisis.

### More stringent climate policy and targets have led to the increased priority of SDG 7.

In October 2021, the State Council released The Action Plan for Carbon Peaking before 2030, providing a concrete roadmap for achieving China's 2030 climate goals. Many sectoral plans with more detailed guidelines and targets have followed. These plans have specified several new concrete targets on energy and key industrial sectors, including iron and steel, chemicals, building materials, as well as transport, affecting the future development of all these sectors. As a result, enterprises are paying more attention to practical emissions reduction measures such as adopting clean energy.

At the same time, global crises have further exacerbated worldwide energy shortages. The impact on global prices of natural gas, coal, oil and other energy sources, provides another incentive for enterprises in China to turn to non-fossil energy sources, such as wind and solar power, to improve energy security and lower energy costs.

## 2.4 Brand influence and strategic growth remain the main drivers behind SDG implementation



What is the key driver for your company to promote the SDGs?

Figure 4: Main drivers of SDG integration among enterprises





According to the survey data, the top three objectives for enterprises to engage with the SDGs are: enhancing brand influence, assisting strategic business growth and using the SDGs to identify risks and opportunities. This is aligned with the 2020 and 2021 survey results, where enhancing brand influence and growth strategy were also listed as top priorities. The proportion of enterprises that have chosen these two categories as their main drivers has increased by 6.4 percentage points and 13.9 percentage points respectively since 2020.

Meanwhile, the focus on using SDGs to identify risks and opportunities has grown considerably. Compared to the 2020 survey, using SDGs for risk management climbed one place to rank third, seeing an increase of 22.5 percentage points. This is most likely due to the fast-changing and uncertain global context. Since the first survey was conducted in 2019 and published in 2020, global shocks such as climate disasters and the COVID-19 pandemic have continued to occur.<sup>8</sup> In the face of the evolving global risk landscape, enterprises see value in using the SDGs to further identify risks and opportunities.

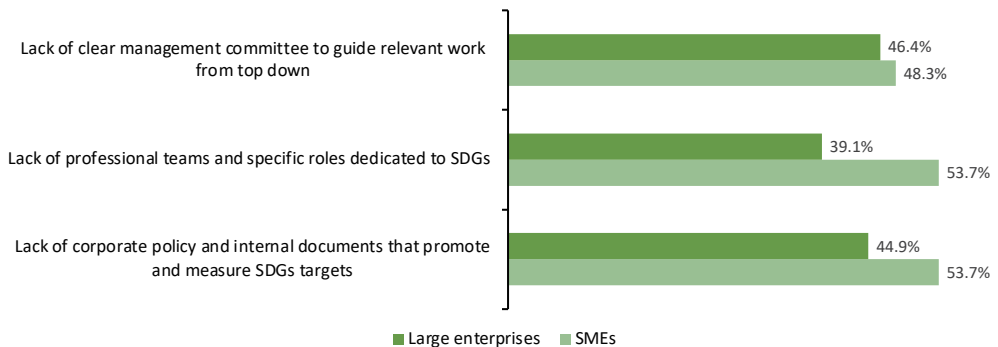
## 2.5 Enterprises lack the institutional structures for SDG implementation

Regarding the challenges faced when implementing the SDGs, around half of the respondents acknowledged the following challenges: lack of clear internal management



What are the key challenges your enterprise has faced when implementing the SDGs?

Figure 5: Challenges in implementing SDGs, by business size





documents/policies (50.9%), lack of professional teams and specific roles (49.1%), and lack of clear management committees (47.7%).

In terms of enterprise size, large enterprises fare better than SMEs in all three corporate functions (see Figure 5), with the difference in professional teams and specific roles being the largest (14.6%). This suggests that large enterprises have better corporate management structures for SDGs implementation, especially in terms of execution.

The lack of a mature SDG management system is universal among enterprises. An effective and practical management system can help enterprises promote SDGs more coherently and consistently. Therefore, the introduction of internal SDGs management regulations, the establishment of functional departments to promote work related to the SDGs, and the establishment of SDGs management committees will help enterprises to clarify the direction of sustainable development and implement relevant measures.

Additionally, enterprises have also identified other difficulties and challenges, including: a lack of sufficient funds and budgets to commit to SDG practices; the need for clear policy guidelines; inadequate awareness of SDGs among investors and consumers, and the lack of a favorable market atmosphere for enterprises to practice SDGs.

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7. Question: Please rank the five SDGs that you believe are currently having the greatest impact on your business, including the supply chain

8. International SOS, Risk Outlook 2022, <https://2022.risk-outlook.com/p/1>

## // 3. Low-Carbon Transition Practices

### Key Findings

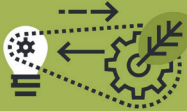


**61.0%** of surveyed enterprises have included the low-carbon transition in their board discussions and **27.1%** will do so in the next two years.

Only **30.3%** of surveyed enterprises have set carbon targets.



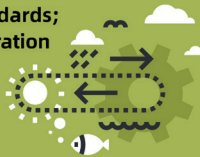
**55.5%** have taken measures to reduce emissions.



**Over half** of surveyed enterprises have carried out climate risk and opportunity identification work.

The top three challenges identified by enterprises during their low-carbon transition are:

- (1) lack of industry-specific standards;
- (2) low-carbon transition cooperation along the value chain;
- (3) carbon accounting.



Only **28.4%** of respondents conducted carbon accounting.

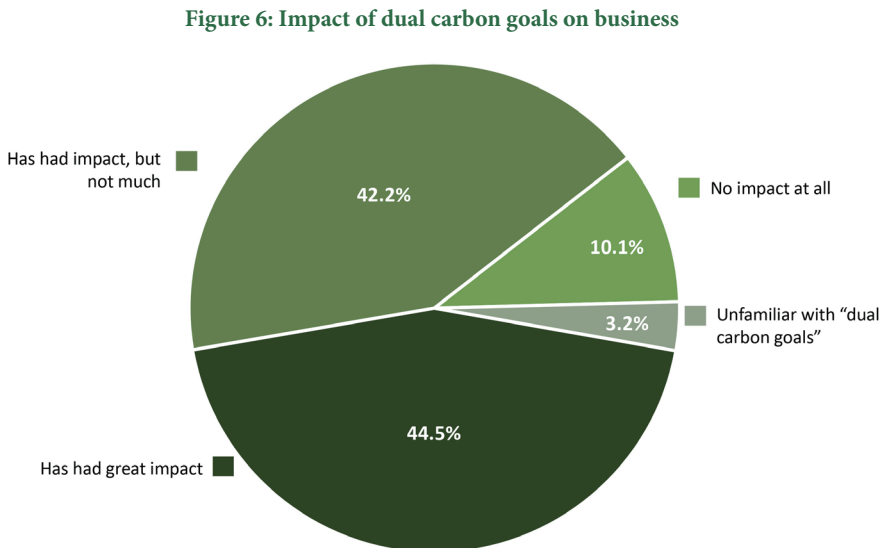
In the summer of 2022, historic heat waves swept the Northern Hemisphere. In China, unprecedented high temperatures and extreme droughts triggered a series of chain reactions, such as water bodies like the Yangtze River Basin and Poyang Lake drying up and frequent mountain fires in Chongqing. A decline in hydropower production capacity in Sichuan led

to a shortage in energy, affecting both enterprises' production costs and residents' lives. These climate-related disasters have highlighted the urgency for China to mitigate and adapt to the impacts of climate change.

Since the announcement of the 2030-2060 carbon peaking and neutrality goals, the Chinese government has increased its focus and the resources available for its green transition. **As essential stakeholders, enterprises play a significant role in driving China's low-carbon transition.**

**Most enterprises recognize the impact of carbon targets on their businesses.** As many as 86.7% of the respondents believe that the dual carbon goals impact their operations and revenue, of which 44.5% believe the impact to be "significant". This section further unpacks how enterprises are responding to China's climate targets.

**Q.** How much impact do you think carbon peaking and carbon neutrality goals have on your enterprise's operations/revenues?







“ This report shows us where Chinese companies are on their journey to carbon neutrality. To accelerate the low-carbon transition, extensive collaboration among multiple stakeholders is urgently required to resolve the challenges and obstacles identified by the research. ”

— Li Fei  
Carbon Disclosure Project Associate China Director

“ The report provides useful and interesting insights into the corporate low-carbon transition. The report finds that large companies and SMEs face different 'transition challenge maps', and that the differences between the two are highly complementary. This is particularly the case with issues such as carbon accounting, technology innovation and joint value chain carbon reduction, which can be very helpful in guiding upstream and downstream companies to collaborate with each other to achieve a low-carbon transition. ”

—Cao Yuan  
SynTao Sustainable Solutions Project Head Consultant

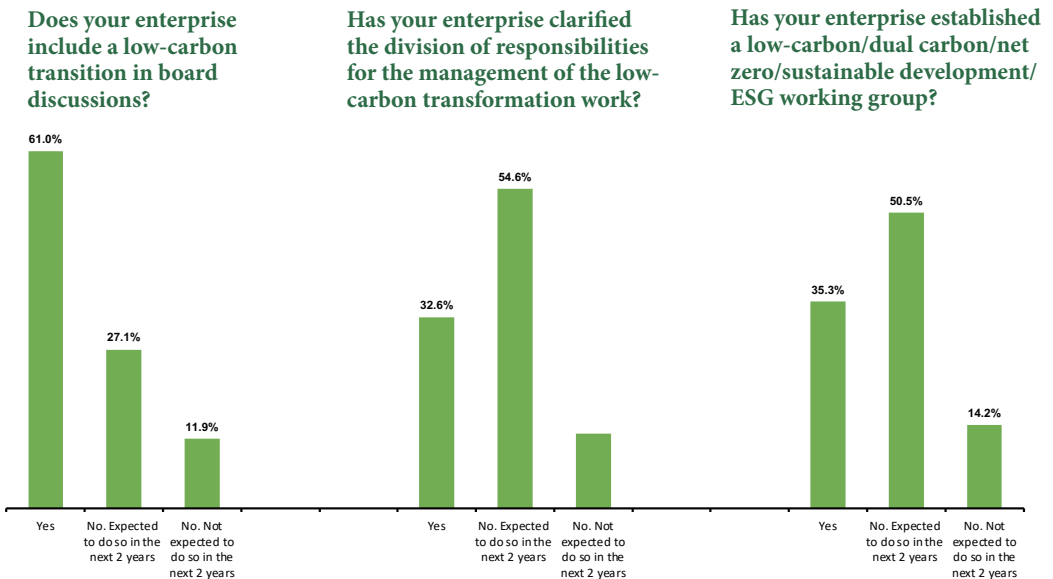
## 3.1 Corporate governance and strategy on the low-carbon transition

### 3.1.1 Better governance structure is needed

**The majority of enterprises have included the need for a low-carbon transition in their board discussions, suggesting the high importance of this topic.** Among them, 61.0% have already included the topic in board discussions, while 27.1% are planning to do so in the next two years. This demonstrates relatively high awareness among corporate executives on the necessity of transition towards a low-carbon future.

**Though the importance of a low-carbon transition is well recognized at the director level, fewer enterprises have clearly defined the division of authority and responsibilities at the managerial and executive levels.** At the managerial level, only 32.6% have clarified the authority and responsibilities for low-carbon transition work; at the executive level, only 35.3% have established a low-carbon/dual carbon/net-zero/sustainable development/ESG working group. Without the relevant governance structures, the promotion and implementation of specific emissions reduction measures could be constrained and may even become an obstacle to implementing a low-carbon transition.

**Figure 7: Director and executive-level involvement in low-carbon transition**



### 3.1.2 General lack of clear emissions reduction targets

**More than half (59.2%) of the surveyed enterprises indicated they have formulated low-carbon transition plans in line with the dual carbon goals, and nearly half (43.6%) have developed more detailed roadmaps for their low-carbon transition.**

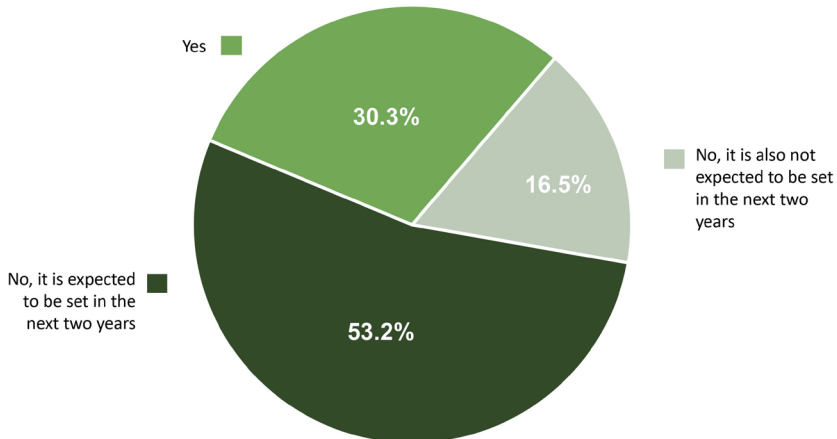
While many have developed low-carbon transition strategies, only 30.3% of enterprises have set carbon emissions targets, with over half (53.2%) expected to do so in the next two years.

The result is similar to the 2021 survey, where only 33.3% of surveyed enterprises had set emissions targets. The consistently low rate in setting emissions reduction targets suggests that it remains a key challenge for enterprises in China.

Several factors are behind this. At the technical level, to clarify their emissions, enterprises need to acquire expertise in determining the organizational boundaries for carbon accounting, emissions factors, and the scope of greenhouse gas emissions. Externally, an uncertain economic outlook also affects enterprises' operations and production, making it challenging to accurately predict their emissions reduction paths. In addition, the interviewed enterprises revealed another issue when setting targets: China's carbon market is not mature and active enough yet. This makes it difficult for enterprises to determine whether they can buy enough carbon credits on time and on demand, hence restricting their ability to leverage carbon markets to support emissions reduction targets.

### Q. Has your company set a carbon emissions target?

Figure 8: Carbon emissions target setting



## Case Study

### Lenovo: Achieving Net-Zero by 2050

#### 1. About Lenovo

Lenovo is a Chinese technology company operating in 180 markets which integrates ESG into its strategy, planning, implementation and reporting activities. Lenovo regards ESG as one of the three main pillars of its development strategy and is one of the first companies in China to join the Scientific Carbon Target Initiative (SBTi). Lenovo has taken steps to implement a green and low-carbon transition within its organization, while also supporting the upstream and downstream of its industrial chain to jointly realize a low-carbon and digital transition. With its '3S' strategy covering Smart Internet of Things, Smart Infrastructure and Smart Verticals & Services, Lenovo focuses on delivering services and developing technologies that create a more inclusive, trustworthy and sustainable digital society.

#### 2. Highlights

##### Setting data-driven targets with the aim of reaching net-zero by 2050

- **Adopting a top-down approach to setting out roadmaps based on quantified emissions:** Lenovo has taken a variety of actions ranging from setting up top-level objectives, to formulating strategies for net-zero emissions, as well as initiating closed-loop carbon reduction practices throughout the product life cycle. Under the Science-Based Carbon Targets Initiative (SBTi) guidance, Lenovo has pledged to reduce 50% of the direct and indirect carbon emissions from its operational activities by 2030 and reduce the carbon intensity of certain value chains by 25%, aiming to achieve net-zero by the end of 2050.
- **Building green supply chains and digital intelligence platforms:** the company has established a framework for green supply chain management. Through its self-developed Green Supply Chain Data Management Platform (GSCDM) based on management methods like Life Cycle Assessment (LCA) and Full Material Information Disclosure (FMD), the platform can intelligently identify environmental risks and optimize the ecological attributes of products that drive Lenovo's supply chain. This helps to improve the green data management of both upstream and downstream enterprises in the supply chain and promote the sustainable development of the entire value chain.



- **Leveraging technology and green manufacturing solutions to pursue low-carbon goals:** to reduce its plastic and carbon emissions, Lenovo has been developing its own technology solutions like warm water cooling to support China's interprovincial infrastructure. For example, the new low-temperature solder pasting process has lowered the company's carbon dioxide emissions by 10,000 metric tons since 2017, while the innovative 97% post-consumer recycled plastic (PCC) battery enables Lenovo's zero plastic application on laptops. Lenovo has also rolled out various other zero-carbon products and participated in carbon market transactions, e.g., creating zero-carbon products by writing off the corresponding quota via the China Certified Emission Reduction (CCER) scheme. It has also established an internal carbon inclusive platform for employees, Lenovo Le Carbon Circle, setting up carbon accounts for employees to begin carbon accounting, management and trading, both in the office and in their daily lives. The company also set up and put into operation the first zero-carbon factory in the information and communications technology industry.

### 3. Lessons Learned

- Integrate sustainable and green concepts into product design, craftsmanship, recycling, and other processes.
- Use digital solutions to conduct carbon accounting during the operations process, to properly document the enterprise's carbon reduction goals.
- Quantify sustainability performance indicators and link them to performance appraisal systems.
- Establish green supply chains, encouraging suppliers to achieve multi-dimensional environmental management goals and drive the low-carbon transition of upstream and downstream partners.



## 3.2 Diversified emissions reduction measures and market mechanisms

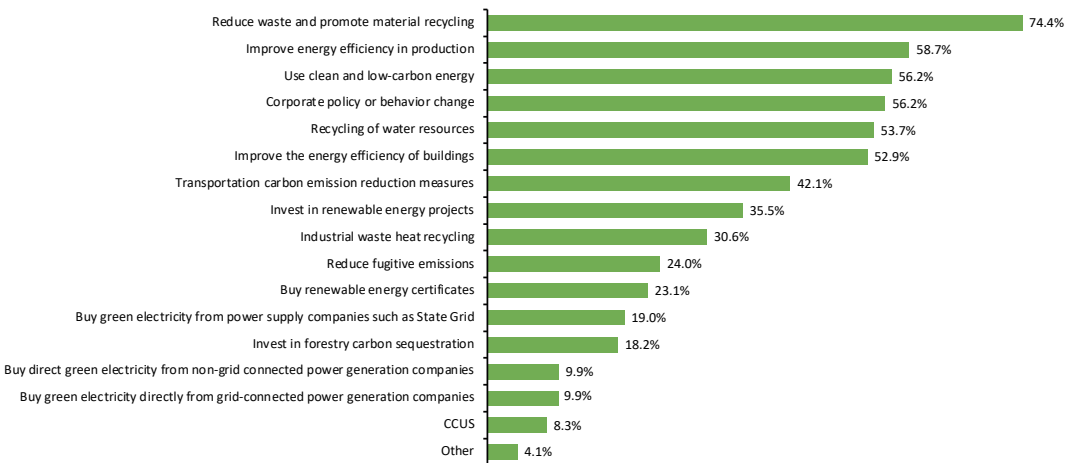
### 3.2.1 Improving resource utilization and energy efficiency are the most common measures to reduce emissions

55.5% of respondents reported carrying out emissions reduction measures. The top three low-carbon measures adopted by surveyed enterprises are: (1) reducing waste and promoting material recycling (74.4%); (2) improving energy efficiency (58.7%) and (3) using clean energy (56.2%).



**Q.** What are the specific emission reduction measures of your enterprise?

**Figure 9: Emissions reduction measures**



These top three measures align with China's Action Plan for Carbon Peaking before 2030, where the promotion of renewable energy and the circular economy, as well as the improvement of energy efficiency, are emphasized as priority areas for achieving China's climate targets. Following this trend, several economically viable emissions reduction technologies have emerged in the market. For example, there has been an improvement in energy cascade utilization equipment, technologies and materials that improve photoelectric conversion efficiency in the photovoltaic industry, as well as in hydrogen production, storage and distribution, etc.

## Case Study

### JA SOLAR: Leveraging Innovation in Clean Energy Technology for a Low-Carbon Transition

#### 1. About JA SOLAR

JA Solar is a Chinese manufacturer of high-performance photovoltaic products. As a leading manufacturer in the renewable energy industry, a low-carbon transition is a key component of JA Solar's strategic planning. In continuing to introduce new innovations into its technology, JA Solar promotes the construction of a clean energy system and contributes to China's low-carbon transition.

#### 2. Highlights

**Producing new clean energy technologies through innovation and top-down management.**

- **Setting up a carbon & sustainable development department that report directly and regularly to the strategy committee within the board of directors:** JA Solar's strategy committee sets the overarching goals and outlines the direction of the low-carbon transition, and is responsible for carbon emissions accounting and other low-carbon management work. The department has six working groups in charge of energy efficiency, supply chain management, etc., linking to the enterprise's nine management platforms. The resulting structure coordinates low-carbon work across the enterprise horizontally and vertically.
- **Improving innovative capacity for photovoltaic technology and increasing investment in the research and development of PV module products:** 2.in reaction to the rising production costs of solar energy, as demand for input increases following large scale investments in the solar PV industry, JA Solar has adopted granular silicon as a raw material and is leveraging new technologies to reduce costs and increase productivity. For the upstream supply chain, JA Solar has launched a new department concentrating on PV material business development, aiming to efficiently utilize equipment established upstream. The company has also increased investment in downstream PV applications, expanded the scale of power station construction, conducted green power transactions, and collaborated with upstream and downstream partners to reduce overall carbon emissions.

### 3. Lessons Learned

- Enhance scientific and technological research and development capabilities, or cooperate with relevant scientific research enterprises and institutions to promote the transformation of the energy structure by introducing new energy products.
- Collaborate with upstream and downstream enterprises to reduce overall carbon emissions.

## 3.2.2 Market-oriented means of promoting green power

Market-based mechanisms for emissions reduction cannot be ignored as they allow enterprises greater flexibility in developing their emissions reduction strategy. In addition to China's Emissions Trading System (ETS) and voluntary carbon market (VCM), green power trading also plays a crucial role. 38.8% of surveyed enterprises reported reducing emissions by directly purchasing green power, and 23.1% by purchasing the Green Electricity Certificate (GEC). The following table shows the difference between the two trading mechanisms:

|          | Green Electricity Certificate Trading  | Green Power Trading  |
|----------|--|--|
| Overview | <p>To provide stronger financial incentives for renewable energy development and reduce the government's subsidy burden, China launched the voluntary trading platform for the Green Electricity Certificate (GEC) in 2017. GECs are issued to large-scale grid connected onshore wind and solar PV plants. One GEC corresponds to 1MWh of green electricity generation. Enterprises and individuals purchase GECs to support the generation of renewable energy and meet their voluntary emissions reduction targets. However, it does not involve physical delivery of electricity to buyers. Once GECs have been sold, RE generators who have been receiving government feed-in tariffs (FiTs) must forego the subsidy.</p> | <p>Piloted in 2021, the direct green power trading program is conducted via the Beijing Power Exchange Centre and the Guangzhou Power Exchange Centre. Enterprises who purchase green power will receive both physical power delivery and a green electricity consumption certificate. There are currently two transaction methods:</p> <ol style="list-style-type: none"> <li>1. Electricity users (including electricity sales enterprises) and power generation enterprises purchase green electricity through direct electricity transactions, including power purchase agreements (PPAs);</li> <li>2. Electricity users purchase green electricity from grid enterprises that they guarantee to acquire.<sup>9</sup></li> </ol> |

|                                   | Green Electricity Certificate Trading  | Green Power Trading  |
|-----------------------------------|--|--|
| Advantages                        | <ul style="list-style-type: none"> <li>• The registration and auditing agencies of GECs are all over China, with no regional restrictions.<sup>10</sup></li> <li>• Using the online transaction platform, the difficulty of obtaining GECs is low.<sup>11</sup></li> </ul> | <ul style="list-style-type: none"> <li>• Diversified trading methods.</li> <li>• Through the PPA-fixed contract, the user can obtain a certain power supply at a more favorable price.</li> </ul>  |
| Challenges                        | <ul style="list-style-type: none"> <li>• GEC prices fluctuate greatly.</li> <li>• Many enterprises are not familiar with either GECs or the green power trading system.</li> </ul>   | <ul style="list-style-type: none"> <li>• Limited by energy storage technology and the actual transmission capacity of the power grid, it is challenging to trade green electricity across regions. Current regulatory barriers also prohibit inter-provincial trading.</li> <li>• China's green electricity trading market has not yet fully formed a market-based pricing mechanism.</li> <li>• Many enterprises do not have an urgent need for green power and stick to cheaper and more accessible alternatives.</li> </ul> |
| Usage of mechanisms in the market | PV sales in 2021: 502,015 certificates, Wind power sales in 2021: 75,338 certificates. <sup>12</sup>   | In September 2021, after China's green power trading market opened, the first batch of green power transactions reached a volume of 7.935 billion kWh. <sup>13</sup>   |

While the carbon emissions trading scheme (ETS) puts a price on emissions to incentivize enterprises to lower them, the GEC trading and direct green power transactions are designed to promote green power production and consumption. The GEC system serves as a supplementary mechanism to direct green power transactions, particularly for those enterprises that need to fulfill renewable energy consumption requirements but cannot do so by purchasing green power.

At present, the transaction volume of GECs in China is extremely low compared to the amount issued. The main reasons identified by analysts include:<sup>14</sup>

- **Insufficient incentives for voluntary purchase:** enterprises and individuals are not entitled to additional benefits or preferential policies by purchasing GECs. Furthermore, according to Article 3 of the ‘Notice of Voluntary Subscription Trading System’, secondary sales of GECs are restricted, resulting in low liquidity in the market.
- **Lack of compulsory purchase mechanism:** in 2019, China released the Renewable Energy Portfolio Standard (RPS) targets, which sets minimum renewables consumption at the provincial level.<sup>15</sup> While some enterprises can fulfill RPS targets by purchasing GECs, it is among one of the many options that enterprises can choose from.
- **More competitive alternatives available:** some companies buy GECs to meet their RE100 target.<sup>16</sup> However, the prices of GECs are higher than the prices of certificates traded at the APX Tradable Instrument for Global Renewables (TIGR) Registry<sup>17</sup> and the price of the International Renewable Energy Certificate (I-REC) issued by the Green Certificate Company (GCC)<sup>18</sup>

## 3.3 Risks and opportunities surrounding a low-carbon transition

### 3.3.1 Growing awareness of climate risks among businesses in China

The Financial Stability Board created the Task Force on Climate-related Financial Disclosures (TCFD) to develop recommendations on the types of information that companies should disclose to support investors, lenders, and insurance underwriters in appropriately assessing and pricing risks related to climate change. According to the TCFD Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures document<sup>19</sup>, climate risk is the potential uncertainty caused by climate factors such as extreme weather, natural disasters, global warming, and social transition to sustainable development on economic and financial activities, such as losses caused by extreme climate events or high carbon emissions.



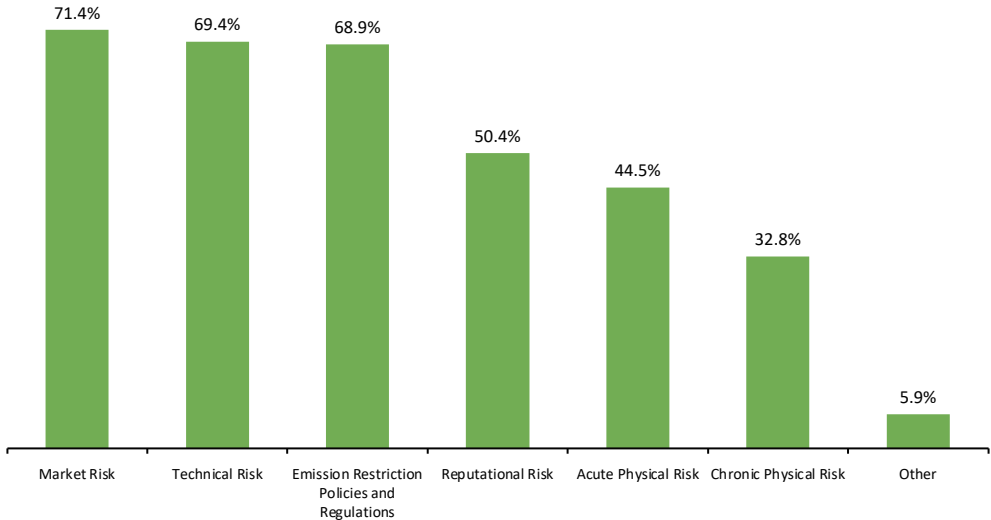
Climate risk includes two categories: transition risk and physical risk. Transition risk refers to loss caused by factors such as changes in climate policies, technological innovation and market changes in the low-carbon transition process (e.g., market risk, emissions restriction policies and regulations, technical risk, reputational risk). Physical risk refers to property damage caused by extreme weather, natural disasters and related events.

**At present, enterprises generally pay more attention to the impact of transition risks in the short term.** 55.5% of the surveyed enterprises have already carried out exercises to identify and assess climate related risks. As shown in the figure below, market and technological risks are identified by the majority of surveyed enterprises, followed by emissions restriction policies and regulations. Market risk refers to risks that affect the performance of the entire market simultaneously, and technological risk refers to any risk to information technology, data or applications that negatively impact business operations.



**Q.** Has your enterprise undertaken risk identification for low carbon transition/carbon neutrality? What types of risks has your enterprise identified?

**Figure 10: Risks identified for a low-carbon transition**

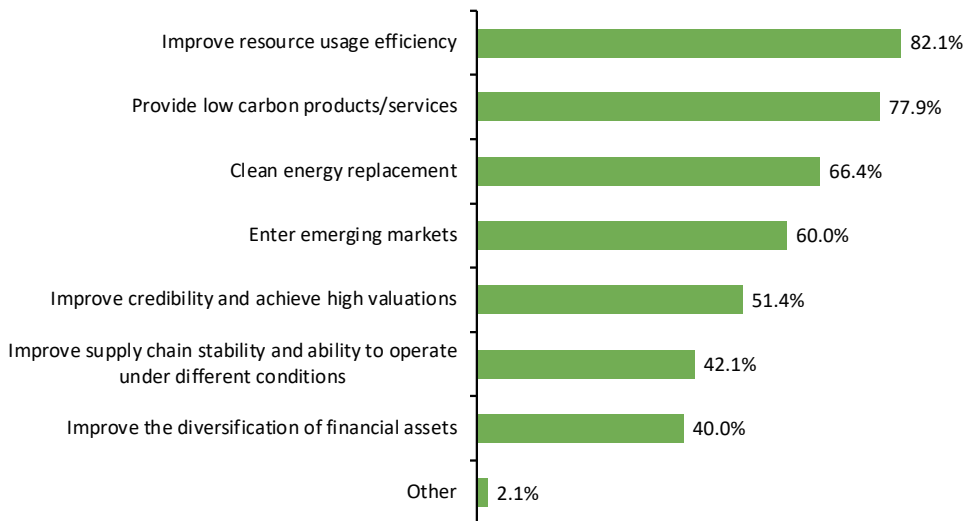


### 3.3.2 Low-carbon transition brings about more opportunities for enterprises in China

64.2% of the enterprises surveyed have carried out opportunity identification exercises regarding a low-carbon transition and carbon neutrality. The top three opportunities identified are: (1) improving resource efficiency to reduce costs and increase business efficiency (82.1%); (2) offering low-carbon products and/or services to adapt to shifting consumer preferences to enhance competitiveness and revenue (77.9%) and (3) clean energy replacement to reduce dependence on fossil fuels and increase diversification and cleanliness of corporate energy use (66.4%).

#### **Q.** What types of opportunities has your enterprise identified?

Figure 11: Low-carbon transition opportunities



Aided by low-carbon policies, plus research and innovation, there exists multiple areas of potential growth for green products, services and industries. The policy orientation and market space for green and low-carbon businesses imply more investment opportunities, as indicated by a study conducted by Tsinghua University showing that China will need to

invest about CNY 138 trillion (USD \$21 trillion) by 2060 to meet the dual carbon goals.<sup>20</sup> In addition, increased consumer awareness might further drive green consumption. **The sooner enterprises identify and invest in a new low-carbon mode of development, the better placed they will be to stay ahead in and reap benefits from the future transition process.**

## 3.4 Common challenges

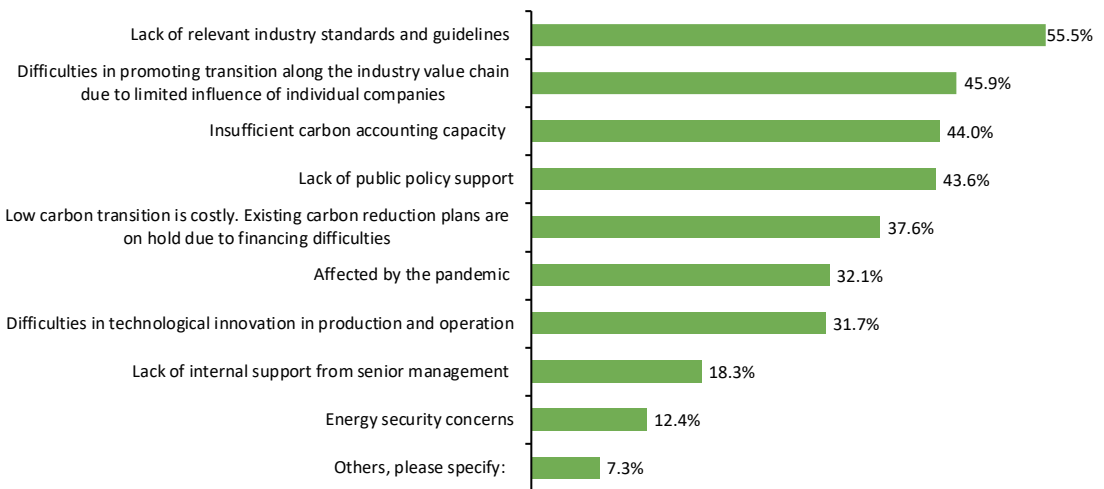
### 3.4.1 Lack of industry standards is a pressing issue

Enterprises in China face both internal and external challenges in making a low-carbon transition. The five most pertinent difficulties identified by surveyed enterprises are: (1) a lack of relevant industry standards and guidelines; (2) difficulties in promoting transition along the industry value chain; (3) insufficient carbon accounting capacity; (4) lack of public policy support and (5) the high cost of a low-carbon transition.



**Q.** What are the challenges and difficulties your enterprise faces in a low-carbon transition?

**Figure 12: Challenges and difficulties enterprises face in a low-carbon transition**

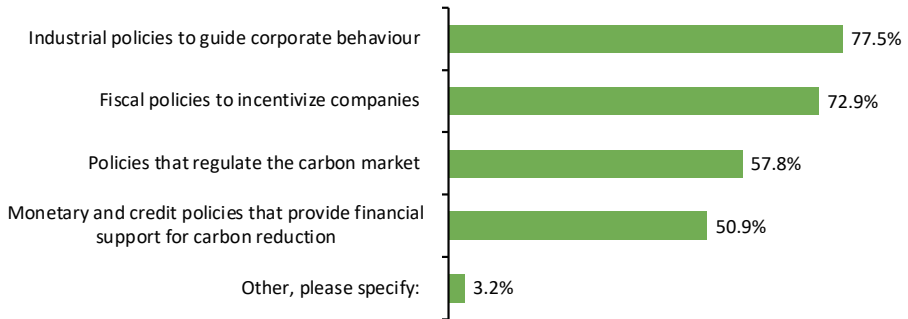


In terms of government policy, more than 70% of respondents hope for the relevant ministries to issue industrial policies to help guide the low-carbon transition of enterprises

and introduce financial subsidies to encourage the transition. Industry standards in particular, serving as the basis and reference for enterprises, can not only guide enterprises in their low-carbon efforts but also restrain unfair market competition and promote the healthy development of low-carbon industries.

**Q.** What public policies do you think are critical to your enterprise’s low-carbon transition?

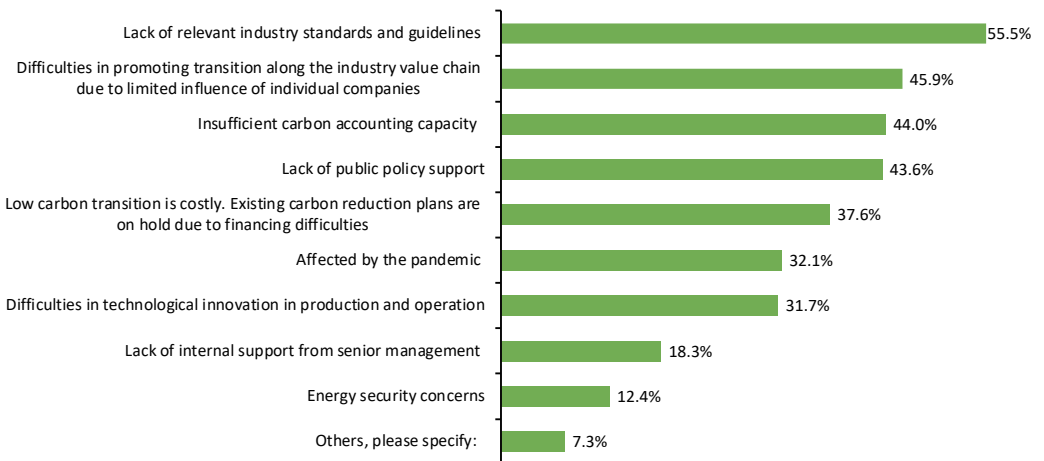
**Figure 13: Policies critical to a company’s low-carbon transition**



**3.4.2 Difficulty of large enterprises in promoting the implementation of a low-carbon transition along the value chain**

**Q.** What are the challenges and difficulties your enterprise faces in pursuing a low-carbon transition?

**Figure 14: Challenges in pursuing a low-carbon transition, by enterprise size**





According to the survey, 58.1% of large enterprises believe that "difficulty in promoting the upstream and downstream of the industry value chain" hinders enterprises' low-carbon transition. The following challenges were reflected in our interview results and industry research:

- **Multiple stakeholders:** large enterprises often have a long supply chain with many suppliers across different regions and different supplier management conditions, making it difficult to coordinate low-carbon efforts such as carbon accounting.
- **Lack of awareness and standardized definitions:** according to the enterprises interviewed, parties from upstream and downstream of the supply chain have a poorer understanding and awareness of low-carbon transition-related issues, resulting in higher communication and education costs. Even within large enterprises that have promoted a low-carbon transition along its supply chain, understanding of the concept might not be aligned.<sup>21</sup>
- **Limited capacities:** Parties along the supply chain have insufficient low-carbon transition capabilities, in particular they face a lack of adequate resources and technologies
- **Data challenges:** Supply chain data collection is difficult, and measures are needed to ensure the accuracy and authenticity of the data collected.

### 3.4.3 Carbon accounting, especially for Scope 3 emissions, remains a problem area

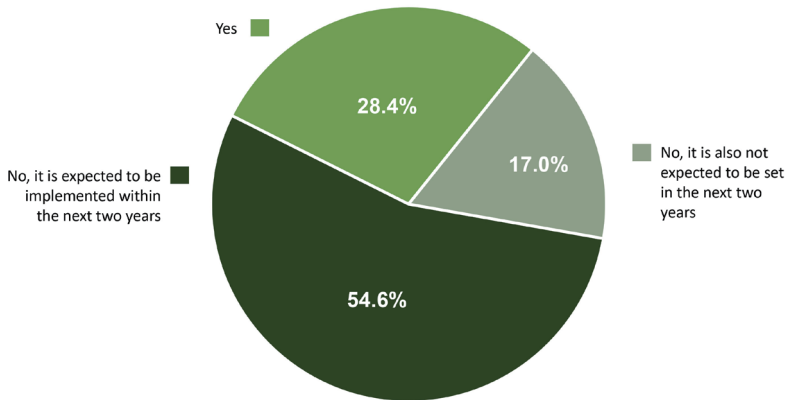
Carbon accounting is the first step in developing a low-carbon strategy - only by quantifying their carbon emissions can enterprises establish feasible targets and plan a road map for carbon reduction. However, only 28.4% of respondents have conducted carbon accounting. 54.6% expect to do so in the next two years. This shows that although enterprises in China have positive attitudes and plans for carbon accounting, actual implementation continues to be a pain point due to the difficulty of data collection, complicated accounting methods, lack



of accounting standards, and difficulty in accessing high-quality carbon emissions factor databases.

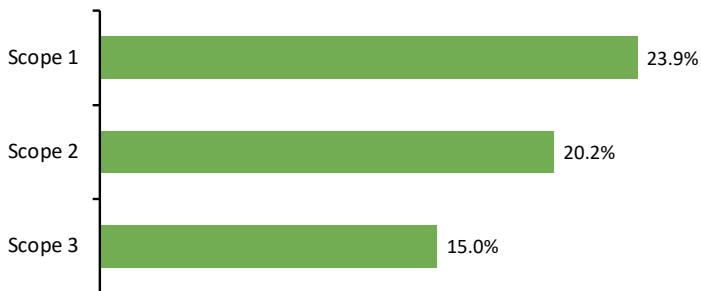
**Q.** Has your enterprise carried out carbon emissions accounting/inspection?

**Figure 15: Proportion of businesses performing carbon accounting**



**Q.** What is/are the scope(s) of carbon emissions data that your enterprise has calculated/checked at this stage?

**Figure 16: Scope of enterprises' carbon accounting**



Only 15.1% of respondents included Scope 3 in their calculations. Scope 3 emissions are difficult to calculate as it involves emissions from both upstream and downstream of the supply chain, covering a variety of activities and widely distributed suppliers. Clear value chain boundaries can also be challenging to define.

## Case Study

### Siemens China: Building Zero-Carbon Industrial Chains through Digital Innovation

#### 1. About Siemens

Siemens is a technology company focused on industry, infrastructure, transport, and healthcare, aiming to empower customers to transform their industries and markets through digitalization. By fiscal 2022, Siemens had more than 5,100 R&D and engineering staff in Greater China, 21 R&D hubs, as well as nearly 11,500 active patents and patent applications in China. Siemens has heightened their commitment to ESG through their DEGREE framework (decarbonization, ethics, governance, resource efficiency, equity and employability), which takes a 360-degree approach to all stakeholders, customers, suppliers, investors, people, societies, and the planet.

In September 2021, Siemens China officially launched its 'Zero-Carbon Pioneer Initiative' under DEGREE, focusing on decarbonization and resource efficiency. Under the initiative, Siemens aims to co-create a green ecosystem with all its partners in China. It will use its digital innovations and cross-industry expertise to help build end-to-end zero-carbon industrial chains, and support the achievement of China's dual carbon goals.

#### 2. Highlights

##### Driving low-carbon efforts through digitalization and industrial expertise

- **Leveraging technology to reduce emissions and lower waste:** recognized by the World Economic Forum in 2018 as one of the "most advanced factories" in the world, Siemens Industrial Automation Products Ltd., Chengdu (SEWC) exemplifies Siemens' strategy to be a zero-carbon pioneer. For instance, via employing the 'Industry 4.0' concept, SEWC demonstrates how digitalization can drive innovation to achieve circularity and dematerialization. It shares experiences and best practices with more than 10,000 industry partners every year and works to achieve circularity and dematerialization in the design, supply chain and production of its products. Additionally, SEWC is China's first pilot user of SiGREEN, a carbon data management platform which helped SEWC quantify a traceable and reliable carbon footprint. SiGREEN is empowered by blockchain and other digital technologies, linking factories, suppliers, third party certifiers, and customers to build up a trusted low-

carbon ecosystem and cover the entire value chain. Moving forward, SEWC aims to enhance its factory-level carbon footprint and decarbonization solutions, and further leverage cloud technology under the Software as a Service (SaaS) model.

- **Accelerating the reduction of Scope 3 carbon emissions with digital end-to-end solutions:** for industrial products, normally 80-90% of carbon emissions are derived from the supply chain. Siemens has established a carbon reduction management system covering nearly 7,000 suppliers in China to enhance the transparency of suppliers' carbon emissions and actively drive suppliers' decarbonization efforts. Their Carbon Web Assessment system supports key suppliers in accelerating their green transition through seven levers: fostering energy efficiency, generating electricity and heat, purchasing green electricity, implementing efficient processes, optimizing logistics, reducing business travel, and using recycled materials. In addition to this, low-carbon-related indicators have also been embedded into key sourcing decisions and their suppliers' management processes, becoming a factor during partnership evaluations.

### 3. Lessons Learned

- Use blockchain and other digital technologies in the early stages of product design to quantify a traceable and reliable carbon footprint for products and continuously optimize product design. This helps build up a trusted low-carbon ecosystem that covers the entire value chain.
- Establish a cohesive supply chain management system that considers low-carbon efforts and indicators to encourage supply chain transparency and help trace the sustainability performance of suppliers.

#### 3.4.4 SMEs experience greater challenges in implementing a low-carbon transition

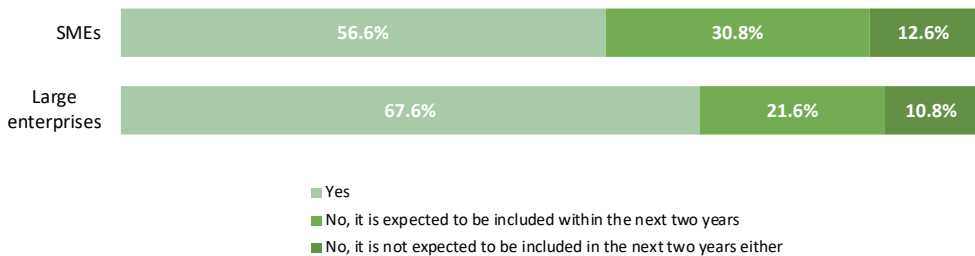
**SMEs lag behind large enterprises in low-carbon governance.** Large enterprises significantly outperform SMEs<sup>22</sup> at all levels of corporate governance, including discussing a low-carbon transition in board discussions, clarifying authority and responsibilities at the

managerial level and establishing working groups at the executive level. Notably, 51.4% of the large enterprises surveyed have established low-carbon/dual carbon/net-zero/sustainable development/ESG working groups, while only 26.6% of SMEs have done so in comparison. A lack of governance structures may cause SMEs to fall behind large enterprises in implementing a low-carbon transition.



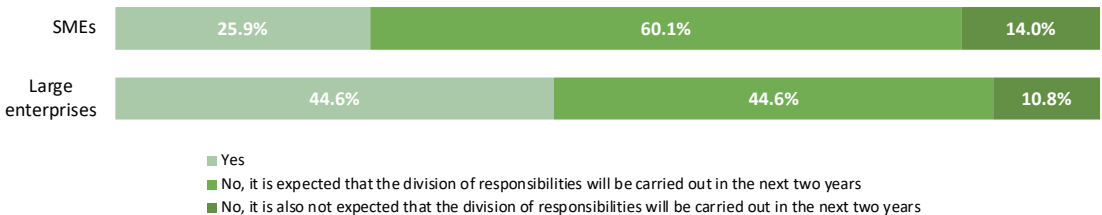
**Q.** Does your enterprise include the issue of low-carbon transition in board discussions?

**Figure 17: Low-carbon transition at the director level – SMEs and large enterprises**



**Q.** Has your enterprise clarified the division of authority and responsibilities of the management team in driving the low-carbon transition work?

**Figure 18: Low-carbon transition at the managerial level – SMEs and large enterprises**

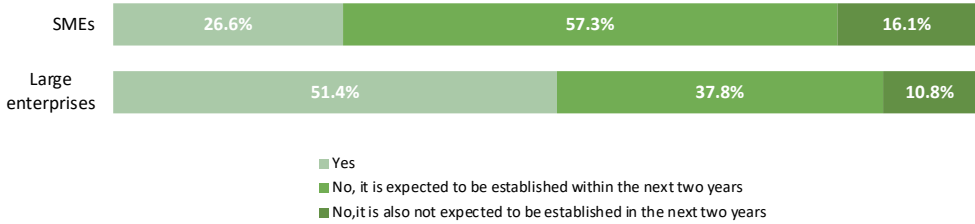


Concerning corporate strategies for a low-carbon transition, large enterprises remain ahead - 64.9% have already developed strategic plans in line with the dual carbon goals. SMEs are also falling behind in terms of forming roadmaps for action and taking specific measures to reduce emissions.



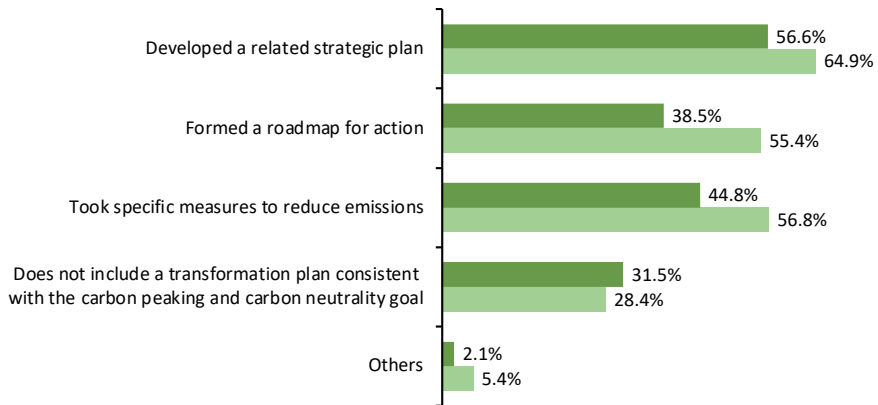
Has your enterprise established a low-carbon/carbon peaking and carbon neutrality/net zero/sustainability/ESG working group?

Figure 19: Establishment of the low-carbon working group at the executive level (by enterprise size)



Does your corporate strategy include a transition plan aligned with the dual carbon goals?

Figure 20: Low-carbon transition plans in corporate strategies – SMEs and large enterprises

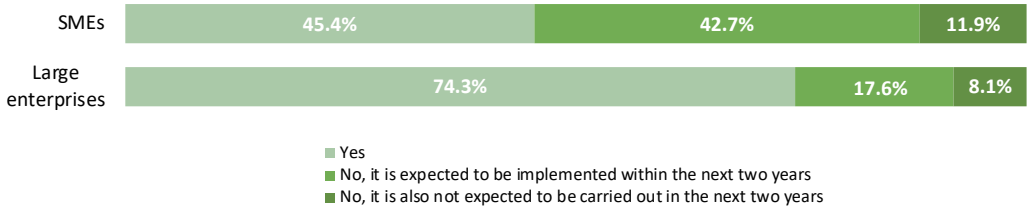


**SMEs also lag in reducing emissions.** 74.3% of large enterprises have already undertaken carbon reduction initiatives, compared to 45.4% of SMEs.



### Does your enterprise carry out emissions reduction initiatives?

Figure 21: Implementation of emissions reduction initiatives – SMEs and large enterprises

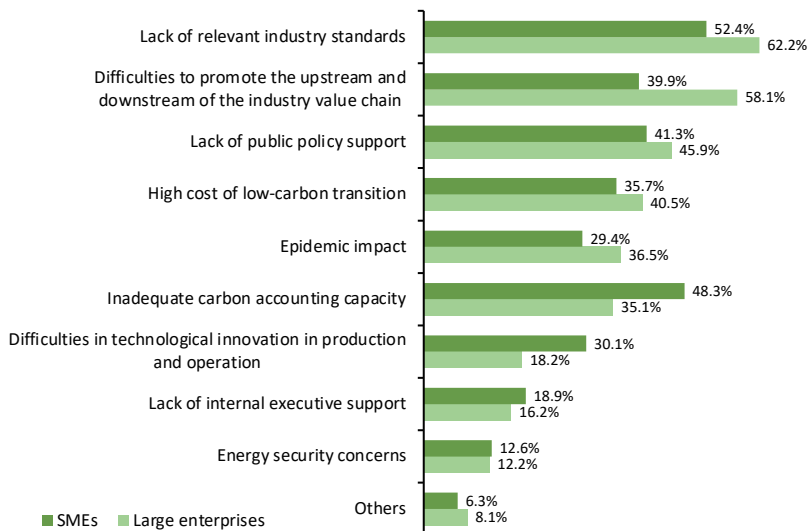


**Internal factors are major obstacles for SMEs' low-carbon transitions.** Comparing the difficulties faced by SMEs and large enterprises, the survey found that large enterprises are affected by external factors at the macro level, such as the difficulty in engaging parties upstream and downstream in the value chain and a lack of policy support and relevant industry standards. Though SMEs are also disturbed by macro and external factors, internal factors such as insufficient carbon accounting capabilities play a large role as well. Nearly half (48.3%) of SMEs report an inadequate carbon accounting capacity, compared with 35.1% of large enterprises.



### What are the challenges and difficulties your enterprise faces in pursuing a low-carbon transition?

Figure 22: Challenges and difficulties faced in a low-carbon transition – SMEs and large enterprises





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9. <https://iigf.cufe.edu.cn/info/1012/5050.htm>
  10. GEC 在中国分布 <http://www.greenenergy.org.cn/shop/product/plist.jhtml>
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  13. “我国启动绿色电力交易试点 首批交易电量近 80 亿千瓦时”, China Media Group Online, accessed Sep 03, [http://china.cnr.cn/yaowen/20210908/t20210908\\_525594460.shtml](http://china.cnr.cn/yaowen/20210908/t20210908_525594460.shtml)
  14. <https://iigf.cufe.edu.cn/info/1012/4871.htm>
  15. [http://www.gov.cn/zhengce/zhengceku/2019-09/25/content\\_5432993.htm](http://www.gov.cn/zhengce/zhengceku/2019-09/25/content_5432993.htm)
  16. RE100 is a corporate renewable energy initiative, made up of hundreds of large businesses globally, committed to 100% renewable electricity.
  17. APX created the TIGR Registry as an online platform for tracking and transferring Renewable energy certificates (RECs), enabling developers to generate, verify, and sell RECs
  18. GCC certifies renewable energy generation around the world and is the default issuer of the I-REC, <http://www.greenenergy.org.cn/history/echarts.jhtml?beginDate=&endDate=&projtype=1,2,3&projtype1=1,2,3>
  19. TCFD Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, accessed Sep 03, [https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing\\_Guidance.pdf](https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf)
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  21. Sustainability in the Supply Chain – The Asia Perspective, Maersk, accessed Sep 03, <https://www.maersk.com/news/articles/2022/08/11/sustainability-in-the-supply-chain-the-asia-perspective>
  22. The scale of enterprises are classified according to Notice on Printing and Distributing the Provisions on the Classification Standards of Small and Medium-sized Enterprises issued by the State in 2011, [http://www.ccg.gov.cn/specialtopic/htrzxggn/201808/t20180806\\_10418081.htm](http://www.ccg.gov.cn/specialtopic/htrzxggn/201808/t20180806_10418081.htm)



## // 4. Special Focus: Women and the Low-Carbon Transition

### 4.1 SDG 5 and SDG 13 are intrinsically linked

While the low-carbon transition brings a range of benefits and opportunities for both the environment and economy, these opportunities and benefits will not be automatically inclusive, unless deliberate policies and interventions are carried out. According to an International Labor Organization (ILO) report, the low-carbon transition will lead to 24 million new jobs globally by 2030; however, the transition might result in a lower female employment rate given most of the new green jobs will be located in currently male-dominated industries (renewables, manufacturing, and construction).<sup>23</sup> PwC estimates that if no policies and initiatives are undertaken to improve women's representation in

these sectors, the gender gap in employment in OECD countries will widen by 1.7% by 2030.<sup>24</sup> Specific policies and interventions need to be adopted to empower women as viable agents of change to advance climate action, and to ensure that women and men can equally participate in and benefit from the green economy.

The promotion of gender equality is important for the smooth structural transformation to a net-zero economy and achieve inclusive growth in general. **Indeed, there are considerable opportunities to create synergies between gender equality and climate change action across key green economy sectors:**

It is important to recognize the gender-differentiated impacts of a green transition and ensure that women and other groups have the capacities and support system to take advantage of the opportunities of a low carbon transition. Under the Climate Promise initiative, UNDP is supporting 34 countries and territories to incorporate just transition principles, processes, and practices into NDCs and LTS, advancing inclusive climate action with a consideration of all sectors and stakeholders, recognizing and listening to all groups, including those most vulnerable, but also, crucially, empowering them to act.

—Lee Sangji  
UNDP Climate Promise  
Just Transition Focal Point

- **Gender inequality is not only a moral and social issue, but also an economic one.** Although women comprise half the working age population, they are heavily underrepresented in the workforce and across many sectors of the economy including energy, construction and industrial production. For example, women only represent 32% of the workforce in the renewable energy sector. PwC's latest Women in Work report finds that increasing women's labor participation in OECD countries could boost global Gross Domestic Product (GDP) by as much as USD \$6 trillion per year.<sup>25</sup>
- **Facilitating women's upskilling and reskilling is the key to addressing the talent shortage for the transition to a net-zero economy.** According to LinkedIn, from 2017 to 2022, hiring talent with green skills increased by 40% globally; however, there is a shortage of talent to meet this increasing demand. This is partly due to the gender gap - in 2021, there were 62 women for every 100 men considered to be green talent.<sup>26</sup> If women could be empowered to participate in the workforce at the same rate as men are, there will be an instant infusion of talent and creativity to accelerate the transition towards a more inclusive and sustainable economy. To fully tap into women's potential, it is imperative for the private sector to ensure the equitable development of green skills between men and women, supported with adequate investment in upskilling and reskilling opportunities that are equally accessible to men and women.
- **The inclusion of women could also improve the environmental outcomes of business.** Evidence shows that although women and men are equally exposed to the physical impacts of climate change, women are found to have greater perceived vulnerability to ecological risks, especially with regards to climate change.<sup>27</sup> However, they are also more inclined to seek transformations to reduce such risks. Research from 2022 by the European Central Bank (ECB) found that every 1 percentage point increase in the percentage of female managers within the ECB led to a 0.5% decrease in CO2 emissions. Studies have shown that women on corporate boards can often be more involved, prepared and diligent.<sup>28</sup> This can create an atmosphere on the board which is conducive to driving innovation in low-carbon transition efforts.

- **An inclusive pathway towards the low-carbon transition provides opportunities to advance gender equality.** As enterprises around the world ramp up their efforts to meet the ambition set out in the Paris Agreement, it is essential to understand what an inclusive and sustainable green economy looks like and how everyone could equally benefit from it. Incorporating gender considerations into the low-carbon transition and equipping women with the right skills could help to promote economic security for women by improving their access to high quality and sustainable jobs in the long term. Hence, aside from proactively addressing the barriers that women face to navigate the green economy, the government and the business sector should use the transition as an opportunity to redesign the world of work to better meet the needs of women.<sup>29</sup> To achieve that, both the government and businesses need to integrate gender considerations into low-carbon transition strategies to account for women and other disadvantaged groups, and make them part of the solutions to mitigate climate risks.

While gender mainstreaming has appeared more frequently on the international climate agenda, less research and analysis combining the topics of climate change and business' low-carbon transition and women has been conducted. This section of this report aims to shed light on the connection between these three aspects and the business sector's current actions in driving women to participate in low-carbon transition efforts, providing a basis for further recommendations as outlined in Chapter 5: Recommendations.

## 4.2 Awareness: Lack of understanding on the gender dimension of the low-carbon transition

In-depth interviews with enterprises demonstrate a general lack of awareness of the relationship between climate change and gender equality, as well as a lack of focus on the potential contributions of women to addressing climate change and the low-carbon transition. As gathered from the interviews, this may be due to the lack of discussion on "women and low-carbon transition/climate change" in public discourse.

Similarly, the survey results show that SDG 5: gender equality ranks sixth from the bottom in the ranking of SDGs that enterprises prioritize the most. This is as expected, as according

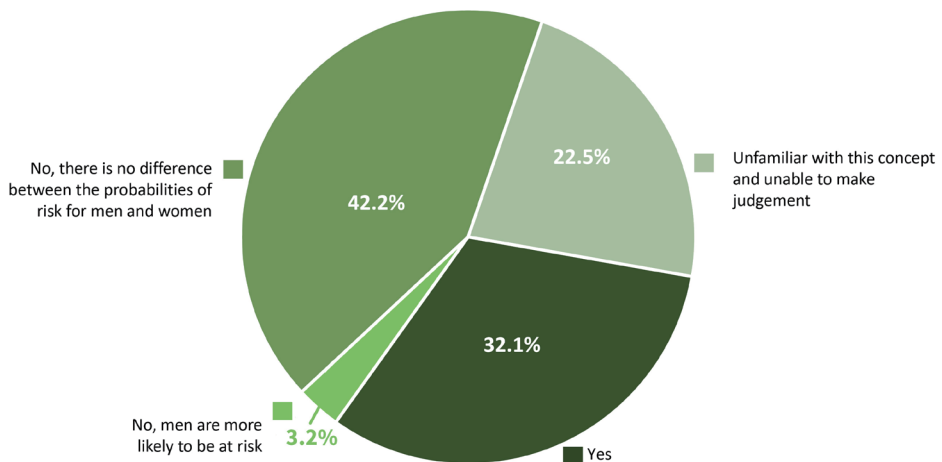
to the Women on Boards: Progress Report 2021 released by MSCI, an international index compiler earlier this year, the average proportion of female directors among the 636 listed enterprises in China participating in the MSCI survey is 13.8%. This number has increased 5.3 percentage points over five years but is still lower than the average level of 22.6% calculated by MSCI's global benchmark index.<sup>30</sup>

Only a small fraction of respondents (32.1%) indicated that women face higher risks in the impacts of climate change/low-carbon transition. Of these respondents, the top 3 risks identified are employment (77.1%), health (68.6%) and access to and control over resources (68.6%). In comparison, nearly half of the respondents (42.3%) did not believe that climate change/low-carbon transition affect women more than men.

In addition, 22.5% of all respondents reported that they are not familiar enough with the concept to make a judgement. The lack of disclosed data is a well-documented issue preventing the private sector and policymakers from understanding and addressing gender gaps, and from empowering women as active agents in the transition towards a net-zero economy. In 2020, the Workforce Disclosure Initiative (WDI) found that while 86% of companies collect and publicly disclose data on gender distribution among leadership positions, therefore enabling more gender insights for this indicator, only 37% disclosed other types of gender data, such as with regards to promotions or grievances.

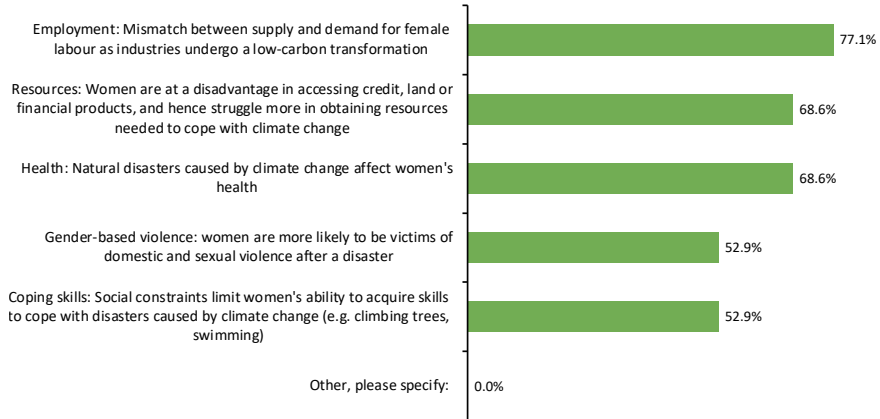
**Q.** Do you believe that women are more likely to be at risk from the impacts of climate change?

Figure 23: Perception of the gender-based nature of climate risks



## Q. Why do you think women are more likely to be at risk from the impacts of climate change?

Figure 24: Women's potential climate vulnerabilities

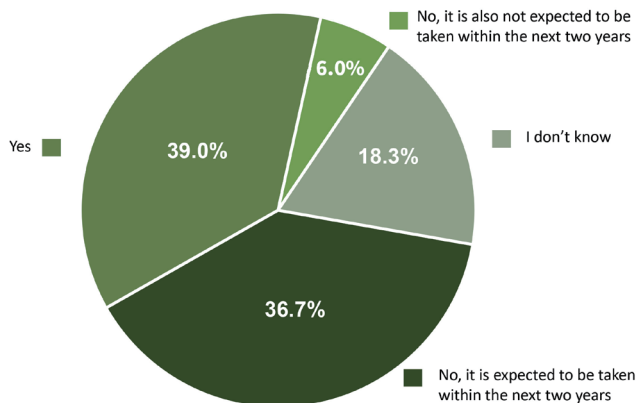


## 4.3 Action: Enterprises showing initiative in supporting women to participate in the low-carbon transition

The survey shows that more than 39% of enterprises are undertaking initiatives to empower female employees to participate in their low-carbon transition efforts, while 36.7% expect to do so in the next two years.

## Q. Is your enterprise currently taking steps to engage more female employees in low-carbon transition work?

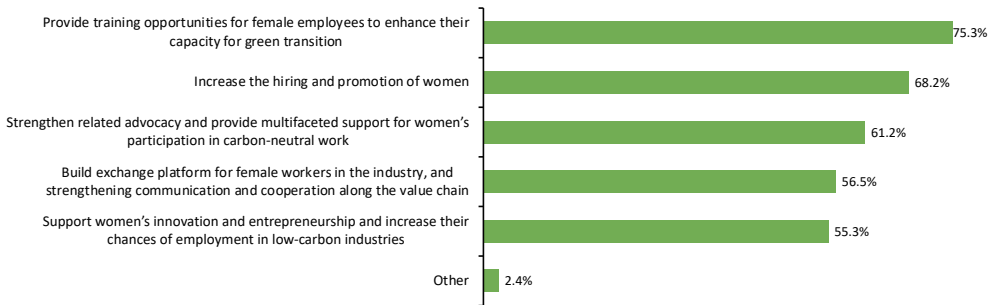
Figure 25: Encouraging female participation in enterprises' low-carbon transitions



Of the 39.0% that have taken initiatives to realize the full potential of women in low-carbon transition efforts, the majority focused on providing training opportunities for female employees to enhance their knowledge and abilities in navigating a green transition (75.3%).

**Q.** What measures did your enterprise take to let more female employees participate in your low-carbon transition?

**Figure 26: Initiatives to encourage female participation in the low-carbon transition**

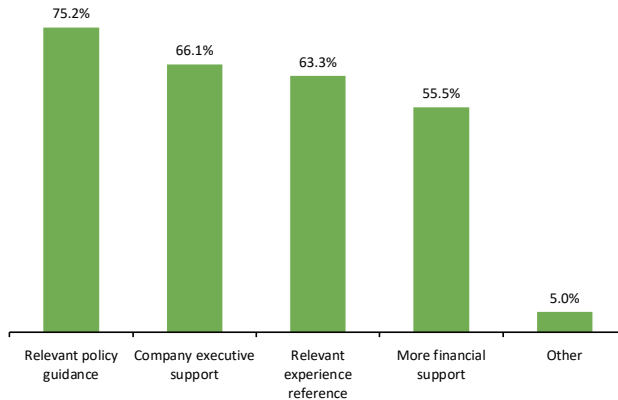


## 4.4 Call on the government and enterprises to build a green economy with a fairer future for all

When being asked about what type of support is most needed to further empower women as successful agents of the low carbon transition, 75.2% of the respondents said they need relevant policy guidance; whereas 66.1%, 63.3% and 55.5% indicated they would need top-level support, access to existing practices to draw on and more funding respectively.

**Q.** What support do you think your enterprise needs to engage more women in the low carbon transition?

**Figure 28: Support needed for promoting female participation in low-carbon transition**





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23. <https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/global-green-skills-report-pdf/li-green-economy-report-2022.pdf>
  24. <https://www.pwc.com/id/en/media-centre/press-release/2022/english/pwc-women-in-work-index.html>
  25. <https://www.pwc.co.uk/economic-services/WIWI/pwc-women-in-work-index-2022.pdf>
  26. <https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/global-green-skills-report-pdf/li-green-economy-report-2022-annex.pdf>
  27. <https://www.scopus.com/record/display.uri?eid=2-s2.0-0039560234&origin=inward>
  28. <https://www.emerald.com/insight/content/doi/10.1108/09649420610650693/full/html#idm46345068776592>
  29. <https://www.pwc.co.uk/economic-services/WIWI/pwc-women-in-work-index-2022.pdf>
  30. Women on boards-Progress Report 2021, MSCI

## // 5. Recommendations

### 5.1 Recommendations on a low-carbon transition for enterprises

#### 5.1.1 Establish an enterprise-wide governance structure

A governance structure targeted at implementing a low-carbon transition and consisting of the board of directors and relevant personnel at the managerial and executive levels, should be established.

- The board of directors should be responsible for leading the low-carbon transition work and establishing a working mechanism for transition governance. This is where the direction of a low-carbon transition and overarching objectives should be set according to science-based targets.
- At the managerial level, the departments, positions and responsibilities for low-carbon transition work should be clearly assigned, quantifiable objectives and performance indicators should be formulated accordingly, and progress tracked regularly.
- At the executive level, relevant departments should be coordinated, and responsible personnel should be selected from each department to set up working groups based on specific objectives or areas of focus.
- Regular mechanisms should be built to facilitate vertical and horizontal coordination, including lateral work reporting and a horizontal department coordination mechanism.

Ultimately, businesses should seek to align low-carbon transition considerations with core business motives and mainstream them in the long-term by incorporating them into standardized business routines like strategy formulation, planning, investment decision-making, and operation management. It is essential to include low-carbon transition indicators in existing performance assessments at all levels.

“ Clear board oversight of climate change, alongside related management incentive schemes, are critical enablers of an enterprise’s low-carbon transition. This is consistent with asks from investor initiatives such as Climate Action 100+ that seeks to ensure enterprises are taking the necessary action to reduce greenhouse gas emissions across the value chain. ”

—Ben Pincombe  
Head of Stewardship, Climate Change

“ Since the low-carbon transition has become a challenge for most enterprises in China, talent related changes and transformations are bound to happen simultaneously. The growth of green talent will help the industry build standards, form a broad value consensus and drive the implementation of transformative solutions with practical skills. ”

—Justin Cui  
Chief of Staff and Head of Strategy at  
LinkedIn China

### 5.1.2 Utilize digital tools to empower the low-carbon transition

During the in-depth interviews, enterprises within the TMT sector highlighted the importance of building an information infrastructure and the role of digital technologies such as artificial intelligence, big data and blockchain in facilitating an industrial low-carbon transformation. For other industries as well, these new digital technologies can also accelerate efficient low-carbon transitions.

- In the manufacturing industry, the Internet of Things collects mass data from smart sensors and feeds it through big data analysis technology to predict customer demand more accurately and dynamically, optimize production and manufacturing processes, and consequently reduce carbon emissions.
- In the logistics industry, artificial intelligence technology and big data analysis can help to integrate freight lines and capacity resources, optimize vehicle transport routes, improve land transport efficiency, and ultimately reduce fuel consumption.
- In finance, blockchain technology can carry out transparent, real-time, and

tamper-proof management of enterprises' carbon assets, realize on-chain data storage for the whole process of carbon asset development, trading, and circulation, thereby improving trust and further enhancing activity in the carbon trading market.

Enterprises should use digital technology to accelerate their low-carbon transition based on an understanding of their own industry's characteristics and business scenarios.

## Case Study

### Ant Group: Using Digital Platforms to Assist Enterprises with Carbon Management

#### 1. About Ant Group

Ant Group, founded in 2014, is a Chinese internet technology company providing inclusive financial and life services to consumers and micro and small enterprises. In 2021, Ant Group released its carbon neutral action roadmap and committed to achieving net-zero emissions by 2030. In June 2022, Ant Group announced that it had achieved operation-wide carbon neutrality and decided to introduce a comprehensive ESG framework to corporate management, along with officially launching a four-in-one ESG sustainable development strategy consisting of digital inclusion, green and low-carbon development, technology innovation and open ecosystem.

#### 2. Highlights

##### Aiding enterprises and their partners with low-carbon management via digital solutions

- **Facilitating scientific carbon emissions management with data-driven digital platforms:** with the support of online-offline hybrid development technologies, 'AI elastic capacity' and other green computing technology capabilities, Ant Group has achieved a twofold increase in server utilization in 2021 compared to 2019, accounting for 82% of the carbon reduction in Ant Group's value chain. In addition, Ant Group has launched a SaaS product facilitating digital carbon neutral management for enterprises – the Carbon Matrix. This platform helps enterprises scientifically manage their carbon neutral efforts. Based on the technical characteristics of trustworthy blockchain-empowered collaboration, the Carbon Matrix helps with unified platform management, data visualization of enterprises' carbon data and enables the remote certification and

issuance of certificates by third-party professional organizations along the supply chain. In addition, the Carbon Matrix platform can link the upstream and downstream of the enterprise value chain, such as government regulators, financial institutions, industrial chains, etc., to achieve multi-stakeholder collaboration. At present, Ant Group is using the Carbon Matrix to increase the transparency of the whole carbon verification process, settlement, liquidation, supervision and audit activities within the group.

- **Exploring the formation of a green evaluation system for SMEs:** to drive small and medium-sized enterprises to reduce their carbon emissions and provide them with green financial services, Ant Group is cooperating with domestic think tanks specializing in green finance and exploring the potential of establishing a green evaluation system for SMEs. For example, their digital platform, which supports enterprises to take the initiative in filling in information and uploading relevant documents, helps SMEs improve their environmental data disclosure.

### 3. Lessons Learned

- Leverage digital technologies to build a carbon inventory. A scientific and effective carbon inventory is essential for enterprises to move towards carbon neutrality.
- Take advantage of the digital tools developed by large enterprises. While large enterprises can make use of digital technologies and data to manage carbon emissions, SMEs without environmental data disclosure can turn to these existing tools to participate in ESG evaluation and advance their own carbon development.

## 5.1.3 Actively identify climate risks and opportunities

From the perspective of climate risk, enterprises should integrate low-carbon transition considerations into their existing risk management processes. Enterprises should identify risks, assess risks, establish indicators for daily monitoring, and make mitigation plans for risks brought about by climate change. By identifying the degree of climate and environmental risk borne by the enterprise and its supply chain, enterprises can then reduce their vulnerability to climate risks and work on building resilience. Enterprises can set transition risk monitoring indicators by paying attention to key policies in their industries, the transition efforts and results of leading enterprises, geographical location of enterprises, and the ways in which they are sensitive to a low-carbon transition.

Enterprises should also work to incorporate the potential opportunities of a low-carbon transition into their strategic decisions. For example, enterprises can save costs and improve brand credibility by using low-carbon products such as energy-efficient products or low-emission energy sources. Low-carbon transition services can also be developed to try to open new lines of business, enter low-carbon transition markets, and assist supply chains in building resilience.

## Case Study

### China Power: Identifying Climate Risks and Opportunities while Undergoing a Green Transition

#### 1. About China Power

China Power International Development Co., Ltd, a subsidiary of State Power Investment Corporation (SPIC), is a large Chinese energy group covering coal, hydropower, gas, wind power, photovoltaic technology, biomass, and waste environmental protection power generation. In 2021, the company released a new strategic outline, aiming to achieve peak carbon emissions by 2030, with onshore installed capacity of clean energy hoping to account for over 95% of total onshore installed capacity in China. By the end of 2022, its consolidated installed clean energy capacity had reached 64.94%, marking a fundamental change in China Power's asset structure, which was previously based principally on coal-fired power. China Power is the first traditional energy enterprise in Hong Kong's capital markets who's clean energy capacity accounts for more than half of its total installed capacity.<sup>31</sup>

#### 2. Highlights

##### Constructing a comprehensive risk and opportunity management framework

- **Establishing a clear risk management structure and assessing climate-related risks:** China Power has established a risk management department under the direct leadership of the board of directors. With reference to the TCFD framework,<sup>32</sup> China Power identifies the company's risks under different climate scenarios and discloses the list of its climate action plans and implementation progress. Following frequent instances of extreme weather in 2021, China Power collected information about heavy rain, floods and other catastrophic weather events, and established an emergency plan to ensure power supply is unaffected.

- **Grasping the opportunity to pursue a green and low-carbon transformation:**

China Power has made efforts to promote the development of low-carbon energy such as photovoltaic technology, wind power, geothermal energy and biomass energy, building several new energy bases across the country. In 2022, the Group's clean energy power generation amounted to 40,999,427MWh, representing a year-on-year increase of 8.28%, equivalent to a reduction in carbon dioxide emissions of 26,102,786 tonnes. China Power has also helped to develop emerging industries such as energy storage, hydrogen, and green transportation. Among these new commercial opportunities, 'battery-swapping heavy trucks' is one of China Power's main focuses. These work to advance electric energy substitution within the 'heavy weight, high frequency, high pollution' transportation segment. By the end of 2022, China Power's market share in the green power transportation market ranked amongst the top of the industry.

### 3. Lessons Learned

- Improve risk management structures and identify and analyze risks according to domestic and international policies, frameworks and standards. Focus on enhancing resilience against climate risks to ensure a secure energy supply in the face of external risks such as extreme climate disasters and coal price fluctuations,
- Seize market opportunities by actively developing clean energy and cultivating green industries.

## 5.1.4 Step up low-carbon management of value chains

Enterprises can comprehensively promote a low-carbon transition in the full value chain in the following ways:

- **Implement a series of measures to improve suppliers' capacities.** These include carrying out supplier knowledge training, providing a digital learning platform, inviting benchmark suppliers to share best practices, cooperating with suppliers to develop low-carbon technologies, and promoting low-carbon projects.



- **Carry out value chain management at all stages of the product life cycle.** Identify low-carbon transition opportunities at each stage of the product life cycle including raw material extraction, production, transportation, use and recycling, explore transition methods and technologies, and collaborate with suppliers to carry out low-carbon transition activities.
- **Support the development of low-carbon standards and guide the low-carbon transition of supply chains.** Large enterprises should be active in helping to formulate green and low-carbon standards and guide upstream and downstream suppliers to carry out their own low-carbon transition according to those standards. In addition, large enterprises can further review and score according to the standards, include suppliers in the performance evaluation and take reward and punishment measures to encourage suppliers to actively carry out low-carbon transition activities.
- **Strengthen database construction.** Build the carbon database of the enterprise, verify the accuracy of suppliers' carbon emissions data based on different types of materials purchased, emissions factors, quantities purchased etc., and facilitate the calculation of carbon emissions for suppliers.

## Case Study

### Junlebao Dairy: Increasing Local Farmers' Involvement in the Low-Carbon Transition through Innovative Partnerships

#### 1. About Junlebao Dairy

Founded in 1995, Junlebao Dairy Group is the largest dairy processor in Hebei Province, a leading agricultural industrialization enterprise in China, as well as a hub for Chinese dairy technology R&D. Junlebao Dairy regards green development as a primary requirement for enterprise development. Adhering to the development concept of 'green, low-carbon, circular and sustainable', Junlebao Dairy is developing a green industrial chain through a 'family ranch' model which aims to help with the low-carbon transition

and rural revitalization, while also promoting the efficient development of the dairy industry and the local economy.

## 2. Highlights

### Engaging value chain partners to implement a low-carbon transition

- **Cooperate with local farmers to implement the ‘family ranch’ model:** integrating a unified management of centralized feeding and energy-saving production models, controlling the emissions intensity per unit of cattle production, and promoting the awareness and capacity of individual farmers can reduce emissions.
- **Improve the level of information management of ‘family ranches’ to enhance the ability to reduce emissions throughout the product life cycle:** Junlebao employs information management techniques to better help emissions management. For example, by monitoring cattle activity indicators through digital equipment, farmers can scientifically track and screen cattle breeds with high yield and low regurgitation emissions, thus reducing emissions in the process of breeding. Additionally, Junlebao has built a digital silage system to monitor and reduce emissions from feed harvesting and transportation. At the same time, through the ‘family ranch’ model Junlebao aims to drive local employment, increase farmers’ incomes and improve the lives of the surrounding population.

## 3. Lessons Learned

- Consider ways to better introduce stakeholders to low-carbon activities and methods. Enterprises can examine various approaches while exploring their own carbon development models, as a way to expand their potential impact on advancing sustainable development.

## 5.1.5 Increase awareness of and action for women's equitable participation in low-carbon transition

Enterprise leaders should start by increasing their understanding of the barriers women face in a low-carbon transition and identify possible policies and initiatives to progress gender equality across the organization, and the supply-chain. This can be addressed by collecting, analysing, and using key gender data.

In addition, enterprises can work to empower women in their low-carbon transition using a more holistic, targeted approach. To this end, the Women's Empowerment Principles (WEPs) developed by United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) and the United Nations Global Compact (UNGC) serve as a useful point of reference. The WEPs are a primary vehicle for corporate delivery on gender equality dimensions of the SDGs, providing a holistic framework for businesses on how to empower women in the workplace, marketplace and community. Informed by real-life business practices and input gathered from across the globe, the WEPs can guide enterprises to better incorporate gender equality into business decisions and can be applied to low-carbon transition matters as well.

The WEPs include:

Principle 1: Establish high-level corporate leadership for gender equality

Principle 2: Treat all women and men fairly at work – respect and support human rights and non-discrimination

Principle 3: Ensure the health, safety and well-being of all women and men workers

Principle 4: Promote education, training and professional development for women

Principle 5: Implement enterprise development, supply chain and marketing practices that empower women

Principle 6: Promote equality through community initiatives and advocacy

Principle 7: Measure and publicly report on progress to achieve gender equality

A comprehensive list of resources regarding the WEPs can also be accessed as follows:



- Toolkit on WEP implementation
- WEPs Gender Gap Analysis Tool  
<https://www.weps.org/resource/weps-gender-gap-analysis-tool>
- Emerging Practices that Advance Women's Economic Empowerment  
<https://www.weps.org/resource/power-working-together-emerging-practices-advance-womens-economic-empowerment>

## Resources

### 1. UN Publications

1.2004. Gender Perspectives on the Conventions on Biodiversity, Climate Change and Desertification. Rome, FAO

<https://genderandenvironment.org/wp-content/uploads/dropbox/Policy/Gender%20Perspectives%20on%20the%20Conventions%20on%20Biodiversity,%20Climate%20Change%20and%20Desertification.pdf>

2. Gender, the Environment and Sustainable Development in Asia and the Pacific

<https://www.unescap.org/sites/default/files/publications/SDD-Gender-Environment-report.pdf>

3. Gender Perspectives: Integrating Disaster Risk Reduction into Climate Change Adaptation – Good Practices and Lessons Learned

[https://www.un.org/waterforlifedecade/pdf/2008\\_isdr\\_gender\\_perspectives\\_disaster\\_risk\\_reduction\\_cc\\_eng.pdf](https://www.un.org/waterforlifedecade/pdf/2008_isdr_gender_perspectives_disaster_risk_reduction_cc_eng.pdf)

### 2. Other resources on UN websites

1. Women, Gender Equality and Climate Change Fact Sheet

[http://www.un.org/womenwatch/feature/climate\\_change/](http://www.un.org/womenwatch/feature/climate_change/)

2. Explainer: How gender inequality and climate change are interconnected

<https://www.unwomen.org/en/news-stories/explainer/2022/02/explainer-how-gender-inequality-and-climate-change-are-interconnected#:~:text=The%20climate%20crisis%20is%20not,less%20access%20to%2C%20natural%20resources.>

3. People-Centred Climate Change Adaptation: Integrating Gender Issues

<https://www.preventionweb.net/publication/people-centred-climate-change-adaptation-integrating-gender-issues>

## Case Study

### Enviroally: Advancing a Sustainable Transition Through Gender Equality

#### 1. About Enviroally:

Enviroally is a sustainable development education company started by three young Chinese women in Guangzhou, China, aiming to integrate sustainable development and low-carbon concepts into a range of products and services for clients across the globe. The company specializes in game-based educational tools, event planning, and consulting services with a didactic approach. As a startup company, Enviroally incorporates gender equality into its sustainable development actions, such as by actively pursuing women's involvement in hiring and recruitment, office operations and management, product design, business implementation and leadership of the promotion of low-carbon product development and implementation of low-carbon actions. By the end of 2022, female employees accounted for 70% of the workforce.

#### 2. Highlights

##### Spotlighting gender equality's contribution to education for sustainable development and the low-carbon transition

- **Implementing actions towards advancing a low-carbon transition:** The operating plans emphasize public welfare and social good and foster the positive influences of women in climate change and low-carbon transition.
- **Highlighting female agency in driving climate action:** Enviroally includes female main characters and female perspectives in its climate education products. Gender concerns regarding climate change are also addressed through integrating realistic gendered scenarios in the games. Besides conducting low-carbon training sessions for employees, Enviroally supports its employees to carry out low-carbon practices in their daily lives, as well as in the workplace, such as with regards to their purchasing behaviors.

#### 3. Lessons Learned

- Gain commitment from board members and senior executives to support the integration of more concepts regarding gender equality into top-level design, throughout the entire low-carbon transition, and to take gender issues as primary

considerations in sustainable development actions.

- Reconsider an all-compassing systematic agenda. Employees of different genders deserve equal status in the organizational structure
- Provide learning and development opportunities: Be mindful of advocating and promoting female leadership, as well as helping employees to receive continuous and equal support in career and talent development.
- Create a sustainable organizational strategy and culture. Emphasize the influential potential of women in key business metrics of sustainable development and low-carbon transition, helping build equity, diversity, and inclusion (EDI) into the organizational value proposition.

## 5.2 Recommendations on low-carbon transition for policymakers and regulators

### 5.2.1 Strengthen the coordination of low-carbon market mechanisms

There are coordination problems between existing market-based low-carbon mechanisms, particularly for GECs, green power trading and ETS, owing to insufficient policy guidance and planning.

Lacking coordination between different low-carbon market mechanisms may lead to conflicting policy signals. Currently the GEC market is not connected to the national carbon market, which may cause repeated payments of environmental costs. For example, the amount of green electricity purchased by enterprises is not deducted when calculating their total carbon emissions, providing less incentive for enterprises to participate in the green electricity markets. In Jan 2022, the National Development Reform Commission (NDRC), together with other six agencies released Measures to Boost Green Consumption, indicating they are investigating the feasibility of deducting the emissions of green electricity.

The disconnection of the GEC and green power trading systems may hinder their further development. NDRC has issued policies to strengthen coordination mechanisms between

the two markets so that enterprises can more efficiently use market mechanisms to promote their low-carbon transition. In addition to these steps, more efforts are needed to accelerate research around this topic and enhance synergy among the three markets of GECs, green power trading, and ETS.



The characteristics of the Chinese system and the construction of a new mode of government-business relations have helped enterprises effectively promote and achieve sustainable development. The Chinese government has continued to optimize the business environment, empowering and inspiring companies to deepen their cooperation with the government and research institutions, promoting sustainable development and low-carbon innovation, and undertaking social responsibilities. This gives full play to the role of both an efficient market and an effective government.



—ZHU Xufeng  
Dean of School of Public Policy and Management, Executive Director of the  
Institute for Sustainable Development Goals,  
Director of the Science & Technology Development and Governance Center,  
Tsinghua University

### 5.2.2 Strengthen financial support for industries' low-carbon transition

Financial support is an integral aspect of the transition to a low-carbon economy, and financial institutions play a critical role in guiding the low-carbon development of different industries. In China, financial regulatory authorities have introduced preferential policies and provided low-cost funds to support green and low-carbon investment and financing. For example, the Central Bank has created and launched support tools for lowering carbon emissions and allocated funds for loans to support carbon reduction initiatives in key areas, including for carbon emissions reduction technologies.

Financial subsidy policies and tools can support low-carbon transition activities in various industries. Looking at advanced practices in different regions of China, enterprises that actively shut down facilities with high energy consumption and high emissions can be rewarded, and enterprises that use new energy sources such as distributed photovoltaic



power generation can be subsidized according to the amount of electricity used. Enterprises that carry out an energy-saving technical transition and achieve carbon reduction results can be given support based on the effectiveness of those results. New green and low-carbon development projects that meet relevant standards will be rewarded according to the percentage of total investment. Also, enterprises that are excelling in their low-carbon transition practices can be accorded accolades and provided with one-time subsidies to incentivize them to adopt concrete emissions reduction measures.

## Case Study

### China Construction Bank: Improving Green Financial Services in Support of Enterprises' Low-Carbon Transitions

#### 1. About China Construction Bank

China Construction Bank Co., Ltd. (CCB) is a leading state-owned commercial bank in China, which provides customers with comprehensive financial services such as personal banking, corporate banking, investment and wealth management, and has subsidiaries in many industries such as funds, leasing, trust, insurance, futures, etc. CCB has identified green and sustainable finance as a foundation of its long-term development, and has formulated “the Development Plan for the 14th Five-Year Plan Period and the Outline of 2035” and “the Strategic Plan for Green Finance Development (2022-2025)” to guide green finance efforts.

#### 2. Highlights

**Developing a series of Corporate Green Finance products and services to promote the development of green and sustainable finance**

- **Creating Green, Social, and Sustainability (GSS) Linked Bonds:** the GSS Bond Framework of China Construction Bank provides guidelines for all domestic and overseas branches and subsidiaries of CCB to issue GSS bonds for the financing or refinancing of eligible assets/projects. Net proceeds from the GSS bonds will be used to finance and/or refinance eligible green and social projects that are sorted in alignment with the SDGs, such as energy conservation and environmental protection projects. The issuance, underwriting, investment, trading and environmental benefits of green bonds are calculated consistently. By the end of the 2021 reporting period, the total net proceeds of CNY 25.56 billion raised by GSS bonds were fully

allocated to eligible green and social projects, helping to reduce 989,044 tons of CO<sub>2</sub> emissions. In addition, corporate customers can receive support in the form of establishing green bond frameworks, consulting on green bond structures, as well as organizing and executing green bond issuances in accordance with the sustainable investment requirements of green investors in the market.

- **Offering green loans:** green loans and sustainability-linked loans are available to support corporate customers in their green transition and accelerate sustainable development for green industries. To support green projects, CCB can also mobilize sister banks to form internal syndicated loans for larger industry-wide efforts. By the end of the 2021 reporting period, the balance of green loans had amounted to CNY 1.96 trillion<sup>33</sup> an increase of 35.6% over the previous year.
- **Innovating with new financial products like 'Carbon Credit' and 'Carbon Footprint':** unlike traditional green finance products, Carbon Credit is based on the carbon trading market and applies the carbon emissions quota and surplus carbon quota to the financing scheme. Carbon Footprint ties the interest rate of the bank loan to the carbon dioxide emissions of the enterprise: the lower the carbon emissions intensity or the greater the reduction, the lower the interest rate of the loan.

### 3. Lessons Learned

- Establish comprehensive frameworks, green finance committees and other related structures as required, to implement coordinated green finance efforts from the top-down.
- Employ a range of green finance products to expand financing channels and lower financing costs.
- Increase the scale of green credit, enhance support for key areas by adjusting credit structures, clarifying industry policies, innovating green financial products and other measures to promote the comprehensive green transformation of business.
- Improve data accuracy for measuring the environmental impact of investment and financing activities.



### 5.2.3 Strengthen the support structure for SMEs' low-carbon transition

In view of the problems faced by SMEs in the low-carbon transition, such as a weak capital base, a lack of knowledge and expertise and weak incentives for voluntary engagement, financial institutions should provide green finance and inclusive finance policies for SMEs, so as to broaden their sources of low-carbon transition funds.

Relevant authorities should also introduce subsidies and incentive policies to encourage SMEs' participation in the low-carbon transition. For instance, certain public authorities in EU countries have established projects to offer subsidized or free energy assessments and grants to SMEs, to help reduce their energy use and emissions and have obtained noticeable results<sup>34</sup>. Establishing clearer industry standards and guidelines would also create a more level playing field, encouraging SMEs to voluntarily pursue low-carbon initiatives.

In terms of capacity building, relevant authorities should also provide more training to equip SME personnel with the skills necessary for initiating a low-carbon transition. Additionally, authorities can support business networks to enable collaboration, knowledge sharing and knowledge transfer between SMEs and with large enterprises. Large enterprises should be encouraged to lead SMEs in their supply chain and third-party professional institutions should be encouraged to provide guidance to SMEs, to broaden access to low-carbon transition technology.

### 5.2.4 Improve ESG and carbon disclosure regulations to ensure credibility, transparency, and measurability

Currently, the information disclosed by enterprises is usually focused on past performance and accomplishments. This is due to the fact that enterprises often face technical uncertainties and difficulties when predicting and measuring emissions. To resolve this, it is recommended for regulators to provide incentives on disclosing more forward-looking plans, strategies, or measurable deliverables, and to also provide the necessary tools and instructions to benchmark ESG disclosures. They could also connect enterprises to relevant industry-specific experts who can help enterprises at any stage of their journey in developing their approach to ESG. External attestation would also help validate ESG data credibility and ensure high-quality information is provided. These types of initiatives from regulators would help enterprises of any size in their low-carbon transition process,

allowing for more transparent and structured engagement, as well as in cultivating higher levels of standardization and information symmetry for improved ESG disclosure across all industries.

Also, regulators should acknowledge and promote globally recognized science-based target (SBT) setting for carbon reduction. This will align the transitional actions of enterprises with current climate science, helping enterprises to better gauge how much and how quickly they need to reduce their emissions. The target dashboard, criteria and guidelines can clearly identify threats of potential events that could impact the enterprises' competitive advantage, reputation, compliance environment, operations, or financial health. Referencing international sustainability disclosure standards can help enterprises to develop more actionable pathways developed in line with the dual carbon goals.

### 5.2.5 Develop a comprehensive approach to ensure gender equality in the workplace

Empowering women is key to unleashing their potential in fulfilling the dual carbon goals. While laws and regulations exist in China that stipulate gender equality, women remain under-represented in technical and senior management roles across all sectors. To attract and retain more female talent in green sectors, policymakers need a more consistent and integrated approach to address the structural barriers women face in the workplace. In this regard, external frameworks can serve as useful points of reference.

Created by UN Women and the International Labor Organization (ILO) for ASEAN member states, the Women Empowerment Principles (WEPs) Public Policy Roadmap provides a normative framework on advancing women's economic empowerment in the private sector. It contains national commitments and public sector policies pertaining to the seven key areas covered by the WEPs. In the context of China, policymakers can further advance workplace equality through:

**1. Ensuring comprehensive policies and legislative frameworks to promote gender equality in the workplace.** This includes equitable access to employment opportunities and protections, and support for childcare and

other domestic and care work (including employer-supported childcare), amongst others.

**2. Improving enterprise development for women-led businesses and promoting business norms and practices conducive to gender parity.**

This can be done through supporting women entrepreneurs in gaining access to resources, financing, networks and more. For instance, relevant authorities can help in initiating business development services, accelerators and bootcamps, and set targets for percentages of senior management and boards that are women. The government can also remove regulatory hurdles to help women entrepreneurs grow and scale their businesses.

**3. Guiding and incentivizing the private sector to measure and report progress in gender equality.**

This can be achieved through setting mandates or providing guidance to enterprises to disclose their diversity policies and/or gender parity targets.

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31. China Power Sustainability Report 2021

32. The TCFD framework helps enterprises and other organizations more effectively disclose climate-related risks and opportunities through their existing reporting processes. For more information, please visit: <https://www.fsb-tcdf.org/>

33. 中国建设银行 2021 环境信息披露报告,

[http://www1.ccb.com/cn/group/esg/upload/20220719\\_1658230524/20220720162319127176.pdf](http://www1.ccb.com/cn/group/esg/upload/20220719_1658230524/20220720162319127176.pdf)

34. <https://www.interregeurope.eu/find-policy-solutions/stories/assisting-smes-in-the-low-carbon-transition>

## // Appendix

The report builds upon surveys for 218 enterprises in China and in-depth interviews with 14 enterprises. The survey was distributed online by UNDP, UNGC, PwC, and CCOIC through their respective networks between June and August 2022.

In this period, the project team conducted surveys with the enterprises in China, and based on preliminary sample data analysis, 14 enterprises that have made notable progress in either SDG implementation, low-carbon transition or gender equality were selected and interviewed. Among them, 8 enterprises were selected as exemplary case studies to be included in the report.

The report intends to present outstanding practices of SDG implementation and low-carbon transition within the context of the dual carbon goals. Moreover, it analyzes difficulties and challenges encountered during the process of a low-carbon transition to provide examples for other enterprises and promote feasible recommendations for policymaking regarding such issues. The report also includes a special section on “women and a low-carbon transition”, focusing on what enterprises are doing, and can do, to involve more women in their low-carbon transition efforts.

### Questionnaire Survey

The survey consists of 41 questions covering three areas: enterprises’ SDG awareness and practices, enterprises’ low-carbon transition practices, and the role of women in enterprises’ low-carbon transition. The enterprises’ SDG awareness and practices and enterprises’ low-carbon transition practices sections build upon the previous two reports, detailing issues related to carbon accounting and carbon disclosure. The role of women in enterprises’ low-carbon transition is a new focus of this report, which specifies general perceptions of issues regarding women and climate change and the nexus between the two, as well as the current status of women’s participation in the low-carbon transition within companies.

### In-depth Interviews and Case Studies

In selecting interview candidates, the project team followed the methodology of the previous two reports, evaluating performance by three criteria: Awareness, Action, and Ambition, or the ‘3A’ criteria. “Awareness” refers to the enterprises’ communication of their SDG-

related progress in the public domain through the environmental, social, and governance (ESG) reports; "Action" refers to the achieved results, such as having positive SDG impacts and implementing carbon reduction projects; "Ambition" refers to incorporation of the SDGs into strategic planning. Selected enterprises satisfied the 3A criteria and did not have public scandals within a three-year period. These enterprises were interviewed to share their experience of SDG implementation. The Interview questions mainly focused on low-carbon transition strategies and actionable steps, aiming to analyze the difficulties and excavate pain points encountered during the process of a low-carbon transition.

The interviews were individually scored according to the 'STAR' principle: Situation, Target, Action, and Result. "Situation" measures if higher level personnel of the interviewed enterprise can clearly describe the enterprise's efforts in SDG implementation, low-carbon transition and/or gender equality; "Target" examines the feasibility and ambition of the enterprise's targets in these 3 topics, "Action" examines if corporate measures to reach the targets are carried out comprehensively, and "Result" examines the measurable impact of such measures. Based on the 'STAR' principle, 8 companies with high overall scores were identified as suitable case studies for the report. The case studies consist of large private enterprises, SOEs, and foreign-funded enterprises, such as Lenovo, Junlebao Dairy Group, JA Solar Holdings, Ant Group, China Construction Bank, China Power and Siemens, as well as SMEs and start-up enterprises like Enviroally.

## Report's Limitations

This report may have the following limitations:

- The survey questionnaire was released through the online platform Golden Data and distributed by the UNDP, PwC, and the CCOIC. It does not follow random sampling, thus the results presented in this research only reflect the situation of the surveyed companies and should not be generalized to all enterprises in China. Given the survey distribution channel, the survey will tend to reach companies with higher sustainability awareness, likely leading to some bias in the results.
- There is limited overlap between the 218 enterprises that participated in this round of survey and the sample from the previous two waves. To improve

data comparability, the team has made efforts to align sector composition of the sample across waves, however any cross-wave comparison should be viewed with caution.

- Survey questionnaires and in-depth interviews are mainly based on the respondents' subjective understanding of the company, which may result in subjectivity when answering the survey. The perspectives of respondents might also be limited by their respective scopes of work and may not offer a holistic understanding of enterprises' macro low-carbon transition strategy.

To overcome the limitations mentioned above and avoid potentially subjective biases, this report has utilized publicly available data, consulted opinions from experts, and passed third-party audits to make corresponding revisions and adjustments during the writing process.





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# Tracking the Low-Carbon Transition of Enterprises in China

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