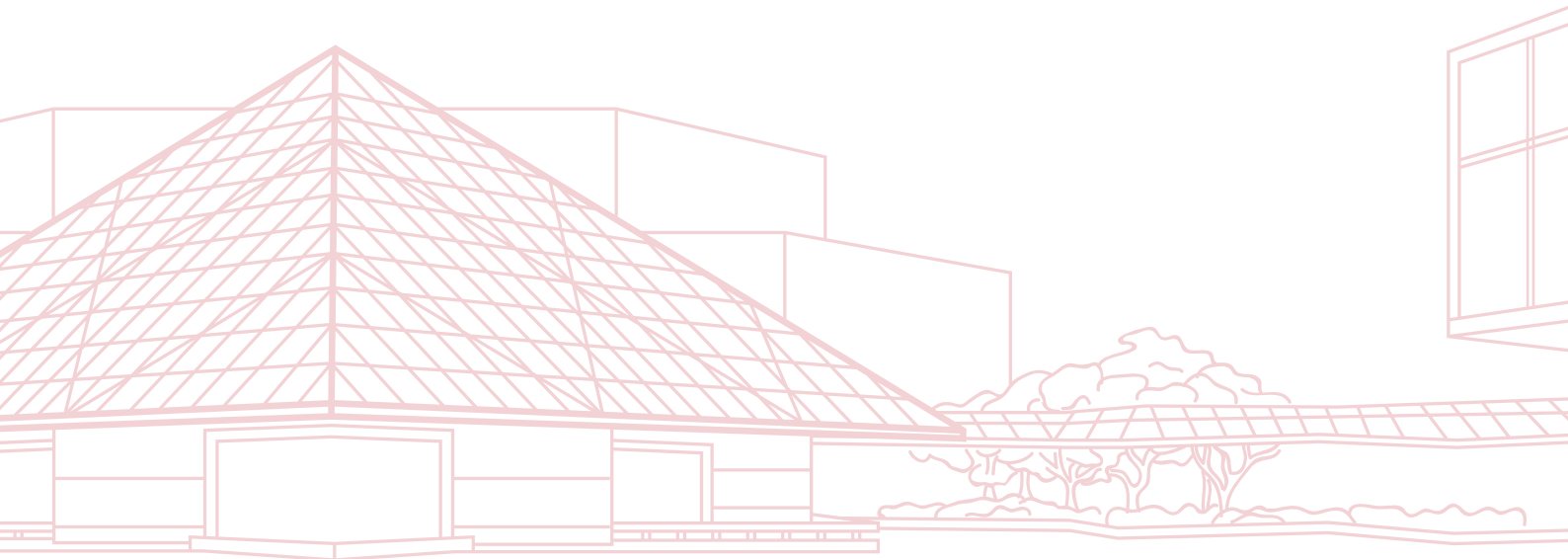


ESG

WHITE PAPER

2022



中国深度 全球广度
CHINA DEPTH GLOBAL BREADTH

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Foreword

In 2021, China launched its *14th Five-Year Plan* and committed itself to becoming carbon neutral. In light of these announcements, policymakers, investors, and companies have been placing increasing focus on environmental, social, and corporate governance (ESG) issues. In addition, companies—which form the backbone of national policies to achieve common prosperity and reduce emissions—are playing a key role in sustainable development and the transition to a green, low-carbon economy.

At CEIBS, we have witnessed the profound changes that have taken place since our inception 27 years ago, and have responded to meet the needs of a changing world. As a world-renowned international business school that ranks among the best in Asia, CEIBS is committed to the mission of educating responsible leaders versed in “China Depth, Global Breadth”. Over the past year, we have integrated the concepts of social responsibility and sustainable development into every facet of our operations, including the following specific measures:

- Incorporating the “exemplifying CSR education” initiative into the *CEIBS Strategic Plan (2021–2025)* in order to open up new vistas and opportunities.
- Stepping up ESG research to spearhead the creation and dissemination of cutting-edge knowledge about CSR and sustainable development.
- Developing a range of programs related to carbon neutrality and ESG to meet the needs of students, alumni, and the general public.
- Hosting the annual CSR forum to pool knowledge and expertise on sustainable development.
- Connecting alumni companies and business leaders with pioneers in green innovation in order to empower sustainable business practices.

While we are proud of our achievements, we acknowledge that we have a responsibility to do more. In line with our purpose of “service to alumni, contribution to CEIBS, and dedication to society”, the CEIBS Alumni Association is committed to the mission of empowering alumni and alumni companies to make a positive contribution to society. In recent years, alumni companies have demonstrated a firm commitment to CSR practices, including innovative low-carbon strategies, ESG investing, and CSR reporting. In terms of poverty alleviation, companies have shifted their focus from charitable donations to empowering local people with skills to generate their own income. Thanks to their commitment to business practices in line with the CEIBS motto of “Conscientiousness, Innovation, and Excellence”, our alumni have provided a great impetus for our successful development.

A changing world demands new ways of thinking. We hope that all CEIBS alumni will be able to make a positive contribution to responsible business practices and sustainable development. We will, as always, work with the CEIBS community to fulfill our CSR mission in the post-pandemic era and create win-win outcomes for business and society.



Dr. Wang Hong

CEIBS President



Dr. Ding Yuan

CEIBS Vice President and Dean

Introduction

Since China pledged to peak CO₂ emissions by 2030 and achieve carbon neutrality by 2060 (jointly referred to as the “dual carbon” targets), these goals are set to drive the green, low-carbon transition of the Chinese economy, and will have a profound impact on the business sector. Following an initial period of excitement and confusion, many companies are now attempting to navigate this complex topic and develop green development strategies.

The *ESG White Paper 2022* provides an excellent guide for the business community, and offers an informative, practical, and academic insight into CSR-related topics at the global, national, and company levels. Thanks to a combination of concise language, comprehensive data, and objective research methods, the *White Paper* provides a wide-ranging insight into how companies can incorporate China’s “dual carbon” targets into their CSR practices, and presents common misconceptions and risks associated with emissions-reduction strategies.

A Call for Action on Net-Zero, authored by Prof. Lydia J. Price and Prof. Laurie A. Underwood, explains how carbon neutrality is a pressing and arduous task that will require planning, resources, collaboration, and innovation. The paper presents a snapshot of the world’s leading economies, including the scale of the net-zero emissions movement, the wealth of scientific research, and the wide range of organizations that can play a supporting role. It examines the progress of businesses towards achieving carbon neutrality and prompts business leaders to consider how they can share the benefits and costs of the low-carbon transition in the face of new challenges and investment opportunities.

Review and Prospects of Practices across China’s Sectors towards the Dual-Carbon Goal, authored by Prof. He Jinyu and Wu Fan, offers a comprehensive analysis of emissions reduction policies for various types of enterprises, and analyzes how the dual-carbon goal will bring about systemic changes to China’s economy. It also sheds light on the experiences and misconceptions of companies across a wide range of sectors in moving towards the dual-carbon goal, and provides businesses with a toolbox and roadmap for adapting to macroeconomic changes and balancing financial goals with social responsibility.

The five CEIBS alumni companies/organizations described in this chapter, namely SEE, Landsea, 37 Interactive Entertainment, Saint-Gobain (China), and INCOM Recycle, are from different sectors and have contrasting growth and low-carbon strategies. Nevertheless, they are all keenly aware that CSR is not a slogan, but rather a call to action to pool efforts through innovation and collaboration. The cases on these companies and organizations provide readers with extensive insights into the business logic behind corporate practices, and will inspire more companies to think outside the box and respond to the dual-carbon targets with appropriate strategies.

The chapter “Cutting-Edge Research on ESG” comprises papers by three CEIBS professors, namely Jiing-Lih Farh, Guo Wei, and Hyun Young Park. Based on rigorous reasoning, they delve into the CSR policies of enterprises and organizations and examine their outcomes from a social perspective in order to address misconceptions and highlight potential risks.

The *White Paper* ends with “*Research on CSR Reports of A-Share Listed Companies*” conducted by Prof. Rui Meng and the CEIBS Center for Wealth Management that he chairs. This year’s report, which is more concise than in previous years, focuses on several key indicators that provide an overview of the CSR practices of A-share listed companies. Notably, the report also presents an analysis of 55 major carbon emitters in the corporate sector, providing comprehensive, data-based insights into the contributions that key emitters are making toward China’s dual-carbon targets from a number of dimensions, including region, sector, and scope and frequency of disclosure.

The *White Paper* provides an up-close look at the concepts of peak carbon and carbon neutrality. For China, achieving carbon neutrality will be especially challenging due to the scale of carbon emissions and the structure of its economy and energy mix. It is therefore crucial for companies to devise a low-carbon strategy and take effective and comprehensive action. In light of these challenges, we hope that the business and academic communities will work together to deliver long-term, sustainable growth.





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01

**INTERNATIONAL
TRENDS FOR CARBON
NEUTRALITY**



A Call for

By Lydia J. Price and
Laurie A. Underwood

Action on Net-Zero*



Lydia J. Price

Professor Emeritus, CEIBS



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Companies urgently need to start cutting carbon from their operations, and plan for achieving net zero across their entire value chains by 2050 – including drastic reductions by 2030. It's a daunting task that requires planning, resources, collaboration and innovation. In this year's chapter we explain the urgent need for action and we share ideas and experiences from the pioneering companies that have gone beyond simply making a commitment to actually launching comprehensive, effective action plans.

* Special thanks to CEIBS Research Associate Chaojie Jin for his contribution, and to the following CEIBS alumni and supporters for their advice and input to this chapter: Dmitry Andreev, Richard Brubaker, Rex Gu, Min Ko, Nikolaj Moesgaard.



“[U]ltimately, the emergency climate (situation) comes down to a single number: the concentration of carbon in our atmosphere — the measure that greatly determines global temperature...[T]he people alive now and the generation to come will ... consider one thing: did that number stop rising and start to come down as a result of commitments made here? There is every reason to believe that the answer can be ‘yes.’ If working apart, we are a force powerful enough to destabilize our planet, surely working together we are powerful enough to save it.”

Sir David Attenborough 
opening speech at COP26 in Glasgow November 2021 (COP26, 2021)

If you haven't yet made a commitment to reduce your company's carbon emissions to net-zero by 2050, you're falling behind global trends, and possibly losing the opportunity to gain advantage in the dawn of a new industrial revolution. If you have made a commitment but haven't yet determined a credible pathway to achieving it, you're keeping pace with the masses. And that's a big problem, according to scientists who warn that governments and businesses are moving far too slowly to limit global warming to 1.5°C above pre-industrial levels by mid-century – the point beyond which polar ice sheets will collapse, leading to rising sea levels, more frequent and more extreme weather events, and ultimately a shock to global economic systems and a rise in poverty (Abnett, 2021).

Net zero by numbers

- **What is net zero?**

Net zero is achieved when all greenhouse gas (GHG) emissions from human activity are balanced by GHG removal from the atmosphere (Levin et al., 2019). The path to net zero requires elimination of GHG to the extent possible through efficiency gains, material and technology upgrades, modifying behaviors, and drawdown of residual emissions by means of nature (soil, water, and trees) or technology.

- **Why zero? Why not just “less” carbon?**

Given that excess carbon launched in our atmosphere since the Industrial Age persists so long (up to 10,000 years), to stop the greenhouse effect and restore balance we must reach net zero by mid-century. If we still emit more than is absorbed by 2050, the polar ice caps will melt, triggering catastrophic effects worldwide.

- **Which gases are included in greenhouse gasses?**

Mainly carbon dioxide, nitrous oxide, and methane.

- **Which industries / sectors emit the most GHG globally?**

Manufacturing (cement, steel, plastic) 31%; Electricity 27%; Agriculture (animal and plant) 19%; Transportation 16%; and Temperature control (heating, cooling, refrigeration) 7% (Gates, 2021).

In the wake of the November 2021 COP26 climate conference in Glasgow, analysts applauded the quickly rising number of national and corporate *long-term* commitments to reach net-zero by 2050; at the same time, they bemoaned the lack of associated *interim plans* to reduce emissions by 50% in comparison to 2010 levels by the year 2030. Without that steep and rapid drop in aggregate global emissions by 2030, the IPCC (Intergovernmental Panel on Climate Change) believes the path to net-zero by 2050 becomes untenable (Masson-Delmotte et al., 2018). Experts, analysts and activists therefore are calling for coordinated *action now* to put 2030 carbon reduction plans into practice, aligned with realistic commitments and strategies to phase out fossil fuels within a few decades. Failing to act raises the risk that later moves to curb climate change will necessarily be extreme: hefty taxes, crippling legislation, and abrupt disruptions to businesses and communities.

The transformation to carbon neutrality^① will be vast, fast-paced and chaotic according to analysts. To help you prepare, we've compiled data and expert assessments of national and corporate-level achievements, along with expert insights about getting started, overcoming challenges, and staying on track. We'll also give a view of developing technologies designed to accelerate progress, and the major alliances being formed to share the gains and the costs of transformation. Finally, we share lessons from outstanding companies and organizations emerging as role models toward net zero.

IPCC Reports Grave Risks for Missing 1.5°C Target

An August 2021 report by the UN-created Intergovernmental Panel on Climate Change (IPCC) has been called a “code red” warning for humanity, grimly stating that: “unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach,” (IPCC, 2021).

The report confirms that human-made GHG emissions have already triggered an increase of 1.1°C since around 1900, and details the grave consequences of a 1.5°C rise as “increasing heat waves, longer warm seasons and shorter cold seasons,” while the impact of a 2°C increase will be catastrophic in many cases: “heat extremes would more often reach critical tolerance thresholds for agriculture and health.”

GLOBAL PROGRESS TOWARDS CARBON NEUTRALITY

Recent forecasts by researchers at the *U.N. Environment Program*, the *Environmental Energy Agency* and the *Climate Action Tracker* show global warming in the range of 1.8-2.1°C by 2100 if all 196 countries in the Paris Agreement fulfill their commitments to achieve net-zero by 2050. However, based on existing 2030 interim action plans to achieve those goals, the same agencies warn of significantly higher temperature increases of 2.6-2.8°C (Kaplan and Birnbaum, 2021) – scenarios which threaten the preservation of life as we know it. The risk perception is shared by nearly 1000 global leaders surveyed for World Economic Forum’s annual *Global Risks Report*, who see *Climate Action Failure* as the number one risk on a global scale over the next 10 years (World Economic Forum, 2022).

Climate Action Tracker notes that many countries need to increase their ambitions on long-run carbon cutting pledges. Even more urgently, though, governments need to enact policies and provide the financing to turn net-zero pledges into reality. Policy support is needed to eventually phase out fossil fuel production, to accelerate the decarbonization of high intensity sectors and to assure financial markets that the looming economic transformation will be orderly. Financing is needed for research and development, as well as climate mitigation and adaptation projects in developing economies which face the greatest immediate risks of climate disaster, yet have the smallest carbon footprints and the least resources available to help themselves (Climate Action Tracker, 2021). Without concrete plans and strategies, along with regulating mechanisms to assure continuing progress, many of the current pledges will amount to mere “greenwashing^②”.

Coordinated Global Action

The United Nations (UN) leads global coordination on climate change mitigation and adaptation. A key platform for their work is the annual Conference Of Parties (COP) at which nations report progress and plans, and negotiators hammer out deals for future cooperation. The COP26 meeting in Glasgow in November 2021 was notable for a vast increase in

① Carbon neutrality: carbon neutrality, i.e. net zero, is achieved when all greenhouse gas (GHG) emissions, both direct and indirect, are balanced (every year) by means of nature or technology.

② Greenwashing refers to organizations or businesses that misrepresent or exaggerate their environmental efforts without investing resources in real environmental action.

active participation by business executives and investors who recognize the growing risk of climate-related disruptions to operations and long-run value creation. Conference attendees agree that a sense of urgency was palpable in Glasgow, and that parties showed increased willingness to do their part for climate change mitigation. Nevertheless, questions remain about the potential for timely follow-through.

Key achievements of COP26 (UN, 2022):

- **A commitment to “phase down” coal power, and “phase out *inefficient*” fossil fuel subsidies.** Until the final moments, COP negotiators pushed for stronger wording to “phase out” coal and *all* fossil fuel subsidies, but a compromise was struck that renders the commitments voluntary rather than binding. Though the compromise agreement is less than what is scientifically needed, negotiators noted that this is the first time any agreement has formally recognized the need to abate fossil fuel use.
- **Completion of the Paris Rulebook**, which specifies how the 2015 accord is to be achieved. An important component is a set of guidelines for transparent and rigorous carbon accounting to facilitate the development of a global carbon trading market allowing countries that struggle to meet their NDC commitments to buy credits from others exceeding their formal obligations. Experts expect a boom in voluntary carbon markets as a result, but questions persist about whether the price of credits will be high enough to incentivize countries to shift to renewable energy, and preserve resources including trees, water, and soil that store carbon in natural sinks.
- **Agreement that climate financing is critical.** The conference yielded mixed outcomes on climate financing. On one hand, countries recognized the need to fund climate adaptation and resilience-building in developing parts of the world. The Glasgow Pact calls for a doubling of previous climate adaptation commitments. On the other hand, the conference did not hold developed countries accountable for their failure to deliver on a promise of \$100 billion a year in funding for developing countries by 2020. The deadline for that promise instead was moved back to 2023.
- Outside the formal agreements of the Glasgow Pact, numerous voluntary commitments were made by groups of countries, companies, and industries. Notably:
 - 103 countries pledged to **cut methane** emissions by 30% by 2030.
 - 137 countries pledged to **stop deforestation and land degradation** by 2030. CEOs of 30 major financial institutions committed to stop investments in activities linked to deforestation.
 - Major car makers agreed with national and city leaders to **halt sales of combustion engine cars** by 2040 at the latest.
 - More than 450 public and private financial institutions that control USD 130 trillion in assets pledged under the leadership of the **Glasgow Financial Alliance for Net Zero (GFANZ)** to actively support the **UN Race to Zero**, which requires members to commit and actively work toward achieving net zero by mid-century and a drop of 55% in emissions by 2030.
 - More than 40 world leaders signed on to the **Breakthrough Agenda**, launched by U.K. and intended to make clean technologies the most accessible and affordable options globally in sectors that currently account for high levels of emissions. The Glasgow Breakthroughs set 2030 as the target date for affordable and accessible power, steel, road transport, hydrogen, and agriculture (Climate Champions, 2021).
 - The International Financial Reporting Standards (IFRS) Foundation finalized the creation of an **International Sustainability Standards Board (ISSB)** that will specify high quality disclosure requirements to meet the needs of investors (Baker, 2021).

National and Regional Actions

Consulting company KPMG scored and ranked 32 countries to form a “Net Zero Readiness Index” (NZRI) for 2021. The scores are a composite of two key dimensions: 1) national preparedness and 2) sector readiness in the five highest GHG emitting sectors (KPMG, 2021). NZRI 2021 shows that **better prepared countries have made their net zero commit-**

ments legally binding in laws and regulations. They invest in R&D, and their policies and subsidies support the emergence of clean energy and other clean tech sectors. Perhaps unsurprisingly, they also tend to be wealthier. Furthermore, the report notes that national preparedness and sector preparedness are correlated, reinforcing the need for governments and industries to align in their net zero ambitions and actions.

European countries generally outperform those from other geographies in their readiness to achieve net-zero targets, according to KPMG. Seven of the 10 highest scoring countries on the NZRI are in Europe, benefitting from strong legal, political and social support, as well as advanced investments in clean technologies. **Each also has taken decisive action to cut emissions in sectors of high impact.** Despite these early wins, KPMG argues future progress might be slowed by idiosyncratic national blocking factors including resistance to taxes, difficulties in retrofitting older homes and buildings, and historical economic strengths in high emission sectors like farming and agriculture or fossil fuel exports.

China (NZRI rank #20) and the United States (NZRI rank #14) are the world's leading emitters of GHG and both have pledged to take decisive action to mitigate carbon in coming decades. In April 2021 during the leadup to COP26, the two countries signed a joint declaration to work together to close gaps needed to cap climate change at 1.5°C. China's top climate negotiator announced that, regarding climate issues "there is more agreement between China and US than divergence" (BBC, 2021). Despite this welcome pronouncement, economic and political realities make it hard for either country to achieve its goals. The U.S. struggles with dysfunctional political division and heavy reliance on natural gas as a transitional fuel toward carbon neutrality whereas China is hampered by reliance on coal to fuel its continuing economic growth.

The best-prepared countries for carbon neutrality do the following:

- Make net-zero commitments legally binding
- Invest in clean tech R&D
- Support technology shifts with policies and subsidies
- Cut emissions decisively in high impact sectors
- Coordinate the actions of government and business

Source: KPMG, 2021

European Union and United Kingdom

Several European countries have set early targets for carbon neutrality: 2030 in Norway (NZRI #1), and 2045 in Sweden (NZRI #3) and Germany (NZRI #5). Those three countries are strong in **decarbonizing the transport sector** by means of tax incentives, infrastructure investments and policies to support electric vehicles. U.K., Denmark (NZRI #4) and France (NZRI #6) lead in **decarbonizing electricity and heat sources** by shutting down coal generation (U.K.) or boosting renewables including offshore wind (Denmark and France). Norway, U.K., Denmark, and Germany are world leaders in **decarbonizing the industrial sector** and nurturing clean tech companies. European countries also have mechanisms to **include the voice of citizens** and experts in carbon decision making: U.K.'s Independent Committee on Climate Change, Germany's strong Green political party and France's Citizen's Convention, for example.

The United Kingdom is a leader in **carbon and energy reporting requirements**. Large companies have been required to report their energy use and carbon emissions in annual Directors' Reports since April 2019 (UK Government, 2021). Last year, the country tightened requirements for large listed companies to report according to internationally recognized recommendations of the **Task Force on Climate-related Financial Disclosures (TCFD)** (Akin Gump, 2021). Reporting transparency will help reassure U.K. investors that climate financing brings predictable risks and returns.

An important unifying element for European countries is the Green New Deal, signed by the European Commission

in December 2019, to commit EU countries *in aggregate* to net zero GHG emissions by 2050 (European Commission, 2019). A new European Climate Law approved in June 2021 made the 2050 commitment legally binding, and set a 2030 interim target of lowering emissions by 55% relative to 1990 levels. Soon after, in July 2021, the European Commission released a package of policies termed “Fit for 55” to enact the new 2030 commitment (Van Hoof, 2021).

If approved by the European Parliament and the Council, “Fit for 55” policies will back up the 2021 Climate Law. Emissions will be cut through multiple pathways:

- More ambitious renewable energy production targets and energy efficiency targets for member states;
- A ban on the sale of combustion engine vehicles by 2035 and an increase in electric vehicle charging infrastructure;
- Limits on the allowable content of GHG in transport fuels and higher taxes on heavily emitting transport modes;
- Imposition of a border price on carbon embedded in iron, steel, cement, aluminum, fertilizers, and electricity imports;
- Increases of carbon capture from natural sinks like forests and agricultural land.

Fit for 55

Europe’s “Fit for 55” policies include a **Carbon Border Adjustment Mechanism (CBAM)** that will equalize the price of carbon between products produced domestically and those that are imported (European Commission^a, 2021). The tax will prevent heavily emitting sectors from simply offshoring production, and will incentivize non-domestic producers to lower their own carbon emissions. The mechanism will be introduced in phases, beginning immediately with basic inputs to production, then expanding to include finished goods by 2026.

Europe is also notable for attention to delivering a just transition to carbon neutrality. Officials are acutely aware that rising fuel and energy prices will disproportionately harm low-income consumers and households. Job losses from shuttering fossil fuel industries will also cause livelihood disruptions. Though political and social debates rage about the best way to fund and implement social protection initiatives (Taylor, 2021), it is likely that social support will soften the blows of the economic transformation for European citizens.

United States

The United States rejoined the Paris Agreement in January 2021, raising hopes that a new era of climate leadership was underway. Following the successful example of states including California, **President Biden has taken a whole-of-government approach to climate management.** He set an ambitious target for 2030 to cut the nation’s GHG emissions by 50-52% relative to 2005 levels, then drafted policies and regulations to act on the target. To oversee and coordinate climate actions he established a **White House office of domestic climate policy** and appointed an international climate envoy (New York Times, 2022). Biden aims to generate well-paying U.S. jobs and advance environmental justice by means of his climate initiatives (White House^a, 2021). **Drawing on executive authority to generate early wins,** he is using regulation to cut emissions of carbon and other GHGs. He’s also pushing government agencies and departments to put climate change at the center of everything they do (Wernick, 2021).

Despite the early optimism, Biden’s plans are encountering huge roadblocks. A bitterly divided Congress resists his legislation and budgets, and fossil fuel advocates are suing in U.S. courts to block enactment of new regulations. In November 2021, Congress managed to pass a Bipartisan Infrastructure Deal that will expand passenger rail networks and install a national base of electric vehicle charging stations, boost the electric grid and clean energy transmission, and

enhance the resilience of physical and natural systems to climate risks. In addition to these direct investments in climate technologies, the deal will boost demand for steel, cement and building materials, offering an opportunity to fuel the growth of low carbon alternatives in these most-difficult-to-abate sectors. The bill also includes provisions to reduce injustices to communities of color (White House⁸, 2021). Bigger climate control initiatives are embedded in a Build Back Better bill that, as of early 2022, is stalled in Congress with limited prospects of near-term approval. Fiscal conservatives object to the bill's price tag, and representatives from states reliant on fossil fuels have dug in their heels. Without that bill, the U.S. will struggle to deliver fully on its carbon neutrality pledges.

The bright spot for the U.S. lies with state, city, and private sector initiatives immune to national inertia. Importantly, these groups have strengthened their alliances and coordinated action in recent years as a bulwark against possible moves to slow or thwart progress at the national level (Barnes et al., 2021). As of August 2021, **13 states and U.S. territories had set 100% clean or renewable portfolio requirements for electric utilities, with deadlines ranging between 2030 and 2050. An additional four states and territories have goals of 50% or more** (NCSL, 2021). There is variation in the terms and provisions of individual policies, and some states that previously specified GHG limits have let their commitments expire; but overall, the trend toward local decarbonization of electric systems is fueling reliable growth in renewable- and clean-energy markets. Large U.S. companies complement the work of governments by signing power purchase agreements and investing in renewable energy infrastructure to enable fulfillment of their own net zero commitments. The combined public and private activities result in a vibrant U.S. clean energy market.

California, which would be the world's fifth largest economy if it were a sovereign nation, and which faces grave climate-related threats, **is a leader in cutting emissions and decoupling its economy from carbon** (Barnes et al., 2021). The state's success is attributed to a history of progressively tighter laws and policies that have lowered GHG emissions since 2006 (Berkeley Law, 2022). Emission targets are ambitious and grounded in science, and data are routinely collected and analyzed to keep the programs on track and point the way to needed adjustments. Funding is assured through transpiration taxes and revenues from a successful carbon cap-and-trading system. There is broad-based support for government actions because change is continuous but incremental, public input is solicited on major new initiatives, and revenues collected from the system are reinvested in transportation, clean energy, natural resource preservation and community protections. The cap-and-trade program is overwhelmingly considered a success. Clear policies, effective oversight, and an impressive track record have made the state a magnet for clean tech developers and investors, attracting USD 3.4 billion in clean tech venture capital investments since 2019.

Secrets to California's Cap-and-Trade Success

- Legally binding carbon limits that tighten over time
- Gradual expansion of sectors included in the limits
- Rules that reward the most cost-effective GHG cuts and recognize the need for businesses to continue growing as carbon is lowered
- Continuously rising price for emission permits
- Strict compliance and oversight
- Continuous improvement

Source: California Climate, 2022

China

The world's largest energy producer, largest energy user, and (since 2006) largest GHG emitter (Vidal and Adam, 2007), China is now responsible for 26% of the planet's greenhouse gasses (Vallejo, 2021). As such, China's role in the global net-zero campaign is critical, and recent years have seen the nation emerge as both a leader and a challenger to the mission.

On the positive side, experts report that **much of the world's most advanced research in alternative energy is now underway in China**. From R&D to pilot projects to legislation, China is leading across the spectrum of renewable energy development. Today, the nation is not only the world's top producer of solar energy and wind power by a large margin (Hove, 2020; Reuters^a, 2021; Reve, 2021), but has also – since 2018 – produced and purchased more EVs than the rest of the world combined (Bradsher, 2021).

Also positive have been China's increasingly stringent policies to support net zero. In 2020, Beijing reinforced its **commitment to “30-60” targets** (carbon emissions peaking^③ in 2030, carbon neutrality by 2060). In May 2021, China ordered domestic power plants to add 90 gigawatts of wind and solar power to the national grid by year's end – backing up the government's promise to increase total usage of non-fossil fuels from 15% to 20% by 2025, and to 25% by 2030. China has also pledged to cut carbon intensity by 65% of 2005 levels by 2030 (carbon intensity is the number of grams of CO₂ emitted to create one kilowatt hour of electricity) (Reuters^b, 2021).

Experts are also optimistic about binding commitments toward net zero in China's recent **“Five Year Plans”** (FYP). The 13th FYP saw reductions of both carbon (-18%) and energy (-15%) intensity, and the 14th FYP (2021-2025) has been praised for continuing these reductions. Also, four of the plan's 20 “indicators” on economic and social development focus on energy or climate change, including half of the “binding” targets -- showing strong government commitment to achieve these goals (Liu et al., 2021).

One change which is sparking some optimism: The current FYP sets a GDP growth rate target only for 2021 (6%) – not for the last four years. Easing the pressure to achieve specific GDP targets could speed efforts to reduce carbon. The Centre for Energy and Clean Air (CREA) predicts that if China's GDP growth rate continues at 5-6%, the nation will also see CO₂ emissions rise by 1-1.7% in the coming years.

In another sign of progress, **decarbonization planning is trickling down from the central government to local regions and large companies**. In 2021 Guangdong, Jiangsu, Hainan Island, Beijing, Shanghai and many other locations across China rushed to release carbon reduction plans. Many of China's largest SOEs -- including State Grid Corporation of China and steel giant China Baowu – have followed suit (Downs, 2021; Reuters^a, 2021). Also promising: China's Big 3 national oil companies – CNPC, Sinopec Group, and CNOOC -- have committed to peaking carbon emissions by 2025 and reaching “near zero emissions” by either 2050 or 2060 (Downs, 2021).

One problem: some analysts expect China's energy consumption to peak in 2035, not 2030 (Xu and Chen, 2020), adding **pressure for a very rapid decrease in carbon in the final years before 2060**. Helping in this effort, however, is China's continuing population decrease coupled with eventual slowdown in the urbanization rate – two factors leading some analysts to expect the Chinese government to achieve upcoming goals through reigning in construction and manufacturing.

One of the biggest continued concerns is China's **reliance on coal** as an energy source. The nation now mines and burns half of the total global consumption of coal (Earth, 2021) and has come under fire for its role as financier for new coal-powered energy plants in developing nations worldwide (Schiermeier, 2021). While China met its commitments to cut the percentage of coal consumption in its total energy mix from 64% to 57% under the 13th FYP (GMW, 2021) and added

^③ Peak carbon emissions: Typically, CO₂ emissions go up, hit a peak, plateau, and then fall. In this sense, “peak carbon emissions” could be a turning point, after which a country or region will find its economic and social development no longer commensurately reflected in CO₂ emissions, in other words, economic growth will not come at the cost of increased emissions of carbon dioxide. Therefore, “peak carbon emissions” could be a milestone in the transition to a green, low-carbon economy.

new commitments in the 14th FYP (National Energy Administration of China^a, 2020), last year domestic coal production still reached the highest level since 2015 (Ambrose, 2022). This is largely due to a nationwide drought which cut production of hydropower dramatically. Fears of possible energy shortages during the winter of 2022 made the phasing out of coal even more problematic (China Comment, 2021).

China's Net Zero Accomplishments

Due to strong government support for and clear goals on carbon cutting, China has leapt into a leading position in several key aspects.

- **R&D, pilot projects and startups in renewable energy:** including solar, wind, hydro and hydrogen and (more controversially) nuclear fusion.
- **National carbon emission trading market launched in 2021:** China has become the world's largest carbon emissions trading system.
- **EV Sector** – China not only makes and buys more EVs than the rest of the world combined, but is now building EV factories faster than the rest of the planet (CNBC, 2021).
- **Sustainable, high-tech agriculture** – Following a surge in organic farming since 2005, China also outpaces the world in tech-assisted farming using drones and other devices. (Scott and Si, 2020; Makichuk, 2020)
- **Green building** – China boasts the fastest growth-rate in LEED projects worldwide and is 2nd only to the US in the number of LEED certified construction projects (Zheng, 2021).

Key Lessons from Global, Regional, and National Actions

It is clear that government regulations, policies and financial packages heavily influence the speed and direction of decarbonization efforts. To achieve net zero by mid-century, governments and businesses will have to closely cooperate to balance environmental and financial imperatives. There is solid progress towards net zero in European countries where macro commitments are legally binding, but micro implementation efforts are flexible to reflect the needs and abilities of different regions and industries. There is also progress in California and China where binding top-down targets get tighter and tighter over time, allowing companies to gradually adjust. Though flexibility is essential to maintaining the delicate environmental-economic balance, governments must simultaneously send clear signals to assure investors and early change makers that their efforts will yield gains (Fankhauser, 2021). They also must prevent carbon leakage from companies offshoring their footprints, and maintain a level playing field for regions and industries that move faster than others to decarbonize. Europe's proposed CBAM may be an early indicator of how carbon pricing will be used to assure that geographies move in tandem toward achieving difficult long-term goals.

In addition to supporting companies, well performing governments listen to, and address the concerns of local citizens to guarantee climate justice. Decarbonization is by nature disruptive, and if done poorly, could trigger demonstrations as prior shocks have done in Europe, or feed political stalemate as seen in the United States. By pricing carbon and redistributing proceeds to community preservation or technology innovation that attracts entrepreneurs and investors (as California has done), governments can sidestep many of the social strains that accompany change. Moreover, global markets and communities must not be neglected as national governments plan to ease social unrest. Climate Action Tracker describes EU, USA and China as "insufficient" in meeting 'fairness' obligations' to support less advantaged countries outside their borders (Climate Action Tracker, 2021). As the Covid pandemic has illustrated so vividly in recent years, developed countries need to support developing economies with financing, and also shared technologies, to maintain global stability in the face of massive disruption.

At the company level, starting the work of decarbonizing today, either under mandate or voluntarily, will help to avoid potential shocks when the controlling grip of government ultimately tightens, as seems inevitable when 2030 and 2050 deadlines loom near. Early movers can seek tax breaks, fast-track licensing and approvals already emerging in countries with tight and binding carbon deadlines. And once a region has been flagged for favorable government and industry support, innovators, entrepreneurs, and financiers should flock in, helping to build buoyant low carbon economies that will lead in a newly decarbonized world. Pioneers have begun the journey into this new world, and we turn now to sharing their experiences with you.

BUSINESS SECTOR PROGRESS TOWARD CARBON NEUTRALITY

Like many countries, large multinational companies have been drafting carbon neutrality commitments for 2050 without adding the much-needed action plans for 2030. The scale and scope of the problem has led critics to warn of a looming crisis in ‘carbon washing’. Some worry that corporate procrastination is encouraged when experts stress the need for 2050 target-setting instead of carbon cutting today. Others warn that company plans – when they exist – rely too heavily on offsetting emissions with carbon credits^④, and not enough on cutting emissions directly from operations. Substantial efforts are underway by international agencies and regulatory bodies to close these loopholes and tighten the guidelines needed to navigate the ongoing economic transformation. **Key takeaway #1: Effective business leaders must be alert to the possibility of greater controls on carbon emissions and carbon reporting requirements as we approach 2030.**

In contrast to the voices of climate alarmists, many consultants and financial advisors speak of opportunities to lead and profit from the decarbonized world of the future. Traditional businesses are experimenting with emerging materials and low-carbon processes, while forging new alliances and adding new products and services. There is growing demand (and supply) for qualified carbon-cutting advice and support. Fueling that trend, scientists and entrepreneurs are testing innovative cutting-edge technologies and business models. **Key takeaway #2: Effective business leaders must recognize new business and investment opportunities in the emerging low-carbon world.**

Evolving Carbon Reporting Requirements

The audience for company ESG^⑤ reports and net zero plans has shifted in recent years from sustainability experts and activists to mainstream financial investors tasked with lowering portfolio climate risk (Mattison, 2022). This change has triggered an uptick in public scrutiny of published reports and plans. Vague claims that lack supporting data and credible evidence of progress in lowering GHG emissions toward scientifically-sound targets will increasingly be challenged by investors and regulators alike. One example: Exxon Mobile was called out in early 2021 by Engine No.1 investing firm for its plan to cut emissions intensity rather than absolute volumes. The firm first publicly denounced Exxon as ‘disingenuous’ and far too slow in addressing its climate risks (Crowley, 2021) then launched a proxy battle which eventually succeeded in appointing three of Exxon’s board members (Herbst-Bayliss, 2021).

Mindful that more than USD 35 trillion – a third of all global investments – went to some form of ESG strategy by summer of 2021 (GreenBiz, 2022), national and regional regulators have vowed to tighten the rules for sustainability reporting. Today, India, China and UK already have mandatory climate risk reporting requirements in place; other nations – including the US, Singapore and Japan – are considering it (Fernandez, 2021) .

^④ Carbon Credit: carbon credit, i.e. carbon right, is a unit of measurement of carbon emissions that is certified by the United Nations or a UN-recognized emissions reduction organization under which a country or company reduces carbon emissions by increasing energy use efficiency, reducing pollution, or reducing development, and therefore receives access to the carbon trading market. See <https://baike.baidu.com/item/%E7%A2%B3%E4%BF%A1%E7%94%A8>.

^⑤ ESG, an abbreviation for environmental, social, and governance, is a set of standards for a company’s operations. CSR and sustainability-conscious investors apply these non-financial factors as part of their analysis process to screen potential investments.

Climate Reporting Regulations are Tightening

- Finance ministers and central bank governors of G7 countries agreed in June 2021 to mandate climate-related financial reporting according to **TCFD guidelines** (Caswell, 2021).
- The U.S. Securities and Exchange Commission (SEC) issued a call for investor comments on climate disclosure in 2021 (SEC, 2022). With more than **75% of comments in favor of greater reporting oversight**, SEC is expected to issue new guidelines soon (Gensler, 2021).
- EU introduced the **Sustainable Finance Disclosure Regulation (SFDR)** in March 2021 to increase the transparency about ESG themed products among certain types of investment firms (Intuition, 2021).
- The Chinese Ministry of Ecology & Environment issued trial **Guidelines for the Verification of Enterprise GHG Emissions Reports** in March 2021. The policy clarifies emission reporting, verification processes, and information disclosure and review for “key emission units”(i.e., large enterprises or those in target industries). Provincial level authorities are now charged with verifying GHG emission reports based on scientific research.

A newly created **International Sustainability Standards Board (ISSB)**, launched in November 2021 by the International Financial Reporting Standards Foundation (IFRS) aims to introduce sustainability reporting standards that will be adopted worldwide. IFRS oversees IASB accounting standards that are required in more than 140 jurisdictions and are accepted in many more (IFRS, 2021). ISSB standards, once issued, are expected to receive similar global acceptance.

What to Look for in Current Climate-related Disclosures

- Science-based targets that align with UN guidelines for 2030 and 2050
- Adherence to globally accepted climate reporting protocols such as Carbon Disclosure Project (CDP) or Taskforce for Climate Related Financial Disclosure (TCFD)
- Concrete data to verify carbon cuts in company operations and supply chains rather than over-reliance on offsets.

Evolving Collaborations

Supplier Partnerships

Even companies that currently lead in cutting carbon emissions have limited their work primarily to “scope 1” – i.e., direct emissions from owned or controlled sources -- and “scope 2”-- i.e., emissions arising from purchased electricity, steam, heating and cooling. They now face rising pressure to cut indirect “scope 3” emissions that occur along the company’s value chain (Carbon Trust^a, 2022). In many industries (especially B2C), scope 3 emissions are far greater than those of scopes 1 and 2, and harder to manage. Cutting upstream supply chain emissions is often hindered by a lack of transparency and data, as well as limited means for suppliers to maintain profitability while adapting to new realities. What’s needed for action is wide-reaching collaboration to solve problems at the systems level rather than for individual companies. **Going forward, suppliers to major multinationals can expect greater demands for transparency and carbon cutting commitments, along with invitations for collaboration and mutual support.**

A new report by World Economic Forum (WEF) and Boston Consulting Group (BCG) cites consumer goods as an example in which upstream costs of decarbonization in materials such as steel and aluminum are very high relative to product margins, but the costs of these same materials are a small fraction of end-user prices. Vertical collaborations that share the costs of decarbonization with end users may be a reasonable solution, particularly for products for which consumers express a willingness to pay more for environmentally friendly options (BCG, 2021). Of course, collaborations are easier said than done, but large multinationals are starting to coordinate under the **1.5° Supply Chain Leaders initiative** (Exponential Roadmap, 2022). Member companies including BT, IKEA, Nestle, Ericson, Microsoft and TechMahindra have signed a pledge to recognize supplier commitments and performance toward net zero as key purchasing criteria and considerations for contract renewal. The pledge also requires large buyers to support SME suppliers with tools and knowledge through the UN backed SME Climate Hub.

8 Supply Chains Account for Half of Global GHG Emissions

A report by the World Economic Forum (WEF) and Boston Consulting Group (BCG) says 50% of global GHG emissions come from the supply chains of: food, construction, fashion, FMCG, electronics, automotive, professional services and freight, in decreasing order (BCG, 2021). Moreover, the analysts note that 40% of supply chain emissions can be abated with currently available technologies without appreciably raising final product costs.

European governments are supplementing voluntary industry moves with new regulations for supply chain transparency. The EU Parliament is considering a proposal to require supply chain due diligence of all large companies operating in the European Union regardless of where they are registered (Da Costa et., 2021). Once enacted, the directive will mandate risk identification, including climate risk, as well as risk remediation. Though national laws are not expected before 2023, companies are already starting to prepare.

SME Partnerships

Small and medium sized enterprises (SMEs) struggle to define and deliver on net zero goals because of limited resources. Among other challenges, they lack personnel to conduct carbon audits and submit reports, they have limited influence over carbon emitting equipment and facilities that they rent rather than own, and they lack power in price negotiations for new materials and supplies (Makower, 2021). Though carbon footprints may be small for SME businesses individually, their collective impact is large and until now was largely ignored in global climate management discussions. No longer. The **SME Climate Hub** has been launched by We Mean Business Coalition, Exponential Roadmap Initiative, International Chamber of Commerce, and United Nations Race to Zero campaign (SME CLIMATE HUB, 2022). SME members of the hub are encouraged to sign the UN's Race to Zero commitment, giving them access to tools, resources, and purchasing interest of large companies that have joined the 1.5° Supply Chain Leaders initiative (see above Supplier Partnerships). Tools currently available in the Hub offer detailed advice about setting targets, measuring emissions and taking actions that align with 1.5° commitments.

Business and financial software company Intuit similarly created a **Climate Action Marketplace** that gives SMEs access to products and services of climate solution providers in energy, travel, food waste, commuting and procurement (Hilmer, 2021). The marketplace is instrumental to the company's November 2021 pledge to help 1 million American SMEs to cut their emissions in half by 2030.

Four Tested Resources for Corporate Net Zero Plans

Searching for resources to launch or expand your corporate commitment? We recommend these detailed guidelines

- **Science Based Targets Guidance** – These sector-specific reports help companies of any size to understand the scientific requirements for cutting scopes 1, 2, and 3 emissions in their industry. They also include case studies and descriptions of best practices in scientific target setting among industry players across the value chain (<https://sciencebasedtargets.org/sectors>).
- **The 1.5°C Business Playbook** – Jointly released by the Exponential Roadmap Initiative and the Race to Zero Campaign (SME CLIMATE HUB^b, 2020), these step-by-step guidelines for transforming to net-zero include reducing emissions (direct and value chain), integrating climate into business strategy, and influencing climate action in society (<https://exponentialroadmap.org/1-5c-business-playbook>).
- **Carbon Trust's Journey to Net Zero (for SMEs)** – Leveraging Carbon Trust's network of 300 multinational climate experts and 3000 partner organizations, this document outlines best practices for SMEs to begin on the path to zero, as well as detailing and advising on the most common stumbling blocks (Carbon Trust^b, 2022) (<https://www.businessgrowthhub.com/resource-efficiency/journey-to-net-zero>).
- **B-Corp's guidelines for SMEs and larger businesses** – B Lab UK, creator of B Corp certification, offers "How to get to Net Zero" for SME's (UK B Corps^a, 2020) (<https://pardot.bcorporation.net//39792/2020-12-17/9I93dt>) and "How to Declare a Climate Emergency and Take Climate Action," for larger firms (<https://pardot.bcorporation.net/climateemergencyplaybook>). Both documents draw on the collective knowledge of 900 certified B Corps in 50 countries (UK B Corps^b, 2022).

Industry Buyer Partnerships

Buyer Collectives accelerate the emergence of innovative climate solutions by accumulating sufficient demand to justify production investments by suppliers. Aligning behind a given sustainable technology, product, or service, these collectives also help to lower the risks and associated costs of change.

- Collectives in the air transport sector support the advance of **Sustainable Aviation Fuels (SAF)** which could cut 80% of lifecycle emissions compared to conventional jet fuel. The two leading collectives -- Sustainable Aviation Buyers Alliance (SABA) and Eco Skies Alliance (ESA) – bring together airline industry leaders with corporate customers who aim to offset emissions from company travel. Current members of SABA include Bank of America, BCG, Deloitte, JP Morgan Chase, McKinsey, Microsoft, Netflix, and Salesforce (<https://rmi.org/saba/>) while ESA includes founder United Airlines along with BCG, HP, Nike, and Siemens as well as logistics companies DHL, Maersk and Yusen Logistics (<https://www.united.com>).

- **Steel Zero** members commit to procuring 100% net zero steel by 2050. Diverse members include property and construction companies Lendlease and Grosvenor UK, industrial component maker SKF, and renewable energy producer Orsted (<https://www.theclimategroup.org/steelzero>).

NGO-Corporate Partnerships

Private companies and NGOs also are banding together to tackle the thorniest climate change problems at scale. Inspiring collaborative initiatives include:

- **LEAF (Lowering Emissions by Accelerating Forest Finance)** – LEAF seeks to stop deforestation by protecting tropical forests through **strategic finance campaigns**. At COP26, this private-public collaboration announced a plan to “mobilize” USD 1 billion in funding for countries and states seeking to protect tropical/ sub-tropical forests. So far, Costa Rica, Ecuador, Ghana, Nepal and Vietnam have signed Letters of Intent to reduce deforestation in return for payments, and proposals have been submitted from jurisdictions in Papua New Guinea, Brazil, Mexico, Nigeria, Kenya, Uganda, and Zambia. Participating companies include Airbnb, Amazon, Bayer, Delta, GSK, Nestle, Unilever, Salesforce, and Walmart. <https://leafcoalition.org>

- **Breakthrough Energy Coalition** – Based on the belief that technological advancements will be the key to avoiding a climate disaster, this powerful collaboration founded by Bill Gates now boasts the likes of Jeff Bezos, Richard Branson, Michael Bloomberg, and Jack Ma on its Board. The collaboration promotes science-based solutions to reaching net zero by 2050 through **lobbying for net zero policies, funneling investment into green R&D, and assisting in scaling up promising green products**. <https://www.breakthroughenergy.org/>

- **Midwest Real Crop Collaborative** – Recognizing that steep up-front costs and high risks inhibit farmers from testing regenerative agriculture, which lowers emissions by means of limiting fertilization, tillage, and mono-cropping (Rodale Institute, 2020), this wide-ranging value chain collaboration is working to **catalyze whole-industry transformation**. Food makers Kellogg, Oatley, PepsiCo, and Unilever, suppliers and processors Cargill, Bayer and Nutrien, plus NGOs EDF, WWF and The Nature Conservancy -- have developed a 3-step model of **systems change**: 1) Lower the economic and social risks for farmers, 2) Build a supporting agricultural network, and 3) Boost demand among intermediate and end buyers/consumers (Midwest Real Crop, 2022). By 2030, the collaborative aims to reduce net on-farm GHG emissions in U.S. soy and corn farms by 7 million MT, and to help 30,000 US farms transition to regenerative ag.

Game-changing Business Practices

The following section highlights five promising and impactful practices that companies can take now to transform their net zero targets into reality. We hope details below will inspire readers to begin or expand their companies' transformative journeys.

Electrification

Over the past decade, companies have made impressive gains in energy efficiency as knowledge and awareness of climate risk has grown. In many geographies and sectors, however, the growth in business scale still far outstrips efficiency gains in any fixed period, leading to net emission increases in absolute terms. To fix this, more investors, boards and regulators are demanding a **whole-of-business approach to emissions cutting**. One topic gaining traction for transformative potential is ‘**electrification of everything**’ to coincide with the vast and growing national- and industry-level investments in clean and renewable energy. Once energy systems are decarbonized, rapid gains will come from hooking electric goods to the grid. Many of the needed technologies and advances are already commercialized or in advanced stages of R&D.

The current electrification drive has been likened to early days of energy efficiency which started out slowly and then boomed over the past decade (Clancy and Makower, 2021). Though upfront cost is a barrier – especially when replacing fossil-fueled assets that are not fully amortized – lower operating costs and falling prices for renewable energy will eventually make upfront investments worthwhile. Government subsidies and innovative financing are needed at this point to kickstart the transformation process, but **executives must start thinking today about how and when to switch all fuel-powered operations to electricity**.

Experts advise an immediate start with existing solutions, then a gradual roll-out as new innovations emerge from R&D (Makower et al., 2021).

- Electrification of the **transport sector** is well advanced thanks to improvements in battery technology, particularly for smaller vehicles. With national policies now phasing out combustion engine vehicle sales and funding the expansion of battery charging infrastructure, **the switch to EVs will quickly accelerate**. Major logistics firms and retailers are already changing short-haul delivery fleets to EVs, but don't expect changes in long-haul fleets until new technologies are available at lower costs and larger scale. Green hydrogen holds more promise at present than large-scale EV batteries for powering long-haul trucks, but both technologies are undergoing active research.

- **Building operations** account for roughly 29% of GHG emissions in the United States (Leung, 2018) and even more in Europe where historical buildings are still widely used (European Commission^b, 2021). Decarbonizing the built environment is thus a current imperative. **New construction can leverage efficient design and renewable energy to achieve net-zero operations**. Electrically retrofitting older buildings is more costly and difficult, however, due to legacy heating and cooling systems, and problems of multiple ownership. To lower emissions in existing commercial buildings, look into new technologies like **low carbon heat pumps** when climates are warmer and renewable energy is plentiful, (The Royal Society, 2021) and **intelligent control systems** more generally (Johnson Controls, 2021).

- The **industrial sector** is least advanced in switching to electrification. One reason is the high temperature required for many industrial processes; at present electric furnaces can reach 350°C, ranking electricity lower than hydrogen in potential to transform high emitting sectors like steel or cement (Hellstern et al., 2021). In other applications like drying processes, for example, electrical machinery may be sufficient. **Companies can already electrify small turbines, compressors, motors, and appliances that run in factories and offices as research continues on more difficult challenges**.

How heat pumps reduce emissions

Heat pumps – which operate as “reversible air conditioners” to efficiently transfer heat either out in summer or in during winter, as opposed to generating or cooling heat – not only reduce GHG emissions but also provide cleaner air in buildings (Avelar, 2020). Though carbon abatement from heat pumps is only strong when used in warmer climates and powered by clean electricity, recent innovations hold promise to make the technology more suitable for commercial applications (The Royal Society, 2021).

Digitized Carbon Reporting

Measuring the corporate carbon footprint, when done correctly, can offer companies an opportunity to launch and implement an inspiring internal transformation. Armed with data, business leaders can motivate and activate their teams. But the process of accurately tracking and reporting GHG emissions is daunting for many companies. To help, enterprise software makers are now launching products that promise to lower the burden of data collection and analysis, and increase the insights for active carbon management. Both Microsoft and Salesforce now offer user-friendly cloud-based products incorporating scientific and industry standards, thereby improving reporting accuracy and, more importantly, impact in achieving a net zero future.

Other specialized software makers calculate climate risk in company portfolios and supply chains, and map changes in risk over time on the basis of scenario analysis (Jupiter, 2022). Governments, asset managers, banks and insurance companies already subscribe with leading company Jupiter to access periodic reports about changing risks from water, heat, wind, and fire. Interest is growing among manufacturers concerned with risks to supply chains and facility locations. As corporate demand for green financing continues to grow, professional risk reports will play a growing role in demonstrating the credibility of net zero plans.

Carbon Labeling

Carbon footprint labels have been described by some marketeers as “the new calorie” in meeting consumer demand for information about potential purchases. While eco-friendly brands such as Oatley (oat milk) and Allbirds (shoes) have been carbon-labeling their products for years, 2021 saw several consumer products giants join the trend. Unilever, for example, has promised to add carbon footprint labels over the next two to five years to all 70,000 consumer products it sells (Manning, 2021; Wolfrom, 2021) and Logitech pledged “carbon impact transparency” via labels (eventually for all products) which the company hopes will trigger an industry-wide movement for consumer electronics (Logitech, 2022).

But experts warn of potential carbon-washing, since scientifically accurate carbon footprint measuring is complex and challenging, and currently lacks accepted standards and methods. This is another area where collaborations are helpful. **Sustainable Apparel Coalition, for example, has developed the Higg index that measures the carbon footprint of clothing companies from the raw materials stage to finished products (SAC, 2022).** The tool is already in use by nearly all apparel manufacturers, giving buyers across the value chain the information they need to make better carbon management decisions.

At the consumer level, however, numeric carbon labels often mean little even when emissions are accurately measured. Panera Bread found an innovative solution by teaming with environmentalist research firm World Resources Institute (WRI) to co-create a carbon label identifying food products corresponding to the Paris climate agreement goal of reducing food-related GHG emissions by 25% by 2030 (Wolfrom, 2021). Food products deemed to emit less than 5.38 kg of carbon per meal receive a “Cool Food Meal” label with a smiling green emoji.

Carbon Offsetting

In addition to the mandatory emissions trading markets established by governments to curb GHG from energy producers and other heavy industries, voluntary carbon markets allow companies of all sizes and types to offset their emissions by purchasing credits from others who’ve made verifiable gains. **The global voluntary offset market is forecast to grow to USD 1 billion in 2022 – a 60% increase year-on-year as companies scramble to achieve new net zero commitments.** But an average current price of less than USD 3 per ton incentivizes companies to purchase low-priced offsets rather than doing the more costly and difficult work of carbon cutting themselves (GreenBiz Editors, 2021). With voluntary carbon markets set to explode now that the Paris Rulebook is complete (see Coordinated Global Action above), experts are calling for, and expecting to see, coordinated global action to determine minimum carbon prices.

Before tasking your net zero team to go carbon credit shopping, advise them of two things: 1) **The Science Based Targets initiative (SBTi) argues that only 10% of emissions should be offset for a company to claim it is net zero** and 2) **Carbon abatement projects vary greatly, and only high quality verified credits will stand up to investor and regulatory scrutiny.** Certification bodies – often NGOs – specify rules for credit issuers in different sectors, and also verify that basic principles are observed (Favasuli and Sebastian, 2021):

- Credits should not be granted for projects that would have happened without credit revenues
- CO2 emissions should not be overestimated
- Emission cuts should be permanent and not subject to reversal
- Carbon cuts can only be claimed once, and must be verified upon completion
- Projects must comply with all laws and should offer co-benefits under the UN SDGs

Media company Netflix developed a 5-stage procedure for vetting carbon credits according to the **Oxford Principles for Net Zero Aligned Carbon Offsets** (Smith School of Enterprise and the Environment, 2020). Credit buyers are advised to 1) issue RFPs for competing project types and geographies, 2) accept only credits that are registered and verified by credible third parties, 3) interview project developers and their partners, 4) seek projects that can be technically verified

through AI or satellite imagery, and 5) submit the shortlist of selected projects to an expert external advisory group for approval (Clancy, 2021).

Forests Offer Permanent Carbon Capture

Tree planting programs can be good or bad for carbon sequestration depending on the lifetime of selected trees and the likelihood of pest infestation or neglect. But entrepreneur Yishan Wong, founder of startup Terraformation, points out that well designed forests can last millennia. His company seeks to scale reforestation by reinvigorating degraded land that is available in large swaths. Starting with solar powered water desalination, the company is restoring tropical forest in the most arid region of Hawai'i Island. Terraformation recently released a report that outlines the business case for reforestation. Among other insights, the report notes that bundling diverse reforestation projects will diversify investor risk and assure a constant stream of returns. <https://www.terraformation.com/>

Internal Carbon Pricing

"By setting an internal carbon price (ICP), companies can prepare for uncertain external pricing in the future, and investors can get a clearer picture of a firm's ability to compete in a low-carbon world" according to an article in Harvard Business Review (Aldy and Gianfrate, 2019). The NGO Carbon Disclosure Project (CDP) reports that "nearly half of the world's 500 biggest companies are now factoring this type of carbon accounting into their business plans" (Bartlett, 2021). Among companies surveyed by CDP in 2020, the average internal price of carbon was USD 25 per metric ton of CO2 equivalent, and many companies systematically raised the price over time in the expectation of increasing government taxes on carbon.

Once the price is determined, an ICP can be debited directly to business units according to the carbon intensity of their operations and activities, or merely used as a shadow price to determine the viability of future strategies and investment options. When debited directly to business units, captured funds can be redirected to carbon reducing projects and/or to innovative research. That kind of implementation motivates internal efforts to boost carbon efficiency and update heavily emitting technologies so that future charges are avoided. Companies that implement an ICP hope it will soften the blow if/when stiff carbon taxes are implemented by domestic or overseas governments in the future. One barrier to implementing an ICP has been the need to track and quantify carbon emissions at the level of business units, but as mandatory carbon reporting requirements kick in and digitized carbon reporting technologies are adopted, that barrier is falling.

Corporate Net Zero Action Plan Do's & Don'ts

Don't:

- Delay
 - There isn't time to wait for government or science to further clarify what's needed
- Overutilize offsets
 - Offsets should only be used to remove residual emissions once direct carbon cuts are exhausted
- Limit progress to your immediate footprint
 - Assess backward into your supply chain and forward into distribution, consumption and end use.
- Limit your plans to incremental progress

- Work on multiple fronts at once
- Seek breakthroughs
- Carbon-wash
 - Don't announce a net zero target only; begin developing interim objectives toward a definitive action plan

Do:

- Dream big
 - Set science-based targets for 2050 that you don't know how to reach today
- Take action with 2030 interim plans
 - Assess your full carbon footprint including suppliers and their suppliers. This vast endeavor will pay off in terms of truly transforming your business model as new green suppliers bring their own solutions and connections.
 - Remove inefficiencies in your current operations first, then seek "green" solutions. This assures quick and visible improvements, with business results.
 - Allocate resources, designate manpower, and track progress
- Lead from the top
 - Appoint a climate smart board
 - Link the C-suite, Finance and Sustainability Teams
 - Engage the entire organization, as well as stakeholders and partners
- Collaborate on solutions
 - Join cross-disciplinary initiatives to tackle critical industry bottlenecks
 - Join buyer collectives to build demand and bring down costs of new solutions
 - Include SMEs
- Use respected organizations with proven effective tools for support
- Leverage your net-zero efforts to differentiate yourself
 - More end-users (both B2B and B2C) seek green suppliers, so green efforts often elicit immediate returns
- Fund the Future
 - Invest in breakthrough innovations that will revolutionize your industry

Evolving Investment Opportunities

Climate tech funding is booming now that net zero planning and action is taking the world by storm. Blackrock CEO Larry Fink predicts that the next thousand unicorns will arise from scalable innovations that help the world to decarbonize and make low carbon life affordable (Fink, 2022). **Climate tech startups raised USD 32 billion in the first ten months of 2021** (CNBC, 2021) and corporate venture capitalists (CVCs) are now entering the fray. CVCs often seek strategic gains or risk reduction as they strive to cut their own and their industry's GHG emissions, as well as potential financial gains from backing the winning technologies of the future (CTVC, 2021). As of January 2022, analysts at venture tracker CTVC listed 43 CVCs launched by multinational companies in Energy, Transportation & Supply Chain, Agriculture & Industrial, and Consumer & Technology sectors. Dedicated funds run into the hundreds of millions – e.g., for VW -- or even billions of US dollars in the case of Microsoft and Amazon (Greenbiz Editors, 2021).

Traditional venture capitalists (VCs) are also heading back into clean tech after an earlier investment bubble burst around 2010. **Chris Sacca, who was an early investor in tech firms like Twitter, Uber, and Instagram** (Forbes, 2022) likens the current period to the dawn of the internet. Those who invested too early or too late lost money, whereas those who

invested when the fundamentals were in place, made millions. He believes that fundamentals already support the rapid growth and profitability of many types of climate tech (Jackson Hole Center for Global Affairs, 2021). His recently launched fund -- Lowercarbon Capital -- raised USD 800 million from investors who care about climate change, as well as those who care only for profit. According to Sacca, **climate tech investments “will pay off for sheer business reasons alone”** (Loizos, 2021).

Climate-tech Startups

According to legendary venture capitalist Chris Sacca, **the barriers to entry and the capex requirements for climate-tech startups have fallen dramatically** in comparison to early-stage clean tech businesses. Today's startups benefit from (Jackson Hole Center for Global Affairs, 2021):

- Ubiquitous and low-cost computing power and renewable energy
- Open-source software
- Machine learning
- Shared science labs
- Direct access to consumer, business and government buyers
- Funding from investors and traditional bankers because of low cost and fast revenue business models

One way climate tech innovations can profit in the near term is to offer **cost effective, high performing alternatives to widely used carbon intensive materials, products or processes**. German startup Made of Air, for example, makes **carbon-negative bioplastics** from forest and farm waste (Made of Air, 2022). The carbon embedded in the biowaste material inputs is locked up for the long term in a hardened thermoplastic compound that is being tested in building materials (Audi auto dealerships) and sunglasses (H&M) among other applications. Low costs and eager buyers seeking to achieve their own carbon reduction targets gave this startup the credentials to close a 5 million Euro round of seed funding in October 2021 (Loma, 2021).

Similar fundamentals are found in the business model of Heart Aerospace, a maker of all-electric **19-seat airplanes** (Lowercarbon Capital, 2022). Leveraging machine learning technology, the company's founder designed the plane by running thousands of low-cost computer simulations (Shopify Plus, 2021). Despite early industry skepticism about the product's viability, airlines have now committed billions of dollars to order the machine for use in regional markets. Lower purchase price, easier maintenance, independence from volatile energy markets, and low costs of operations all make this product a preferred alternative to smaller fossil-fueled airplanes.

Another fast-growing innovation field is **Carbon Capture & Sequestration**. Worldwide, existing Carbon Capture Utilization and Storage (CCUS)⁶ facilities sequester a total of 40 million tons of carbon annually. Although the International Energy Agency has deemed this amount 'not on track' to contribute adequately to net zero by 2050 (IEA, 2021), last year saw a sudden jump in the number of CCUS -- more than 100 are now under development globally. While this still falls far short of the targeted capture capacity of 1.7 billion tons of CO₂ annually by 2030 (triggered by the Paris Agreement), it is good news that, since 2020, governments and industry have allocated some USD 18 billion to CCUS initiatives.

Going forward, scaling up fast enough to meet 2030 targets will depend on business model innovations such as developing multi-user networks to attract industrial facilities (IEA, 2022). A key success factor for carbon capture will be successful R&D into innovative solutions such as **direct air capture (DAC)** -- which extracts carbon directly from the atmosphere for storage deep underground to achieve carbon removal (Budinis, 2021). DAC technology removes CO₂ by passing air through either liquid (chemicals) or solid filters. The process can be fueled by renewable energy, adding to its

⁶ CCUS (Carbon Capture, Utilization and Storage) is drawing worldwide attention as it has a key role to play in the fight against global climate change. Nowadays, countries are investing more heavily in CCUS. There has been some headway in carbon dioxide flooding, but the technologies have yet to prove themselves commercially viable. CCUS is the development direction of CCS.

net-zero effectiveness but also (currently) adding to cost. Also promising: **cryogenic carbon capture** which freezes GHGs, then removes them from emissions as solids – a process scientists have called “minimally invasive and highly efficient” (NETL, 2022). One company already offering a carbon capture solution for long-haul transport companies is Remora. Late last year, Remora launched a device allowing commercial trucks to suck up carbon directly from the tailpipe, then capture pure CO₂ which can be sold (Soltoff, 2021). This startup has already landed funding and support from innovation accelerator YCombinator among others.

We hope additional good ideas will be sparked by the \$100M XPRIZE Carbon Removal contest launched and financed by Elon Musk in 2021 (De Cayeux and Hollett, 2021).

CONCLUSIONS

In this year’s report we have tried to accurately summarize the state of the world in terms of total net-zero commitments (quite positive) and total interim action plans (still severely lacking). The situation – whether discussed at the international, national, industry or enterprise level – is both urgent and rather simple. **The message we heard repeatedly was the same from all sources: the time to act is right now.** The decisions made and the actions taken in the coming few years will set the world on either a path toward net zero or a path toward continued global warming, with certain and devastating results. Already, some experts we interviewed have deemed the IPCC’s carbon reduction goals for 2030 and 2050 as unattainable, thus replacing the dream of staying within a temperature rise of 1.5 degrees with the nightmare of 2, 3 or even 4 degrees of warming. The fact that many talented, knowledgeable experts are losing hope (and with it, tragically also losing focus and momentum) gave us an added sense of urgency and purpose in writing this year’s report.

Wherever your company is now in terms of contributing to carbon neutrality, it is our hope that this chapter will assist you in galvanizing toward net zero commitment as well as action. We trust this chapter has shown the vast scope and scale of the net zero movement, the depth of scientific research completed (and underway) and the breadth of organizations available as support. Our message can be summed up in the final closing words of 93-year-old naturalist and media host David Attenborough who finished his COP26 address with a message which applies to all of us: “In my lifetime, I have witnessed a terrible decline. In yours, you could and should witness a wonderful recovery. That desperate hope, ladies and gentlemen, delegates, excellency, is why the world is looking to you and why you are here.”

ADDITIONAL INSPIRATION

Our favorite mini-cases showing company best practices

Maersk Collaborates for Breakthrough Solutions

The Problem: Shipping contributes 3% of global GHG emissions, making the industry a natural target for net zero. In 2018, the world’s largest shipping company – Maersk -- committed to achieving net zero operations by 2050 but had “no idea” how to achieve it. The task involves transforming 750 vessels to green fuels.

The Solution: In 2018, Maersk formed a cross-industry collaborative R&D center with partners in energy, engineering and chemicals. By 2021, the coalition had developed a unique system using green electricity (created via solar or wind power) to produce green hydrogen, then transform the hydrogen into green fuels suited to combustion engines. The process (called Power-To-X), allows Maersk to retrofit its fleet rather than replacing it, thus achieving net zero faster. Maersk’s first net-zero vessel is under development and will sail in 2023.

Key Insights:

- While green fuels now cost 3 times more than existing bunker fuels, this cost can easily be borne by end users, according to Maersk. For example, the retail cost for a laptop shipped from Asia to the US via green fuels would add a “green premium” of just 50 cents for the end user.

- What's needed next (says Maersk) is a CO2 tax reflecting the full cost of fossil fuel usage and ending the 'affordability argument' against green fuels.

- Scaling up production of green fuels to serve the entire world's shipping industry would carry a hefty price tag of \$2 trillion, analysts say –but this is equivalent to only four years of current capital expenditure on the global oil and gas industry.

(MAERSK, 2020)

Johnson Controls Issues Successful Green Bonds

The Problem: Green bonds -- those directly linked to a company's commitment to meet sustainability targets -- offer companies a gateway to the substantial funding needed for net-zero initiatives. But the issuance process can be daunting.

The Solution: Johnson Controls gained investor confidence with a clear and credible plan, attracting \$625 million in its initial offer (in 2020), then securing another \$500 million in 2021. The two offers made Johnson Controls the first industrial company in the S&P500 to issue a Green Bond. (Johnson Controls International plc, 2021)

Key Insights:

- JC publicly committed in 2021 to environmental targets approved by the **Science Based Targets Initiative**: reducing operational emissions by 55%, and cutting customers' emissions by 16%, before 2030.

- JC sought an official "second party opinion" on the environmental framework drafted to meet their targets. Sustainability deemed JC's roadmap to be "credible and impactful," called the KPIs "very strong", and rated the sustainable performance targets as "ambitious-highly ambitious."

- JC linked the interest paid on its bond to sustainability performance; if JC fails to meet its targets for reducing Scope 1-3 carbon emissions by the deadline (2025), the company will pay higher interest rates to investors.

- JC launched an investor roadshow jointly organized by its finance and sustainability departments, forcing both teams to listen carefully to investor comments, ideas and concerns.

- Also key to success: investor confidence that JC can meet its Scope 3 goals via its decarbonization solutions which boost clients' energy efficiency and reduce GHG output.

(Caleb Mutua, 2020).

FedEx Crafts a Holistic Plan for Net Zero by 2040

The Problem: In early 2021, FedEx pledged to achieve carbon neutral operations by 2040. This endeavor requires transforming the planet's largest cargo airlines (700 planes) and vast ground delivery fleet (180,000 trucks) using both currently available and yet-to-be commercialized innovations. At present, the company's carbon footprint comes almost entirely (92%) from fossil fuels. (Fehrenbacher, 2021)

The Solution: FedEx developed a \$2 billion investment plan to reduce carbon in current operations by means of efficiency gains, replace equipment and processes with best solutions currently available, and revolutionize the solutions needed for the future. Ultimately, FedEx plans to transform operations to clean energy, shift its full delivery fleet to e-vehicles (EVs) and its planes to biofuels, and offset remaining emissions with Carbon Capture and Storage (CCS)⁹.

Key Insights:

- **EV Efficiencies:** In urban areas where 'last mile' delivery happens, the price of E-delivery vans is falling and electricity is becoming cheaper than diesel. Leveraging these savings, FedEx purchased its first 500 EV delivery trucks from GM in December 2021, increasing its EV fleet to 3500. (Holland, 2021)

- **Funding:** FedEx issued a sustainability bond to fund the changeover. Initial funding will go to charging infrastructure, which demonstrates tangible progress to bondholders

- **Measurable interim goals** – Investors are reassured by clearly articulated milestones: By 2025, half of new delivery vehicles will be "zero emission vehicles" (ZEV), and by 2030, 30% of the company's planes will use bio fuel.

⁹ CCS, an abbreviation for Carbon Capture and Storage, is the process of capturing CO2 emissions from industrial processes or other point sources, and injecting the captured CO2 into geological reservoirs. CCS technologies are considered the most cost-effective approach to cutting GHG emissions and curbing global warming.

- **Collaboration:** FedEx is working with Red Rock Biofuels for aviation fuel transformation and ChargePoint on charging infrastructure development. It collaborates and funds innovative research on carbon sequestration with Yale University.

Our top picks on what to read or watch to motivate your team for the net zero journey

Read

- *How to Avoid a Climate Disaster: The Solutions We Have and the Breakthroughs We Need*, Bill Gates
- *Net Positive: How Courageous Companies Thrive by Giving More than They Take*, Paul Polman and Andrew Winston
- *Climate Positive Business: How You and Your Company Hit Bold Climate Goals and Go Net-Zero*, David Jaber
- *Net Zero Challenge: The supply chain opportunity*, World Economic Forum in collaboration with Boston Consulting Group

Watch

- “A Life on Our Planet,” David Attenborough (Netflix). Also, his latest series “The Green Planet” (BBC, 2022), and his COP26 opening speech.
- “Countdown” video series (Ted Talks) – including “Dreams and details for a decarbonized future” by Maersk global chairman Jim Hagemann Snabe
- Climate Solutions conversation with Chris Sacca @ the Jackson Hole Global Forum (Jackson Hole Center for Global Affairs, 2021)
- “What is net zero,” The Economist (YouTube)

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02

**CHINESE EFFORTS
TOWARD CARBON
NEUTRALITY**



We Are All Carbon-Cutting Ambassadors

By He Jinyu
and Wu Fan

Sectoral Decarbonization Efforts Toward
China's "30-60" Targets: Review and Outlook



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The unprecedented policy support from the central and local governments to achieve "30-60" decarbonization targets is motivating companies to navigate the next industrial revolution defined by "carbon neutrality" in a systemic, innovative manner. Although priorities evolve differently as industries enter different stages of development, the ability to measure each sector's carbon footprint, coordinate with upstream and downstream stakeholders to seek "green" solutions, and look for new business opportunities, is needed right now.





In 2021, the expressions “peak carbon emissions” and “carbon neutrality” could be heard everywhere in China when talking about the economy and society. Chinese companies immediately embraced these concepts, but were initially at a loss as about what to do. Eventually, as the objectives of the “30-60” targets became clearer, they began finding solutions and planning their next steps in the light of the available scientific knowledge and their understanding of the market. This article aims to illustrate how the macro environment changed over the past year, and attempts to explain the possible impact these decarbonization targets may have on the Chinese economy. At the same time, this paper shares lessons from the business world, and provides a toolkit and roadmap for companies on how to implement national strategies, and keep track of government policy changes whilst exploiting emerging market opportunities.



China’s “30-60” targets: background and policies

Global climate management has become one of the few topics, apart from WWII, which has impacted and influenced worldwide politics and economics, since it is inextricably linked to the sustainable development of energy, industry, economics, trade, finance, and technology worldwide. According to the Third National Climate Assessment Report¹, China has suffered climate-related economic losses equivalent to 1.05% of its annual GDP on average since 2000, more than seven times the global average of 0.14%. Rapid economic growth and urbanization have made China the world’s largest carbon emitter. The country’s CO₂ emissions declined between 2013 and 2016, but rebounded later, indicating that the path to carbon reduction is still long and arduous for both China and the world.

China pledged to “reach peak carbon emissions before 2030, and carbon neutrality before 2060” in September 2020. A year later, China said it would update its nationally determined contribution (NDC) commitments, and impose stricter policies and measures to deliver on its “30-60” targets. Incorporating these targets into the country’s overall socio-economic, ecological development suggests profound systemic economic and social transformation. **China is committed to fighting climate change, by introducing step-by-step policy support and adopting a whole-of-government approach at all levels (see Tables 1&2), including amendments to tax, pricing, finance, land, and government procurement policies with a view to fostering an environment which promotes green, low-carbon development, facilitates carbon emissions trading, and unlocks finance for green growth.**

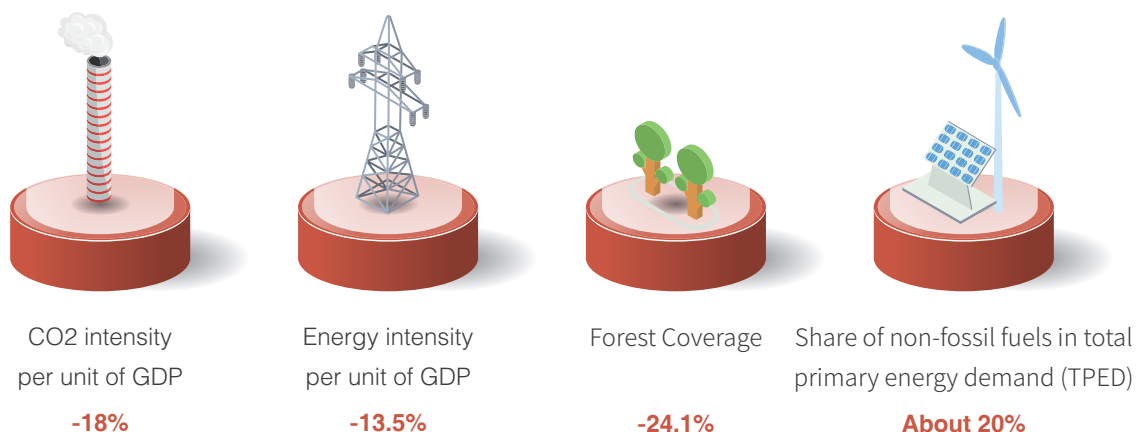


Figure 1: Major climate and energy targets in China’s 14th Five-Year Plan²

Table 1: Latest national policies in support of China’s “30-60” decarbonization targets

Date	Authority	Policies/Regulations	Content and impact
March 2020	The General Offices of the CPC Central Committee and the State Council	Guiding Opinions on Building a Modern Environmental Governance System	Establish an environmental governance system characterized by clear guidance, informed decision-making, faithful implementation, effective incentives, multi-stakeholder participation, and constructive interaction by 2025.
April 2020	National Energy Administration	Notice on Matters Concerning the Preparation of the 14th Five-Year Plan for the Development of Renewable Energy	Lay a solid foundation for the accomplishment of the strategic goal of ensuring renewable energy becomes the largest source of energy to meet future increases in energy consumption during the 14th Five-Year Plan (FYP) period, boosting the non-fossil fuel share of the total energy mix to 20% of total consumed energy by 2030.
October 2020	The State Council	Development Plan for the NEV Industry (2021-2035)	Encourage Chinese NEV manufacturers to develop breakthrough technology in batteries, engines, and vehicle operating systems, and substantially improve vehicle safety to gain a competitive edge by 2025.
October 2020	Ministry of Industry and Information Technology	Energy Conservation and NEV Technology Roadmap 2.0	The Roadmap sets 2025 short-term goals, 2030 interim targets, and 2035 long-term objectives for the development of China’s automotive industry. It is expected that China will see the NEV share of total new car sales jump to over 50%, to reach around 1 million hydrogen fuel-cell vehicles by 2035.
December 2020	The State Council	Energy in China’s New Era	Work on all fronts to change the ways energy is consumed, build a clean and diversified energy supply system, implement a dual control system of total energy consumption and energy intensity, and promote the clean and efficient utilization of energy.
December 2020	Ministry of Ecology and Environment	Measures for the Administration of Carbon Emissions Trading (for Trial Implementation)	Create a national market for carbon emissions trading, and establish national carbon emissions registration and trading agencies, as well as supporting systems.
January 2021	Ministry of Ecology and Environment	Guiding Opinions on Coordinating and Accelerating Work Related to Climate Change and Ecological Protection	Create an overall pattern of integrating climate actions and ecological conservation by 2030.
January 2021	National Development and Reform Commission	Catalog of Encouraged Industries in Western Regions (2020 Edition)	Solar power plants in Shaanxi and Gansu, etc., are entitled to a reduced corporate income tax rate of 15%.
February 2021	The State Council	Guiding Opinions on Accelerating the Establishment and Improvement of a Green and Low-Carbon Circular Economic Development System	Substantially improve the industrial structure, energy mix and transportation structure, increase the proportion of green industries, and cut emissions intensity; optimize the market-oriented green tech innovation system; and create preliminary production, circulation and consumption systems featuring green, low-carbon and circular development by 2025.

Date	Authority	Policies/Regulations	Content and impact
February 2021	National Development and Reform Commission	Guiding Opinions on Promoting the Integration of Power Sources, Grids, and Loads and Storage, and the Complementary Development of Multi-Energy	Raise the proportion of renewable energy in transmission lines to, in principle, no less than 50% by optimizing and integrating power sources, grids, and loads.
February 2021	National Energy Administration	Notice on Guidance on Stepping up Financial Support to Promote the Healthy and Orderly Development of the Wind and Photovoltaic Power Industries	Adopt nine measures to give stronger financial support to renewable energy companies, thereby promoting the healthy and orderly development of the wind and photovoltaic power industries
March 2021	National People's Congress and Chinese People's Political Consultative Conference	Outline of the 14th Five-Year Plan (2021-2025) for National Economic and Social Development and the Long-Range Objectives Through the Year 2035	Reduce CO2 emissions per unit of GDP by 18% over the period 2021 to 2025; meet 2030 nationally determined contribution (NDC) commitments to fight climate change; and aim to reach carbon neutrality by 2060.
April 2021	National Energy Administration	Guiding Opinions on Energy-Related Work for 2021	Cut coal use to below 56% of energy consumption; popularize power generation from photovoltaic and wind power plants; and focus on developing new business and new models.
May 2021	National Energy Administration	Notice on Matters Concerning the Development and Construction of Wind Power and Photovoltaic Power Generation in 2021	Bring wind and photovoltaic power generation to 11% of total electricity use by 2021, and boost the share of non-fossil fuels in primary energy consumption to around 20% by 2025, and 25% by 2030.
July 2021	National Energy Administration	Guiding Opinions on Accelerating the Development of New Stored Energy	New stored energy capacity is expected to advance from the initial stage of commercialization to large-scale development by 2025, with an installed capacity of more than 30 million kilowatts.
October 2021	The State Council	Action Plan for Carbon Dioxide Peaking Before 2030	The goal to hit peak carbon emissions permeates the whole process and every aspect of economic and social development. Particular focus will be placed on implementation of ten major actions, including the action for green and low-carbon energy transition, the action for energy saving, carbon emissions mitigation and efficiency improvement, and the action for carbon emissions peaking in the industrial sector.
January 2022	National Development and Reform Commission	Implementation Plan for Promoting Green Consumption	Comprehensively promote green consumption in key sectors, including food, clothing, housing, transportation, daily necessities, and travel; lubricate key processes such as production, circulation, consumption, recycling, and reuse; and provide more support with regard to technology, service, system, and policy to systematically reduce losses and waste, save energy, and cut carbon emissions.

Source: Collated by the case authors based on policies published on official websites of the State Council, and ministries and commissions directly under the State Council.

Table 2: Latest regional policies in support of China’s “30-60” decarbonization targets

Date	Authority	Policies/Regulations	Content and impact
September 2020	Guangdong Provincial Development and Reform Commission	Action Plan for Nurturing Emerging New-Energy Industry Clusters of Strategic Importance in Guangdong (2021-2025)	New energy refers to ten alternative energies, i.e. nuclear energy, wind energy, natural gas and natural gas hydrates, solar energy, hydrogen energy, bioenergy, geothermal energy, ocean energy, smart grids, and stored energy. Increase the share of non-fossil fuels in Guangdong’s primary energy consumption to around 30% by 2025.
September 2020	Green Finance Committee of Guangdong Society for Finance and Banking	Guidelines for Green SCF Services in the Greater Bay Area – The Automobile Industry	Make Guangdong the first Chinese province to launch green supply chain financing innovations; support the development of major auto makers and their upstream and downstream companies; facilitate the launch of Guangdong’s first pollutant discharge trading program in Guangzhou; promote green bonds and innovations in carbon finance; establish the Guangdong-Hong Kong-Macao Greater Bay Area Green Finance Alliance as a platform for interaction and information sharing among companies in financial services within the Greater Bay Area.
October 2020	The People’s Government of Sichuan Province	Notice on Policies and Measures of Sichuan to Support the Development of the New Energy and Smart Car Industries	Promulgate 18 policies to support the development of new energy and smart car industries; include hydrogen fuel-cell products on a list of major technical equipment that Sichuan would provide initial support; and encourage the use of NEVs in highway passenger transportation, car rental, sanitation, postal services, urban logistics and delivery, and airport and port business.
December 2020	Department of Industry and Information Technology of Shanxi Province	Three-Year Action Plan for the Development of Photovoltaic Manufacturing in Shanxi (2020-2022)	Prioritize development of photovoltaic manufacturing in Jinzhong, Lvliang, and Changzhi. Adopt a three-pronged approach to create a photovoltaic manufacturing ecosystem: step up efforts to nurture key projects and bring in investment; integrate the entire photovoltaic manufacturing chain, which involves silicon chips, cells, and modules; and, improve supporting systems ranging from special-purpose equipment and photovoltaic glass to diamond wires and silver conductive pastes. Generate RMB 13 billion in revenue industry-wide by 2022.
December 2020	Department of Industry and Information Technology of Shanxi Province	Three-Year Action Plan for the Development of Wind Power Generation Equipment Manufacturing in Shanxi (2020-2022)	Double Shanxi’s installed wind capacity to six million kilowatts by 2022; and support growth of suppliers of components and parts, such as electric generators, flanges, and brakes, empowering them to generate over RMB 10 billion in the value of output.
January 2021	Jiangsu Energy Bureau	Special Plan for the Development of Renewable Energy in Jiangsu During the 14th Five-Year Plan Period	Optimize solar energy use, and increase Jiangsu’s installed solar photovoltaic capacity to 26 million kilowatts by the end of 2025, with distributed and centralized photovoltaic power generation capacity standing at 12 gigawatts and 14 gigawatts, respectively.

Date	Authority	Policies/Regulations	Content and impact
June 2021	Zhejiang Energy Bureau	Plan for the Development of Renewable Energy in Zhejiang During the 14th Five-Year Plan Period	Vigorously develop wind and photovoltaic power generation, aiming to double wind and photovoltaic capacity; make better use of pumped hydropower storage; and install 50 million kilowatts of renewable energy capacity by the end of 2025, which accounts for over 36% of total installed capacity.
June 2021	Beijing Municipal Ecology and Environment Bureau	Beijing Municipal Guidelines and Standards for Carbon Neutrality and Carbon Footprint Measuring	Enable organizers of big events, as well as businesses and public institutions, to formulate and announce their implementation plans for carbon neutrality, take actions accordingly, and measure carbon emissions from big events, all based on the Standards. Stipulate how to offset carbon emissions, contributing to more standardized management of Beijing's net-zero efforts.
June 2021	Department of Economy and Information Technology of Anhui Province	Action Plan for the Development of the NEV Industry in Anhui (2021-2023)	Nurture three to five influential NEV companies and an array of globally competitive key component manufacturers; build at least 10 renowned brands; create world-class NEV and Intelligent Connected Vehicle (ICV) industry clusters; and produce over 10% of China's NEVs and source 70% of auto parts and components locally by 2023.
October 2021	Energy Administration of Shandong Province	Plan for Energy Development in Shandong During the 14th Five-Year Plan Period	Adhere to "30-60" decarbonization targets; accelerate overhaul of energy development in terms of quality, efficiency, and driving force; establish a fully clean, low-carbon, safe and efficient modern energy system; and speed up adjustment and optimization of the energy mix by promoting the use of renewable energy, nuclear energy, natural gas, and electricity from other provinces, while cutting coal consumption and phasing down coal-fired power.
October 2021	Shanghai Municipal People's Government	Implementation Opinions on Moving Toward "30-60" targets by Stepping Up Efforts to Build Shanghai into an International Hub for Green Finance	Significantly expand the green finance market, play a growing role in facilitating direct green financing, substantially increase green loans, quicken the pace of product innovations in green finance, improve organizational architecture of companies in green finance, and ultimately create one of the best environments in the world for the development of green finance by 2025.
January 2022	Shanghai Municipal People's Government	Outline of the Development Plan for Chongming Becoming a World-Class Eco-Island (2021-2035)	Consolidate Chongming's position as a key connection in the Yangtze River Economic Belt; protect its ecological resources such as water, land, forests, gases, and beaches; lead the charge to create a green, low-carbon circular economy; and build the district into a beachhead in green ecology, area in the vanguard of green production, and demonstration zone for green lifestyle by 2035.

Source: Collated by the case authors based on policies published on official websites of provincial/municipal governments and government departments.

China has already made significant progress towards cutting carbon intensity. The nation's carbon intensity in 2020 dropped by 48.4% from 2005 levels, meeting its climate change mitigation and adaptation and NDC commitments³. The 14th FYP (see Figure 1) has been praised for continuing carbon mitigation, but results vary according to sector and locality. China remains the world's largest energy user and carbon emitter, now responsible for a third of the planet's CO₂ emissions, though it has taken decisive action to mitigate carbon. What is particularly noteworthy is that China's steel, cement, and chemical sectors emit more CO₂ than the UK and European Union combined⁴. **Important pathways for China to achieve carbon neutrality include increasing usage of non-fossil fuels, popularizing “negative emissions” technologies (NETs), promoting low-carbon regional development, and carving out a national green market.**

Carbon neutrality by 2060 not only sets the tone for China's sustainable, high-quality development in the coming decades, but also propels China toward its second centenary goal^①. One prerequisite for China to reach carbon neutrality is the concerted efforts of governments, businesses, and the academic world. Likewise, stakeholders from industry, academia, finance, and technology worldwide must band together to tackle climate change problems at scale. In short, global coordination is a must. After all, China or any other country alone can neither make a difference to global climate change nor transition to a green, low-carbon economy on its own. One thing is for sure: Carbon neutrality will be attained in the foreseeable future. And the path to carbon neutrality is paved with both daunting challenges and opportunities to prosper in a sustainable manner.

Far-reaching impact of climate change and progress toward “30-60” targets on the Chinese Economy

Management of climate risks: financially disruptive “green swan” events

In January 2020, the Bank for International Settlements (BIS) published a book entitled *The Green Swan*, in which it first discussed “green swan⁵” events, the potential cause of the next systemic financial crisis. The term “green swan” finds its inspiration in the concept of the “black swan.” “Black swan” events have three characteristics: First, they are unexpected and rare. Second, their impact is wide-ranging or extreme. Third, they can only be explained after the fact. “Green swan” events are “climate black swans” that can affect every single agent in the economy, and threaten financial stability by causing irreversible losses. Risks related to green swans are of a higher order than for black swans: First, there is a high degree of certainty that some combination of climate risks will materialize in the future. Second, climate catastrophes carry with them far more devastating consequences: they could pose an existential threat to humanity. Third, the complex chain reactions and cascade effects associated with extreme climate shocks could generate fundamentally unpredictable social and economic dynamics.

According to the *Blue Book on Climate Change in China (2021)* published by the China Meteorological Administration in August 2021, China was a “sensitive area” noticeably affected by global climate change. One manifestation of its sensitivity was that temperatures in China had been increasing faster than the global average. China's annual average surface temperature had risen dramatically since 1951, while its average annual rainfall had become increasingly heavy from 1961 onwards. Furthermore, China reported more extreme weather events, including high temperatures and heavy precipitation. All of the above indicated higher risks of climate change. In fact, China's climate risk index had risen during the past six decades, with the index's average value from 1991 to 2020 increasing by 58% compared with the previous three-decade period⁶.

As an integral part of any society or economy, companies suffer from the impact of climate change, without exception. How to evaluate and cope with climate risks? **There are basically two types of climate change risks⁷: physical risks and transition risks.**

① China's two centenary goals are to “build a moderately prosperous society in all respects” by 2021 and “build a modern socialist country that is prosperous, strong, democratic, culturally advanced and harmonious” by 2049, the 100th anniversary of the founding of the People's Republic of China.

1. Physical risks: risks that arise from physical impacts of climate change

(1) Catastrophic physical risks posed by extreme weather events (e.g. storms, floods, fires, or heat waves), which may damage existing production facilities and foster vulnerabilities throughout value chains;

(2) Chronic physical risks stemming from long-term changes in climate patterns, e.g. temperature changes, rising sea levels, water scarcity, or biodiversity loss.

2. Transition risks: risks associated with a low-carbon transition or climate change adaptation strategies

(1) Policy changes: impacts of climate policies that require energy efficiency improvements, force up prices for fossil fuels via a carbon pricing mechanism, or encourage sustainable land use;

(2) Legal risks: risks of litigation brought by failure to eliminate/minimize adverse impacts on climate, or to adapt to climate change;

(3) Technological uncertainties: for example, if companies replace existing technologies with more climate-friendly alternatives, this may strongly influence business investments;

(4) Shifts in market sentiment: the shift among individual consumers and business clients toward climate-friendly products and services could be a major blow to business operations;

(5) Reputational impacts: as is often the case, a company notorious for harming the environment and aggravating climate change will have difficulty attracting, let alone retaining, investors, customers, employees, and business partners.

Impact of progress toward “30-60” targets on China’s economic and industrial transformation

To achieve “30-60” targets, China has to navigate a broad, profound systemic economic and social transformation to set itself on a green, low-carbon development path. In this process, the most pressing challenge lies in decarbonizing energy systems and the industrial sector. **In addition to cutting production and supply chain emissions, it is also important to encourage green consumption and establish a carbon trading market.**

1. Sparking a clean energy revolution:

Pursuing “30-60” targets requires a shift from heavily emitting energy and electric systems to low-carbon ones. In the energy sector, clean energy (non-fossil energy) will move from the fringe to the mainstream, whereas fossil energy will be phased out. Moreover, renewable energy, now already a cost-effective option, will be delivered at more affordable prices in the future. In the electricity sector, new energy will play a key role. Coordinated development of “power sources, grids, loads, and storage” will contribute to safer and more flexible electric systems⁸.

2. Overhauling the pattern of China’s economic growth:

China is now running into multiple obstacles and challenges in terms of industrialization, energy mix, industrial structure, position in global industry chains, and intervals between target dates for peak emissions and carbon neutrality. **To deliver fully on “30-60” targets, China will recast its pattern for economic growth.** More specifically, it will create a greener industrial structure by furthering supply-side structural reform and moving faster to build a low-carbon industrial system; promote a circular economy in which carbon mitigation, resource utilization, and reuse are at the core of any business model; unleash the potential of innovative transport modes through developing green smart transportation; construct green, low-carbon buildings on a large scale for purposes of energy conservation and emissions reduction⁹; and advance efforts in precision farming and smart agriculture¹⁰.

3. Invigorating green finance and carbon emissions trading:

Green finance holds great growth potential in China. So far, the country has designed relevant standards, statistical criteria, information disclosure requirements, and evaluation mechanisms. Going forward, it will improve relevant systems

to better support industrial, tax, land and environmental policies, launch more green financial instruments, refine incentive mechanism for green finance, innovate financial instruments to adapt to the long turnaround times associated with green projects, and direct financial resources toward green, low-carbon projects. As of early 2021, China Development Bank had issued a cumulative total of RMB 70 billion in green bonds, with outstanding green loans exceeding RMB 2.3 trillion. Data from the People's Bank of China shows that by the end of 2020, China's balance of green loans amounted to RMB 11.95 trillion, which was more than any other country in the world¹¹.

Whilst being the world's biggest greenhouse gas (GHG) emitter, China is surprisingly carbon-efficient. **The massive carbon-finance market justifies its ambitious "30-60" targets.** In 2011, China launched a carbon emissions trading pilot scheme in Beijing, Tianjian, Shanghai, Chongqing, Hubei, Guangdong, and Shenzhen. As the domestic institutional environment improves, carbon finance is poised for a promising future. The *Measures for the Administration of Carbon Emissions Trading (Pilot)* came into effect in December 2020, signaling the rapid establishment of a national carbon trading market, opening the way for fast-track development of carbon finance. This will allow more Chinese financial institutions to enter carbon finance, extending their scope of business to include carbon trading account opening, capital settlement, pledged-carbon-asset loans, and capital preservation and appreciation¹². On July 16, 2021, China's long-awaited national carbon emissions trading scheme (ETS) made its debut¹³, representing a major step toward meeting the nation's carbon reduction commitments.

4. Catalyzing green consumption

Green consumption refers to green, low-carbon consumer behavior. In recent years, a growing proportion of consumers in China have become 'green-minded', but further action is still needed to turn this awareness into consumer appetite for green products and services. **Green consumption will lead to a great leap forward in China's economic transformation and high-quality development.** On January 21, 2022, the National Development and Reform Commission (NDRC) promulgated the *Implementation Plan for Promoting Green Consumption*¹⁴, detailing and advising on how to shift from old consumption patterns to green consumption. The plan aims to transform key sectors, including food, clothing, housing, transportation, daily necessities, and travel, thereby systematically reducing losses and waste, saving energy, and cutting carbon emissions. In addition, the plan suggests that the "Tan Pu Hui^②" system should be put in place to engage the whole society in value creation and allocation: by 2025, green consumption will strike a deeper chord with Chinese consumers, and green, low-carbon products will capture a much greater share of the market. By 2030, the general public will go green unconsciously, and green, low-carbon products will dominate their respective markets. Overall, China's low-carbon development path characterized by green consumption in key sectors will take shape.

Three phases toward carbon neutrality: roles and opportunities by industry

National progress in carbon mitigation confirms that carbon neutrality can be achieved in phases¹⁵ (see Figure 2). These phases are correlated, though key industries vary according to phase. It is thus important for every industry to devise its own carbon-reduction strategy.

☞ Hitting peak carbon emissions: policy interpretation and industry practices

In this phase, major tasks include cutting energy and carbon intensity, controlling coal consumption, and developing the clean energy sector. The key is to tighten the control of energy supply and high impact sectors. At the core is technological innovation. Take for example China's six most energy-intensive and highest GHG emitting sectors:

^② Tan Pu Hui: a mechanism for rewarding low-carbon behaviors and developing a marketplace for low-carbon goods and services, or to be more specific, a mechanism established based on commercial incentives, policy support, and the Pu Hui Certified Emission Reduction (PHCER) trading system, under which energy saving and carbon cutting behaviors of small- and micro-sized enterprises, households and individuals are quantified and priced.

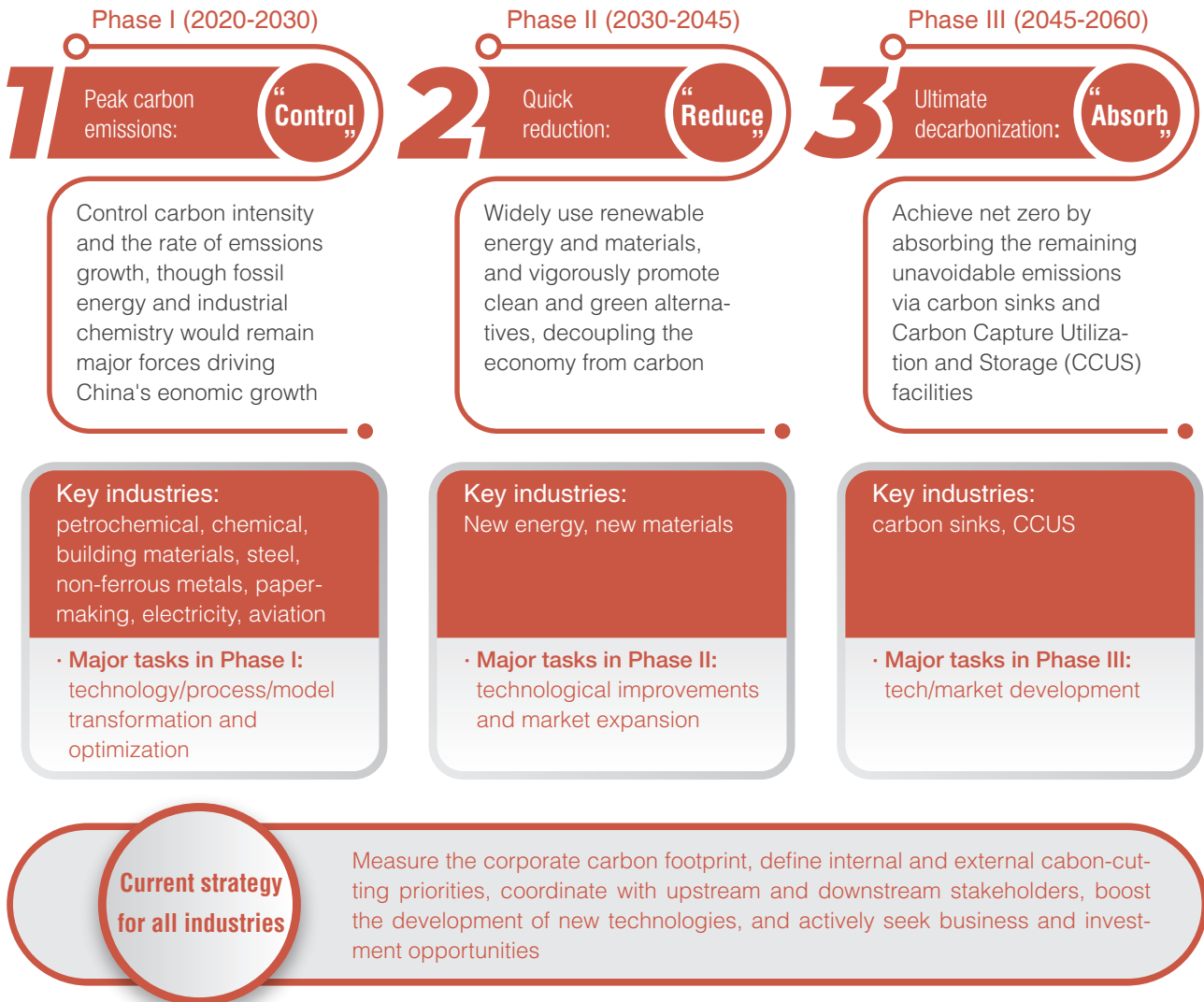


Figure 2: Three phases toward carbon neutrality

1. Low-carbon development and new energy transformation of the coal-fired power industry: Due to China's energy resource conditions (rich in coal), carbon emissions peaking in the electricity industry hinges mainly on coal consumption. Following this line of reasoning, coal-fired power planning over the 14th FYP period is a top priority. To reach China's "30-60" targets, there is a pressing need for further transformation of the coal industry. Many public companies have made "further transformation" the most frequently used words in their annual reports, hinting at their future development paths. A new round of restructuring of coal industry chain and supply chain is inevitable during the 14th FYP period. However, coal will continue to represent the largest proportion of energy consumption in the subsequent 10 to 20 years. As the upward coal consumption trajectory is expected to continue during the 14th FYP period, China should push forward reforms in the coal industry, and turn digital technologies into major growth drivers for industrial upgrading¹⁶. A case in point: Ordos is exploring using green electricity and hydrogen to produce methanol and urea, hoping to convert its coal-driven chemical production bases into demonstrative industrial parks with near zero emissions.

2. Low-carbon transition of the steel industry and development of CCUS technologies: In China, of the 31 manufacturing segments, steel emits the most GHGs, accounting for roughly 15% of national carbon emissions¹⁷. Besides managing energy consumption, developing CCUS technologies is also crucial to China's economic transformation. According to the International Energy Agency (IEA), by 2050, CCUS facilities will sequester a total of 400 million tons of carbon annually, contributing a cumulative 16% of global emissions savings from steel production¹⁸. Carbon capture is a mature, proven

technology applicable to multiple industries. In January 2021, China Baowu Steel Group, the world's largest steelmaker, published its roadmap to and timeline for green, low-carbon metal work. Its pathways¹⁹ include: enabling green, low-carbon development of the steel industry via technological innovation, and creating upstream and downstream synergies in the industry chain; using sophisticated smart technologies to bolster efficient carbon utilization, thus producing greener, higher-quality steel and related new materials; prioritizing the drawdown of carbon emissions, the root cause of climate change, raising the proportion of natural gas, hydrogen energy and other clean alternatives in the energy mix; and heightening public awareness of the need to reduce their carbon footprint.

3. Low-carbon development of the cement industry: Cement is another top source of CO₂ emissions in manufacturing. In China, emissions from cement production have been increasing uninterruptedly, currently responsible for around 9% of carbon emissions nationwide. China, the biggest cement producer in the world, represented approximately 60% of global cement production in 2019 in terms of volume. McKinsey estimates that limiting global warming to 1.5°C above pre-industrial levels by mid-century is beyond reach, unless China can lessen cement-related emissions by over 70%²⁰. Taking into consideration costs, technical feasibility, and resource availability, factors that figure into the decarbonization of China's cement industry should include **demand, energy efficiency, alternative fuel, and carbon capture technology**. In the second half of 2018, Conch Cement launched a pilot CCS project – the first and only CCS project in China's cement industry. The company invested over RMB 50 million in the CCS equipment, which was designed to capture 50,000 tons of CO₂ a year, a small fraction of the 1.5 million tons of CO₂ it generated annually²¹. Future pilot CCS projects in the cement sector will focus on making technological breakthroughs, drastically increasing the volume captured, and building up the CCS industry chain.

4. Low-carbon development of the petrochemical and chemical industry: petrochemicals and chemicals are a pillar of China's economic growth, yet are deemed a carbon-intensive industry. In 2020, the Chinese petrochemical and chemical industry emitted nearly 1.4 billion tons of CO₂ equivalent, or, 13% of the national total, second only to the metallurgical industry in volume²². Industry insiders believe **the petrochemical and chemical industry will embark on a journey of integration and upgrading in 2022. And starting in 2022, the industry will spur the substitution of alternative energy sources, and fully tap the growth potential of new energy and new materials**²³. Since pathways are clear-cut, companies have taken the initiative to lower emissions. On December 31, 2021, the first comprehensive energy station of China Petrochemical Corporation (also known as Sinopec) commenced operations in Jiangxi. The station had a daily hydrogen supply capacity of 500 kilograms and integrated a number of energy supply services, such as refueling (including hydrogen fueling), charging, and photovoltaic power generation. This demonstrated Sinopec's resolve to shape an industry landscape that featured “one basis (energy resources), two vehicles (clean oils and modern chemical engineering), and three growth drivers (new energy, new materials, and new economy).” By the end of 2021, Sinopec had installed 74 hydrogen fueling stations, over 1,000 charging and battery swapping stations, and over 1,000 distributed photovoltaic power stations nationwide.

5. Low-carbon development of the construction industry and “green building”: Construction constitutes 40% of the world's carbon emissions. The *2020 Research Report on Energy Consumption in Buildings Across China* prepared by CABEE Special Committee on Energy Consumption showed that in 2018, 51.3% of the entire country's carbon emissions came from construction²⁴. Indeed, **“green building” is the only road to high-quality development of the construction industry. By definition, green building is the practice of creating quality structures based on scientific management and technological innovation, and using processes that are environmentally responsible and resource-efficient throughout a building's lifecycle. It upholds the philosophy of harmonious co-existence between humanity and nature.** As at the end of 2020, pilot projects for green building were launched in Hunan, Shenzhen (in Guangdong province), and Changzhou (in Jiangsu province), and expected to penetrate other parts of China. In Hubei, for example, Green Building and Technological Innovation Alliance issued a technical manual to provide guidance on how to design and construct green buildings. In addition, in Jiangsu, Heilongjiang, Sichuan, and Tianjin, local governments advocated green building, prefabricated

building, and smart building, as reflected in their respective 14th FYPs for the development of the construction industry²⁵.

6. Low-carbon transition of the transportation industry and net zero throughout the industry chain: A research report by the Ministry of Ecology and Environment reveals that transportation contributes 15% of CO₂ emissions in China, with CO₂ generated from road transportation providing a good chunk of that. Transitioning to green transportation is thus a current imperative. **Shifts in public transportation, shared mobility, smart roads, and commuting patterns seem inevitable.** China's top car rental site and service Shenzhou Zuche is committed to promoting green travel (a portable lifestyle choice) and car sharing (a low-carbon model of car usage). It has deployed green transportation infrastructure across the country, attracting a growing number of people into booking rental cars. New Energy Vehicles (NEVs) are not zero-emission vehicles. Rather, they transfer emissions, bringing lifecycle carbon emissions down to nearly 50% of the total^{③26}. It is widely acknowledged that hydrogen is the cleanest energy of the 21st century, holding the most promise. As a pioneer in hydrogen industry chain integration, Haima Automobile embraces green manufacturing and smart manufacturing, transitioning to producers of NEVs and smart cars. Its leitmotif is now, "Place a premium on smart cars, produce electric vehicles together with other automakers, stay committed to plug-in hybrid cars, and focus on hydrogen-powered cars."²⁷

In October 2021, the State Council issued the *Action Plan for Carbon Dioxide Peaking Before 2030*, which set out "ten major actions for carbon emissions peaking"²⁸ and action on international cooperation and policy support. For companies of all sizes, at different stages of development, and from a wide range of industries across China, what opportunities and challenges could arise from such overall guidelines? How could companies adapt to changes in the environment and macro-economic policies, and balance business value creation and corporate social responsibility, so as to drive China's transition to a green economy? The table below, based on up-to-date information (see Table 3), provides thorough policy interpretation and valuable regional experiences or corporate practices. It could be a how-to guide on low-carbon business transformation.

Moving fast toward carbon neutrality: whole-industry emissions savings

Peak carbon emissions result primarily from energy-related CO₂, whereas carbon neutrality is determined by six GHGs⁵⁸ (i.e. carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons), involving more human activities, such as industrial production, waste treatment, farming, land use change, and reforestation. Another difference: to reach peak carbon emissions, the only thing that matters is the emissions trajectory, but to achieve carbon neutrality, both emissions trajectory and absolute volumes are of vital importance. **China will fulfill its carbon cutting commitments in phases, with "peak carbon emissions by 2030" as an interim target and "carbon neutrality by 2060" as the ultimate goal.** In this sense, "peak carbon emissions" and "carbon neutrality" are literally the same thing. Such a close relevance could lead to the need for dialectical thinking and overall planning. Carbon emissions peaking as scheduled can pave the way for carbon neutrality, while a carbon neutrality deadline may specify a timeline for emissions peaking.

China lags some countries and regions by 10 years in terms of its carbon neutrality deadline, but it is resolved to go from peak emissions to carbon neutrality in the space of just three decades. This compares to 40-50 years or longer for an overwhelming majority of the aforementioned countries and regions, where carbon emissions peaked early with virtually no government intervention⁵⁹. These countries and regions where emissions are falling naturally will find it much easier to achieve carbon neutrality. However, China, with its artificially steep rise in carbon emissions due to its rapid development, has a tougher task to bring emissions down, and still needs to maintain and perhaps increase this "artificial pressure" before it can meet its net-zero commitments.

After reaching peak emissions, fast-paced decarbonization will become an imperative. The main pathways include expanding renewable energy capacity, developing new energy and carbon removal technologies (e.g. CCUS), minimizing

③ The lifecycle of a vehicle involves sourcing of raw materials, manufacturing, and maintenance, etc.

production costs of hydrogen, and ramping up R&D efforts to widen hydrogen use in shipping and aviation, as well as for power generation and heating. Forecasts based on the Integrated Policy Assessment model for China by researchers show that non-fossil energy use would increase to 77% by 2050 if China were to attain its “30-60” targets. This implies fossil fuels and non-fossil fuels will swap positions in the energy mix. In such circumstances, emissions from fossil fuels will need to be fully offset via various carbon sinks (e.g. green and blue carbon sinks and CCUS technologies)⁶⁰.

Fueling the growth of alternative energy is the key to decarbonizing the transport sector. In recent years, the markets for small new energy passenger cars and light delivery vehicles have matured. However, heavy-duty trucks and vessels are beset by a lack of viable low-carbon alternatives. For instance, new energy heavy-duty trucks have mileage and load constraints, while hydrogen- and ammonia-fueled vessels have glaring deficiencies in technical equipment, supporting energy infrastructure, and risk remediation⁶¹. Since a shift to zero-emission vehicles (ZEVs) is important to decarbonization, automakers need to increase their ambitions in this regard and follow through.

Table 3: “Ten major actions for carbon emissions peaking”: policies and industry practices

Ten major actions	Industries concerned	Transformation priorities	Regional experiences and business practices
Action for green and low-carbon energy transition	Coal-fired power, oil and gas, clean power (e.g. wind, hydro, nuclear, solar, and hydrogen)	Promote coal substitution as well as transformation and upgrading; vigorously develop new energy; develop hydro power according to local conditions; actively develop nuclear power through a safe and orderly approach; rationally regulate oil and gas consumption; speed up the development of the new electric power system so that by 2030, provincial-level power grids will be equipped with peak load response capacity of 5% or more.	<ul style="list-style-type: none"> Guangdong: exploited the industrial strength of the Guangdong-Hong Kong-Macao Greater Bay Area to inspire innovations in hydrogen²⁹ Southwest China: built a renewable energy system with hydropower being the mainstay³⁰ Sinopec: picked up the pace of innovation in hydrogen and CCUS technologies, in a bid to evolve into China's largest hydrogen producer³¹ CNOOC: clean and low-carbon energy would make up at least 60% of the energy mix by 2025³² China Energy, China Huaneng, China Huadian, SPIC, and China Datang: installed clean electricity capacity would account for 60% of total installed capacity by 2025³³
Action for energy saving, carbon emissions mitigation and efficiency improvement	All industries	Raise capacity for managing energy conservation across the board; implement key energy conservation and carbon abatement projects; improve energy efficiency of major energy consuming equipment; strengthen energy conservation and carbon reduction in new types of infrastructure.	<ul style="list-style-type: none"> Huawei: as a pioneer in green supply chain management, Huawei put a value on energy saving, efficiency improvement, ecological design, and circular economy in product lifecycle management³⁴ China Huaneng: China Huaneng's solution to reduce emissions from coal-fired power plants was mentioned in a WEF white paper entitled <i>Global Innovations from the Energy Sector 2010-2020</i>³⁵ China Mobile: precisely conserved energy through real-time monitoring of temperature
Action for carbon emissions peaking in the industrial sector	Steel, non-ferrous metals, building materials, petrochemical and chemical, auto	Promote green and low-carbon development in the industrial sector; push the steel, non-ferrous metals, building materials, and petrochemical and chemical industries to peak carbon emissions; firmly curb the irrational expansion of energy-intensive, high-emission projects.	<ul style="list-style-type: none"> China Baowu: became the industry first to set a timetable for peak emissions and carbon neutrality, and launched the largest carbon neutrality-themed fund by asset size in China³⁶ Volkswagen Group China: supplied plants with renewable electricity, with a view to building a green supply chain³⁷
Action for carbon emissions peaking in urban and rural development	Construction and building materials (e.g. cement)	Promote green and low-carbon transformation in urban and rural development; accelerate energy efficiency improvement to buildings; accelerate the optimization of building energy consumption structure; promote the low-carbon transition in rural development and energy consumption.	<ul style="list-style-type: none"> Landsea: focused on developing energy-saving and environmentally friendly residential buildings, and providing green property management services (a vivid example of “green real estate”)³⁸ Yichang, Hubei: announced the first implementation plan for carbon dioxide peaking in China's construction industry³⁹ CSCEC: developed a cloud platform for green, smart construction, enabling real-time monitoring of environmental and energy data; and made full use of green energy, turning zero discharge of solid waste into reality among certain affiliates⁴⁰ Saint-Gobain: rose to challenges with respect to sustainable construction, energy efficiency, and climate change by making inroads into the high-performance building materials market⁴¹

Ten major actions	Industries concerned	Transformation priorities	Regional experiences and business practices
Action for promoting green and low-carbon transportation	Railway, road haulage, shipping, aviation, and logistics	Promote low-carbon transformation of transportation vehicles and equipment so that by 2030, 40% of new car sales will be powered by new energy or clean energy; develop green, efficient transportation systems; accelerate construction of green transportation infrastructure.	<ul style="list-style-type: none"> · COSCO Shipping: offset emissions from crude oil shipping and fuel combustion by purchasing CCER^④ credits · China Eastern Airlines: operated carbon-neutral flights · Shenzhen Zuche: promoted green travel and car sharing, a new model of car usage.⁴²
Action for promoting circular economy for carbon mitigation purpose	All industries	Push industrial parks to develop in a circular manner; strengthen the comprehensive use of bulk solid waste; refine resource recycling systems; step up efforts to reduce and recycle household waste.	<ul style="list-style-type: none"> · Reclothing Bank: committed to sustainable fashion projects since inception in 2011⁴³ · INCOM Recycle: committed to recycling and reuse since 2003, and created the sustainable lifestyle brand BOTTLOOP⁴⁴ · Grandblue Environment: actively sought to develop the solid waste and wastewater treatment business⁴⁵ · SF Express: introduced a smart circular packaging system, under which a π-box can be used 70 times at most with hook and loop fasteners⁴⁶
Action for advancing green and low-carbon tech innovation	All industries	Improve innovation mechanisms and systems; develop innovation capabilities and talent; boost application-oriented basic research; accelerate the R&D and application of advanced, practical technologies.	<ul style="list-style-type: none"> · SAIC-GM: introduced the Ultium EV platform equipped with the industry-first wireless battery management system; invested over RMB 50 billion in electrification and intelligent connectivity⁴⁷ · Tencent Cloud: built a futuristic energy Internet to enable decentralized transactions at lower costs · Newlink: reduced emissions using digital technologies; and designated as a “Low-Carbon, Innovative, and Socially Responsible Enterprise”⁴⁸ · 37 Interactive Entertainment: pledged to build core competitive advantages through technological innovation and digitalization, purchase more green electricity, and invest at least RMB 500 million in six ESG initiatives by 2025⁴⁹
Action for consolidating and enhancing carbon sink capacity	Green carbon (Forests as carbon sinks ^⑤) Blue carbon (Ocean as carbon sinks ^⑥)	Consolidate the carbon sequestration capacity of ecosystems; enhance the carbon sink capacity of ecosystems; strengthen the foundation for ecological carbon sinks; promote carbon emissions reduction and carbon sequestration in agriculture and rural areas.	<ul style="list-style-type: none"> · Shenzhen, Guangdong: compiled China’s first accounting guidelines for blue carbon sinks⁵⁰ · Weihai, Shandong: released China’s first development plan for blue carbon economy · Zhanjiang, Guangdong: launched a blue carbon trading program, which was the first of its kind in China⁵¹ · East China Forestry Exchange: piloted a national green carbon trading platform⁵²
Action for fostering a green and low-carbon society	All industries	Strengthen publicity and education for ecological civilization; advocate green and low-carbon lifestyles; encourage companies to fulfill their social responsibility; and conduct intensive training for cadres.	<ul style="list-style-type: none"> · “Ant Forest”: encouraged over 500 million users to lead a low-carbon lifestyle, contributing to the planting of 100 million trees in areas susceptible to desertification⁵³ · Society of Entrepreneurs and Ecology (SEE): planned to plant “100 million saxaul trees” between 2014 and 2023 through joint efforts by governments, herdsmen, environmental organizations, entrepreneurs, and the masses⁵⁴ · Shenzhen, Guangdong: introduced the “Tan Pu Hui” system, allowing small- and micro-sized enterprises, households and individuals to earn points which could be redeemed for rewards by taking part in low-carbon activities such as buying green products⁵⁵
Action for carbon emissions peaking in all regions hierarchically and orderly	All industries	Set scientifically-sound targets; promote green and low-carbon development according to local conditions; formulate local plans based on coordination between central and local authorities; and carry out pilot projects.	<ul style="list-style-type: none"> · Guangdong-Hong Kong-Macao Greater Bay Area: 13 financial institutions embraced China’s first environmental information disclosure mechanism, catalyzing whole-industry transition to green finance⁵⁶ · Guangdong: became the first pilot city in China to create a spot carbon trading market worth over RMB 4 billion⁵⁷

④ CCER, an abbreviation for Chinese Certified Emissions Reduction, is the second kind of basic product in the carbon emissions trading market. The first kind is carbon credit – a permit from the government that allows a company to emit a certain amount of CO₂ or other GHGs.

⑤ Green carbon (green carbon sinks) refers to CO₂ captured by forests from the atmosphere and stored in the plants and soil. Obviously, green carbon sinks decrease the concentration of CO₂ in Earth’s atmosphere.

⑥ Blue carbon (blue carbon sinks) is the term for atmospheric carbon captured by and stored in ocean and coastal ecosystems. It is reported that blue carbon is a vital part of the global carbon cycle, because ocean and coasts act as sinks for a fourth of man-made CO₂ and over 90% of GHGs.

Also important is breakthrough innovations in new materials. Industry insiders hold that materials can be a vehicle for any technology, and green innovation in cutting-edge technologies initially embedded in new materials is a critical factor in achieving “30-60” targets⁶². The sea change in energy mix will lead to growing demand for new materials. One example: rapid iteration of battery materials is essential to a boom in NEVs. Today, **plant-based materials, by virtue of its eco-friendliness, inexhaustibility, and biodegradability⁶³, are widely used in energy, chemicals, healthcare, agriculture, and manufacturing. In the future, they will become mainstream new materials.** For some new materials used in emerging industries, China is still heavily reliant on imports. So, it is high time to produce locally to tap into the segments with huge growth potential⁶⁴.

|| Achieving carbon neutrality: further decarbonization and carbon sinks

Starting in 2045, China will take its last step toward carbon neutrality by enhancing decarbonization and carbon sinks. **Commercializing NETs that strike a balance between economic growth and environmental protection, especially CCUS and BECCS, will be high on China’s agenda.** Between 2045 and 2060, a wider range of industries will shift their decarbonization efforts up a gear, the vast majority of the population will go green, and energy use in industrial production, power generation, transportation, and daily life will be generally clean and efficient.

Carbon neutrality is not a synonym for zero emissions. In actuality, carbon neutrality is achieved when all the direct and indirect carbon emissions from businesses, products, individuals, or events are balanced by forests and commercial carbon sinks. It is practically impossible for humanity to emit no CO₂. Though the electricity sector may source 100% renewable energy, certain industrial processes and sectors like shipping and aviation find it unrealistic to achieve zero emissions. Therefore, carbon dioxide removal (CDR) technologies are indispensable to “negative emissions”⁶⁵. In order to offset emissions, China will work on two fronts: increase in natural carbon sinks (forests and oceans) and application of CCUS technologies.

Academic research shows that NETs featuring CCUS coupled with new energy underpin the target of going carbon neutral. The cost of limiting global warming to below 2°C through the 21st century relative to pre-industrial levels could increase by 138% in the absence of CCUS technologies, according to the IPCC (the UN-created Intergovernmental Panel on Climate Change) Fifth Assessment Report⁶⁶. Mitigation can be more cost-effective if using an integrated approach that combines cross-sectoral measures to deploy CCUS, boost energy efficiency, save energy in end-use sectors, and increase the use of hydrogen and stored energy. Also, widespread deployment of CCUS involves significant co-benefits. For example, equipping a thermal power facility with CCUS not only prevents premature failure of its existing power units, but also saves it from having to invest in other low-carbon electricity infrastructure, which undoubtedly brings down economic costs of getting to net zero. From R&D to pilot projects, China has made breakthroughs in CCUS technology and industry. At present, six CCUS projects are running in oil fields in north China, but most of them have not achieved economies of scale⁶⁷.

|| Recognizing long-term investment opportunities in the carbon neutral future

China has enacted policies to act on its carbon neutrality ambitions, speeding up the transition to a green, low-carbon circular economy. Its energy supply urgently needs to switch to electrification and new energy, as green buildings, NEVs, and industrial carbon capture technologies are gaining traction on the demand side. The domestic carbon trading platform is still in its embryonic stage, but holds huge transformative potential. More active trading in financial derivatives like carbon futures is expected. Besides rising to challenges by cutting emissions decisively, Chinese companies should simultaneously recognize and seize long-term growth and investment opportunities, which could give fresh impetus to company development. **In light of the massive investment needed to achieve carbon neutrality, private capital could be a strong supplement to government input. At the same time, the market’s appetite for green investment could be a booster for development of green finance.** In this article, we have tried to summarize investment opportunities along the five industry chains⁶⁸ (see Table 4) for reference.

Table 4: Investment opportunities in the carbon neutral future – sectoral carbon-cutting pathways and corresponding industry chains

Sector	Industry chain	Scope of investments
Electricity	New energy	Photovoltaic power, wind power, distributed generation, stored energy (electrochemical energy and hydrogen), Ultra-high-voltage (UHV) electricity transmission, smart grid (energy Internet)
Manufacturing	Energy saving and carbon reduction	Low-carbon transformation of industrial processes, energy-saving equipment, hydrogen and fuel cells, recycling and remanufacturing of materials, reuse of resources, and biomaterials
Transportation	NEV	NEVs, new-energy batteries, EV chargers, smart urban rail system (IoT and AI)
Building materials	Green building	Green building materials, new high-performance materials, prefabricated buildings, energy-saving retrofitting of existing buildings
Public benefit	Environmental protection	Environmental protection equipment, pollution abatement, CCUS, and waste recycling and reuse

Reflections on China's progress toward "30-60" targets

Overcoming misconceptions

There are two schools of thought in China: some people believe that the sooner carbon emissions peak, the better, while others advocate developing fossil-fueled assets and the high-intensity chemical industry till 2030 to push peak emissions up as high as possible. Obviously, both extremes should be avoided. Why? The former underestimates the difficulty of reaching peak emissions and cutting carbon, as well as China's reliance on fossil energy, adversely impacting the country's economic growth. The latter oversimplifies the situation, paying no attention to heavy "path dependence" and "sunk costs" incurred by delayed mitigation, as well as the pressure for a very rapid decrease in carbon in the final decades before 2060. Typically, a thermal power plant is designed to run for 30-40 years. Coal-fired power units there usually cannot function at full capacity, yielding measly economic returns. Installing a vast quantity of coal-fired power units today will definitely erode new energy market share. Worse still, elimination of those power units from the market by 2030 will engender a colossal waste of the initial investment. During the 14th FYP period, China should follow the "golden mean" principle (i.e. the middle way), that is, insist on using "efficient, low-carbon, clean, and flexible" form of coal-fired power on a proper scale, and continue to conduct low-emission and energy-saving R&D⁶⁹ in pursuit of cleaner coal-fired power.

Some industry insiders argue that coal-fired power will remain the cornerstone of power supply for the foreseeable future, because of the particularities of new energy as well as economic and safety concerns posed by yet-to-be commercialized energy storage technologies. Nevertheless, coal-fired power ought to play a different role. Coal-fired power plants and grid companies claim that they are caught between the Scylla of the market price of coal and the Charybdis of a price ceiling on electricity. To resolve this contradiction, they have called on relevant authorities to deepen market-oriented reform of the energy pricing mechanism. This is also conducive to enhancing grid stability and sound development across the entire industry chain. Experts suggest abandoning the one-size-fits-all approach to curbing power-plant emissions, and making carbon footprint measuring a driver of industry transformation⁷⁰.

Low-carbon transformation in energy and manufacturing is currently under the spotlight. Unsurprisingly, the “energy revolution” is now a frequently used phrase. **When supply-side emissions reduction reform is in full swing, people are likely to overlook the demand-side reform, which is equally important.** The truth is demand-side emissions cutting can not only ease the burden on the supply side, but also “increase the willingness of consumers to pay a premium for low-carbon products”⁷¹. The synergy between supply- and demand-side reforms is indispensable for smooth industry transformation and sustainable economic growth. In addition to cutting emissions directly from operations, companies could take their social responsibility a notch up by impelling the staff to live a greener life (exemplified by green travel, zero food waste, garbage sorting, and tree planting), and stimulating green consumption in key sectors, such as housing, transportation, and daily necessities.

❧ Reflecting on carbon cutting “movements” and power rationing

Judging from China’s carbon footprint, industrial structure, and resources/energy mix, “30-60” targets are by no means easy to achieve. Most Chinese companies have reduced emissions by improving management efficiency and capitalizing on advanced technologies, but some have tried in vain to cut carbon via so-called “movements”: One is to make an empty promise to generate buzz, and seldom put carbon reduction plans into practice. The other is to initiate overly aggressive carbon cutting campaigns, including setting carbon reduction goals beyond their reach, overemphasizing net zero, and cutting all energy-intensive, high-emission projects in traditional manufacturing⁷². These corporate movements are two extremes in response to a national call for action on carbon cutting, exerting a negative influence on corporate sustainability and economic and social development – and thereby not conducive to achieving the “30-60” targets.

During the 13th FYP period, all Chinese provinces, municipalities and autonomous regions successfully controlled total energy consumption and energy intensity in accordance with their respective action plans, which was proof that national goals were reasonable and attainable (barring unforeseen circumstances). But starting in September 2021, quite a few energy-intensive public companies claimed they had to temporarily halt production due to limited electricity supply. More than that, homes were affected by power cuts as electricity was rationed in 11 provinces and regions. This could be attributed to a document released by the NDRC in mid-August 2021, which stated that based on regional performance measured against “dual-control” criteria, energy intensity in some geographies was rising in the first half of 2021. In that same document, nine provinces and regions were warned in particular for their poor record⁷³.

Shortly afterwards, some regions set about lowering overall energy consumption by means of mandatory shutdown of inefficient factories, electricity rationing in high intensity sectors, and blackouts that cause livelihood disruptions. This was just a last-minute effort, indicating that local governments and businesses had misinterpreted the new development philosophy, underestimated the difficulty of low-carbon transformation, and marked a disappointing start to the green transition. Achieving “30-60” targets is a formidable task. It can be likened to a final exam, where “dual control” could be the most important exam question, carrying the most weight. **The only way to get the right answer will be to do solid work, knowing that a journey of a thousand miles begins with a single step, and a last-minute effort hinders business growth as well as economic and social development.** However, the question persists about how to cooperate with stakeholders on both the supply side and the demand side to create synergies for this national and even global endeavor.

❧ Suggestions for how companies could help achieve “30-60” targets and high-quality development

This article proposes an ideal roadmap for companies to help achieve “30-60” targets (see Figure 3). The roadmap encompasses major pathways and measures, enlightening companies as to how to prepare for transformation, formulate some form of ESG strategy, and deal with the impact of climate policies.

Company executives, who oversee the decision-making process and strategy implementation, are of vital importance to coordinated corporate carbon-cutting actions and high-quality company development. They may incentivize

employees to explore possible high-quality development paths amid the company's low-carbon transition, by means of promotion and higher pay. One way a company can sharpen its technological innovation capabilities and achieve high-quality development is to incorporate the philosophy of low carbon into product R&D.

Strategically, companies may create a task force charged with devising short-, mid- and long-term carbon reduction plans, setting goals and priorities accordingly, and ensuring a clear division of responsibilities. In practice, companies should employ a top-down approach to strategies according to government policies, sectoral characteristics, and their current state of development, so as to steadily accelerate carbon abatement and business transformation.



Figure 3: Roadmap for companies to help achieve “30-60” targets

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03

**HANDS-ON EXPERIENCE OF
CEIBS ALUMNI COMPANIES
IN CARBON NEUTRALITY**



SEE

By Zhao Liman*

Uniting Entrepreneurs to Protect the Environment



Qian Xiaohua

CEIBS EMBA 2000 Alumnus

6th President of SEE

“Despite our diverse professional backgrounds, we’re united by the common goal of protecting the environment. At the same time, promoting green supply chains has become our core focus. We advocate for a green economy to help achieve carbon dioxide peaking and carbon neutrality targets, but it is currently difficult to measure people’s daily per-capita carbon emissions. I believe that these long-term targets must be realized through commercially sustainable projects, and by giving full play to the creativity and capabilities of entrepreneurs.”

Review

“SEE is an organization that brings together environmentally minded entrepreneurs to form a platform that encourages businesses to contribute to environmental protection and sustainable development. Three organizational features are indispensable for SEE to fulfill this function: first, a mechanism that ensures the long-term dedication of all members; second, incentive structures to motivate members; and third, a mechanism that aligns the individual business goals of companies with social welfare and environmental protection, so as to ensure commercially sustainable solutions.”

Wang Yajin

Professor of Marketing, CEIBS

Research Area Director of ESG

Programme Co-Director of CEIBS-Tencent Joint Programme



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Introduction

A healthy natural environment is vital to the sustainable development of human society, and environmental protection yields benefits that can last for many generations. On June 5, 2004, some 100 entrepreneurs gathered in the Tengger Desert in Alxa League, Inner Mongolia to establish the Society of Entrepreneurs and Ecology (SEE). Amidst this vast expanse of sand, the entrepreneurs published the Alxa Declaration, in which they committed to invest one hundred thousand yuan per year to mitigate sandstorms and protect China's ecological environment. Four years later, in 2008, SEE went on to establish the SEE Foundation.

The SEE Foundation spearheaded various initiatives to prevent desertification, such as the "One Hundred Million Saxaul" project and a groundwater protection project; ten brand projects, including the "Real Estate Green Supply Chain Initiative" which aimed to reduce carbon emissions in the real estate industry; and the first blue carbon sink project in China to achieve carbon neutrality. By rallying entrepreneurs around commercially sustainable, non-profit environmental protection projects, SEE made a significant contribution to environmental protection in China.

On April 22, 2021, which marked the 41st Earth Day, China's President Xi Jinping delivered an important speech entitled "Working together to build a community of life for man and nature". In his speech, he noted that mankind faced unprecedented challenges in global environmental governance, and that the international community required unprecedented ambition and action, needed to assume responsibility and show unity, and work together to build a community of life for man and nature.

On the same date 16 years earlier, and nearly one year after its founding, SEE launched the "SEE Ecological Prize", the first non-governmental prize to encourage efforts made in the area of environmental protection and sustainable development. By the time of writing, the prize had been awarded nine times, and had emerged as an important award in the environmental field.

The Society of Entrepreneurs and Ecology (SEE), which was established on Jun 5, 2004 by some 100 Chinese entrepreneurs, was an organization that sought to engage entrepreneurs in social responsibility and environmental protection. At the time of writing, after 17 years of development, SEE had come to encompass more than 900 member businesses and 32 project centers nationwide, and provided support to over 800 environmental protection and social welfare organizations. At the same time, SEE was involved in a broad range of environmental protection projects that spanned desertification prevention, climate change and commercial sustainability, ecological protection and nature education, and marine conservation.

Starting from "a grain of sand"

Focusing on CSR

In the autumn of 2003, Liu Xiaoguang, then president of Beijing Capital Co. Ltd., travelled to the Tengger Desert to attend a small entrepreneur's seminar. He was shocked to see the extent of desertification there: "Human existence is as insignificant as a grain of sand. Even if you're a billionaire, wealth alone is meaningless." Falling upon his knees, Liu began to contemplate what he could do to alleviate environmental problems such as the one he had witnessed.

The topic of the seminar in the desert was "How Entrepreneurs Maintain their Faith", and the discussion centered

on the responsibilities and mission of entrepreneurs. A friend of Liu's who was also attending, Song Jun, had recently invested in a desert eco-tourism project in Alxa League, where he had dedicated eight years of his life to combating desertification. Liu was deeply touched by Song's sense of social responsibility. "This should be our mission as entrepreneurs, and how we should live up to ourselves!" wrote Liu in his travel notes.¹

Following the seminar, Liu started lobbying others, and in particular friends from the business world, to contribute to environmental protection. He established SEE's strategy of "building long-term mechanisms instead of making one-off contributions" and stressed the need for long-term personal engagement and financial commitment. He also called on member companies to dedicate themselves to environmental causes for at least 10 years.

At SEE's kick-off meeting on February 14, 2004, Liu related enthusiastically:

"We are responsible not only for realizing economic gains and maximizing investment returns, but also for improving social welfare. To be a company of lasting value, we must integrate social responsibility into our business model, so that our business's development also drives social progress."²

SEE was formally founded on June 5, 2004, which was World Environment Day. Founding members marked the event by publishing the Alxa Declaration, which read:

"We hope to make China's economy more prosperous and its people wealthier, cultivate friendlier relations between people, and create a healthier and more beautiful natural environment. We hope to build a global village and a world of universal harmony where everyone's dream may come true."

**Why have we descended on the Alxa Desert from across China?
Why did we establish SEE to help curb sandstorms in China?**

Because we have hopes and dreams!

The infographic features the SEE logo on the left, which consists of a green circle containing a white stylized plant and the letters 'SEE'. Five green arrows point from the logo to the following text:

- HOPE** We hope to make China's economy more prosperous, and its people wealthier;
- HOPE** We hope to cultivate friendlier relations between people;
- HOPE** We hope to create a healthier and more beautiful natural environment;
- HOPE** We hope to build a global village;
- DREAM** And a world of universal harmony where everyone's dream can come true.

Our companies hail from various regions and industries, and our corporate structures vary, but we're gathered here in the Alxa Desert to build recognition for SEE both domestically and internationally, so as to make it the most important social welfare organization in China focused on preventing sandstorms.

From the Alxa Declaration

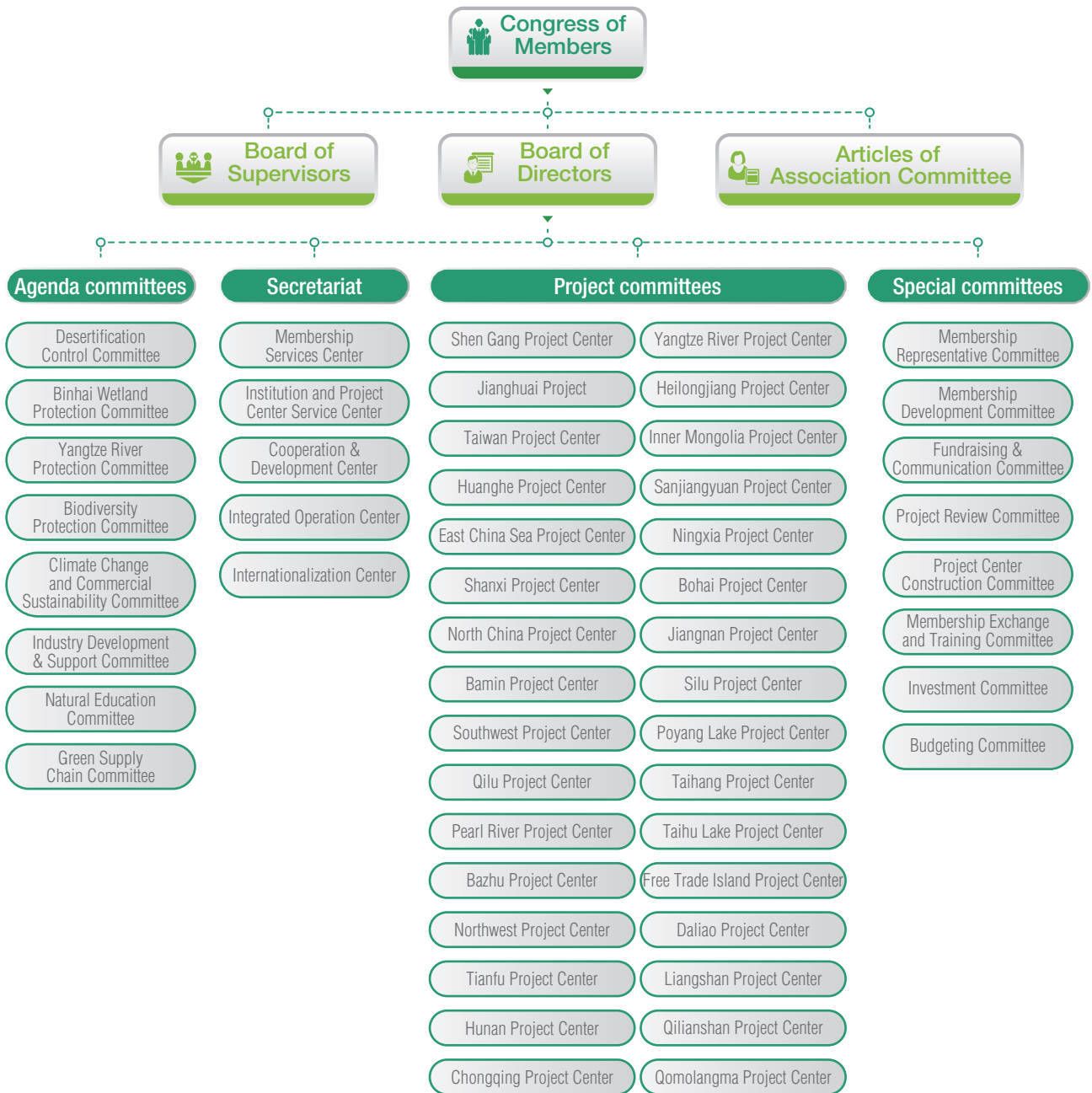
Excerpts from the Alxa Declaration



Based on this founding purpose, SEE' s members continually expanded their engagement in environmental protection and social welfare activities, including through carrying out projects directly, supporting projects initiated by other organizations, and helping entrepreneurs to contribute to environmental causes. One important development was the inauguration of the “SEE Ecological Prize” , which offered funding to winning organizations and facilitated the sharing of best practice and resources between companies.

Improving governance structures and delivering sustainability

SEE upheld the governance principles of equal participation, democratic decision-making, checks and balances, openness and transparency, and accepting supervision from member businesses as well as the general public. Members of governance bodies were appointed via election, major decisions were approved via vote, and the SEE Statute was rigorously adhered to.



Governance Structure

SEE was committed to “protecting and restoring China’s natural environment, which included combating desertification among other things, while urging and motivating Chinese entrepreneurs to assume more environmental and social responsibility.” In 2008, SEE initiated the Beijing Entrepreneur Environmental Protection Foundation (SEE Foundation). Wu Jinglian, a renowned economist and the Foundation’s first chairperson, commented that “building SEE Foundation on top of SEE’s sound governance structures and processes brought greater procedural integrity to our work, and made us better organized as a non-government entity.”

Thanks to this improved governance structure, SEE was able to better align the commercial activities of member companies with social and environmental commitments. At the end of 2014, SEE Foundation was upgraded to a public foundation dedicated to environmental protection and social welfare, under whose umbrella ten brand projects were launched. Two of the Foundation’s signature projects, namely the “One Hundred Million Saxaul” project and the Real Estate Green Supply Chain Initiative both generated a positive social impact, while also enabling substantial carbon emissions reductions and protecting ecosystems.

The “One Hundred Million Saxaul” project

“Love as we do, plant as we do”

From its inception, SEE dedicated itself to protecting the environment in the Alxa region by planting psammophytes such as saxaul and hedysarum. The former is a plant with strong tolerance of drought, coldness, and salt and is highly adaptable to environments with heavy wind erosion and exposure to sand burial. Therefore, it is an ideal plant for wind-breaks, fixing sand, and protecting desert ecology.

Based on its experience from previous projects, SEE formally launched the One Hundred Million Saxaul project with the goal of planting around a hundred million psammophytes, including saxaul, over a period of ten years, and restoring 1.3 million square km of desert vegetation to improve the local ecology and prevent desertification from spreading, while generating additional economic benefits that would improve the wellbeing of local herdsmen.

To this end, SEE partnered with the local government, cooperatives, and herdsmen from the Alxa League, and





sought to secure funding from various organizations and individuals dedicated to combating desertification and ecological restoration, so as to rally diverse interest groups behind this common purpose.

Collaboration on the “Ant Forest” project

In August 2016, SEE and Ant Financial jointly launched the “Ant Forest” project. This mobile phone mini-app allowed Ant Financial users to grow virtual trees by reducing their day-to-day carbon footprint. For each virtual tree that users grew, Ant Financial and SEE worked together to plant a real saxaul shrub in heavily desertified regions of China, together with the support of local authorities.

Qian Xiaohua, then the president of SEE, recalled: “At first, neither we nor Ant Financial anticipated that this project would be so popular or generate such strong network effects. Yet just one year after its launch, we had planted a total of 1.1 million shrubs across an area of more than 500 thousand square km³. By the end of August 2019, we had 5 hundred million users, and had achieved carbon emission reductions of over 7.92 million metric tons, together planting 122 million shrubs over a total area of around 1.2 million square km⁴.

In September 2019, the United Nations Environment Program recognized Ant Forest as a “Champion of the Earth” , its highest honor in environmental protection, for encouraging over 500 million people to adopt low-carbon lifestyles⁵.

Reaping the rewards of the project

While the One Hundred Million Saxaul project presented numerous challenges, it enabled breakthroughs on multiple fronts, including in scientific research, government partnerships, generating publicity, and engaging the public. The project helped to increase soil coarseness, provided effective windbreaks, and fixed sand in the Alxa Desert, delivering a range of ecological, social, and economic benefits.

By the end of 2021, the One Hundred Million Saxaul project had planted more than 75.1 million psammophytes in Alxa League’ s core ecological zone⁶, restored 1.06 square km of saxaul shrubs, and engaged 489 herding households in ecological protection. As the coverage of saxaul bushes increased, other psammophytes and perennial species such as *Zygophyllum xanthoxylon*, *Reaumuria soongorica*, and *Spiraea thunbergii* also began to thrive, providing habitat for foxes, sandgrouses, and wild rabbits.



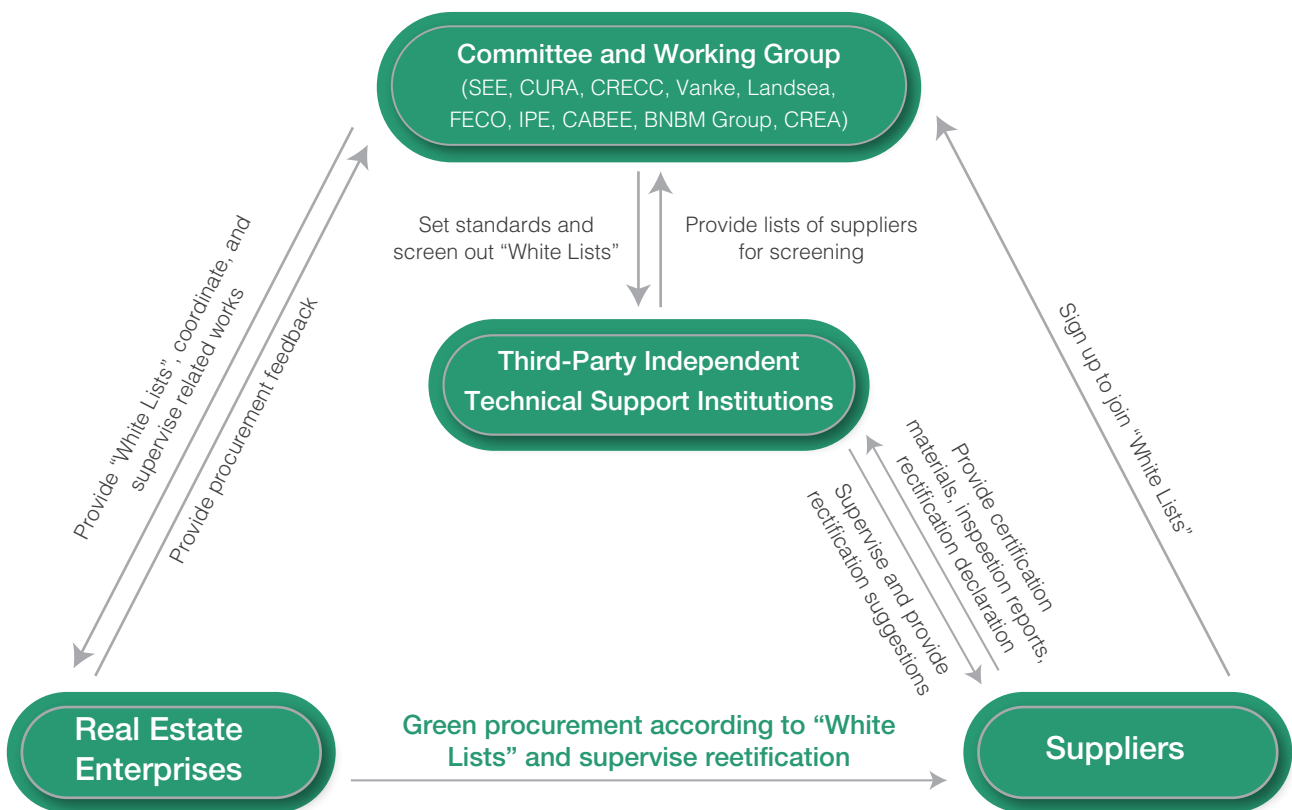
Green supply chains

On January 1, 2016, Qian Xiaohua took office as the 6th president of SEE. Based on the success of the One Hundred Million Saxaul project, he carried out a major reorganization of ongoing projects and launched new project brands, including “Free Flying Wings” for bird habitat protection, “Blue Defenders” for curbing industrial pollution, and “Green Supply Chains” for China’s real estate industry. He was most proud of this final project, which was the culmination of joint efforts by SEE and industry leaders, as it was something that had been advocated for many years.

Bringing low carbon to real estate

In 2016, China accounted for around 20% of the world’s global carbon emissions, with nearly 40% coming from the real estate and the construction sectors. To encourage more real estate developers to contribute to the implementation of the Paris Agreement and drive global efforts to cut carbon emissions, SEE, CURA (China Urban Realty Association), CRECC (China Real Estate Chamber of Commerce), Landsea Holdings, and Vanke jointly established the “Real Estate Green Supply Chain Initiative” on June 5, 2016. This project sought to help steel, cement, aluminum alloy, and timber suppliers to improve their environmental performance, in a bid to reduce pollution and carbon emissions across the supply chain and promote more sustainable development.

Real estate companies and their upstream suppliers were key participants in the Real Estate Green Supply Chain Initiative (“the Initiative”). Under the Initiative, procuring companies agreed to follow green procurement plans and only source materials from green suppliers (the “only buy green” principle). At the same time, third-party agencies provided technical support and advised suppliers on how to achieve compliance, and nominated suppliers with good environmental performance for inclusion on a procurement list (which included a white list and “green list”). Procurement white lists were issued to real estate businesses by the Initiative’s Promotion Committee and Working Group (which comprised members from co-initiating institutions) who oversaw implementation of the lists and urged non-compliant suppliers to make rectifications.



How the Real Estate Green Supply Chain Initiative worked



Expanding influence by formulating standards

On November 1, 2016, China's real estate industry published a white paper on procurement standards for a green real estate supply chain. On November 16, an evaluation of the environmental benefits of the Real Estate Green Supply Chain Initiative was unveiled at a side event of the UN Climate Change Conference. Eric Solheim, the UN Environment Executive Director and Under-Secretary-General of the UN, commended this innovative model for its contributions to tackling climate change.

Following its inception, the Real Estate Green Supply Chain Initiative had a major impact on China's real estate industry. By the end of 2016, 71 real estate companies had joined the Initiative. These companies had a combined sales revenue of 1.3 trillion RMB in 2015, accounting for 15% of the sector's total, and had business dealings with over 2,000 supply chain partners⁷.

On March 22th, 2017, after extensive deliberation, review, and consultation, a white list for the Initiative was formally unveiled. The list initially included 153 companies, of which 145 in the cement sector and 8 in the timber sector. Following this, a growing number of product categories and companies were added to the list.

Taking the pollution compliance requirements of the white list as a baseline, in July 2019, the Initiative also established a "green list" to better respond to emission reduction policies in China and overseas. The requirements of the green list, which were based on prevailing national and local standards, were published in 2020, and mainly comprised indicators for resource usage, energy usage, environmental impact, and other criteria used to screen suppliers. For example, the list required suppliers to meet national water-saving standards, obtain energy management certification, and disclose their greenhouse gas emissions. The green list provided strong incentives for companies to combat climate change and pursue carbon neutrality, and promoted energy conservation, emission reduction, and green development in the real estate industry and its suppliers by rewarding and showcasing businesses with good practices.

In 2020, the Initiative also set up a blacklisting system. Under this system, the Initiative evaluated the environmental performance data of companies (from data in the public domain) and notified companies that performed poorly. These companies would subsequently be reviewed periodically, and if they did not rectify any problems identified, then they would be placed on a black list and denied all future orders from the Initiative's member companies.

"The past five years have seen an increasing number of businesses joining the Real Estate Green Supply Chain Initiative. For many, our 'only buy green' motto is deeply ingrained in their operating philosophy. Such responsible actions by Chinese real estate companies are significant both for tackling climate change and preventing and curbing pollution."

– Tian Ming, Member of the Promotion Committee of the Real Estate Green Supply Chain Initiative

By the end of 2021, over 100 enterprises had joined the Initiative, with annual sales exceeding 2 trillion RMB, or 20% of the industry total. The white list had been expanded to encompass a total of 3,874 companies in 13 categories^①, while the green list included 22 companies in 7 categories. In terms of green procurement, between 2019 and the time of writing, SEE together with CURA jointly made green procurement purchases worth RMB 5.1 billion; this value rose to roughly RMB 10 billion in 2020 and RMB 17 billion in 2021. In addition, the Initiative joined the Aupup Certification Alliance, where it would implement the same white list and green list system. To mark its fifth anniversary, the Initiative also launched a green supply chain index for real estate businesses and published a ranking of the top 20 companies in the industry. SEE hoped to extend the Initiative to other industries such as textiles, electronics, and chemical engineering, and had already seen some preliminary success in the first two of these.

Blue carbon ecosystems

On June 8, 2021, World Oceans Day, SEE Foundation signed a tripartite agreement with the Third Institute of Oceanography (at the Ministry of Natural Resources), and the Administration Bureau of the Zhanjiang Mangrove National Nature Reserve, for the transfer of carbon allowances from the Zhanjiang Mangrove Afforestation Project. Over 300 guests from China and overseas attended the launch of this project, which was China's first blue carbon sink. Following the signing ceremony, 32 public bodies and social welfare organizations jointly launched the Blue Carbon Ecosystem Protection and Restoration Initiative, which called for all sectors of society to research, protect, and restore blue carbon ecosystems and actively promote mechanisms such as blue carbon trading, which realized the value of ecologically beneficial products, in order to help China achieve carbon neutrality by 2060.

At the time of writing, blue carbon trading mainly focused on three blue carbon ecosystems that were certified by the Intergovernmental Panel on Climate Change, namely mangrove ecosystems, seagrass meadow ecosystems, and salt marsh ecosystems. These ecosystems perform important ecological functions including fixing carbon, reducing emissions, maintaining biodiversity, purifying water, providing shelter from wind, and attenuating waves. Researches had demonstrated that mangrove ecosystems had the greatest blue carbon potential in terms of carbon fixation and storage, functions which they performed 3–5 times more effectively than tropical rain forests, making them one of the most ecologically diverse ecosystems on earth. Based on these findings, SEE decided to involve itself in a mangrove carbon sink project.

The project, which was co-initiated by the Third Institute of Oceanography and the Zhanjiang Mangrove Nature Reserve, developed 380 acres of mangroves planted within the reserve from 2015 to 2019 as a blue carbon sink certified by the Verified Carbon Standard (VCS) and Climate, Community & Biodiversity Standards (CCB), making it the first such project in the world. It was calculated that these mangroves could achieve carbon emission reductions of 160,000 metric tons between 2015 and 2055, while companies could purchase carbon allowances to offset their own emissions. Any proceeds from this carbon trading were to be reinvested in the project, allowing it to constantly renew its ability to protect ecological balance and benefit adjacent communities.

By introducing this market-based mechanism, the mangrove carbon sink project helped to improve the quality and stability of mangrove ecosystems, while also tapping their economic, ecological, and social benefits. This provided a successful model for protecting and restoring the ecology of mangroves in China.

Showing reverence for nature

“At this unique juncture between China's ‘two centenaries’⁸, SEE plans to continue exploring green approaches to development, promoting green transformation in industry, onboarding more non-governmental partners, and expanding partnerships to build a broader platform that will help deliver carbon peaking by 2030 and carbon neutrality by 2060. Let us embrace change, drive development through innovation, and walk hand in hand. I, together with the governance team, call on you to make changes step by step and pursue environmental protection sustainably, moderately, and with great determination, so as to improve the natural environment.”

– Sun Lili, 8th President of SEE

On September 29, 2021, SEE Foundation was presented with the 3rd “Capital Charity Award”. During the award ceremony, Xu Xiaonian, SEE's incumbent president, stated: “Entrepreneurs at SEE are closely involved in environmental



protection activities across China and encourage their employees to support environmental causes. I' ve previously argued that entrepreneurs should engage in charitable causes for their own good, and out of a sense of responsibility and concern for society and their country, rather than in response to external pressures, government requests, or a thirst for fame⁹."

SEE sums up its sustainable development philosophy with the motto "Reverence for nature, sustainable development" . Its successive presidents and more than 900 member companies are committed to promoting these values to gain broader influence. By engaging with a wide range of well-known international environmental organizations such as the UN Climate Change Conference, the UN Environment Assembly, and the UN Climate Action Summit, SEE demonstrated the level of commitment of Chinese social welfare organizations both to China, and to the rest of the world.

Man is part of nature, and "nature' s inherent balance is the most infallible law on earth." ¹⁰ We hope that more and more entrepreneurs can join the path of green, low-carbon, and ecologically sound development, and work together to promote harmony between man and nature, and make our planet a better place to live.

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Landsea

By Zhu Qiong*

Pioneering Carbon Neutrality



Tian Ming

CEIBS EMBA 2005 Alumnus

Founder and chairman of Landsea Group

Construction-related carbon emissions account for nearly 40% of China's total emissions. Given that China wants to achieve carbon neutrality, the construction industry will prove the ultimate battlefield in its struggle to achieve this goal. Emission reduction, which was once something optional, will soon become mandatory for real estate developers. Viewed in this context, Landsea offers considerable value, partly due to its (low-carbon) technologies and innovations, but more importantly because in addition to creating green buildings, it also operates a sustainable business model.

Review

Reducing the energy consumption and carbon emissions of buildings is an important way to achieve China's "dual carbon" goals of carbon peaking and carbon neutrality. Landsea's journey offers us valuable insights. Firstly, energy conservation and emission reduction can create an uncontested "blue ocean" inside the existing "red ocean", enabling companies to escape cutthroat competition. Secondly, going green is a step-by-step process, so a short-term, speculative mentality won't work. Companies need to set sustainable goals and adapt their operations to gradually ramp up green capabilities. Thirdly, building a greener business requires support from other supply chain participants. Companies need to bring all stakeholders on board and establish a mechanism that motivates upstream and downstream suppliers to continue optimizing their businesses.

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Introduction

From its very establishment, Landsea chose to pursue a green strategy. It joined the UN Climate Neutral Network back in 2010, marking an important step toward achieving carbon neutrality in architecture. Later, Landsea experimented with low emission, green building projects, which included China's first zero-emission public building, the ZED Pavilion at Shanghai EXPO 2010; the first house in China to receive certification from Germany's Passive House Institute (PHI); and the Landsea Green Centre in Shanghai, a demonstration project certified by five international green building certification programs. As of June 2021, Landsea had completed 141 green building projects, of which 51 received 3-star certification under China's Green Building Evaluation Standard and 21 received international green building certifications. The first three-star green buildings in Shanghai, Nanjing, Hangzhou, Suzhou, Wuxi, and four other cities were all Landsea-made. After China introduced new national green building standards in 2019, two of the first six projects to receive three-star certification were also from Landsea. Several of Landsea's past green residential projects delivered energy-saving rates of 80% or above, exceeding the 65% national requirement applied at the time. At the time of writing, 70% of all of Landsea's past projects were for green buildings.

In China's real estate market, Landsea Group (hereafter referred to as "Landsea"), a company specializing in developing green buildings, consistently stood out from the crowd. Most developers sought to rapidly grow their market share by churning out cookie-cutter houses sold off-plan to increase capital turnover. Landsea, on the other hand, took time to research the local climate and surroundings of each of its projects to create truly bespoke green buildings. As a result of this unconventional approach, by the end of 2020, Landsea's annual revenues remained in the tens of billions of yuan, while many conventional developers were raking in hundreds of billions.

However, such a large revenue gap didn't trouble Landsea's founder and chairman Tian Ming who, in the context of China's carbon neutrality drive, anticipated explosive growth for his business in the future.

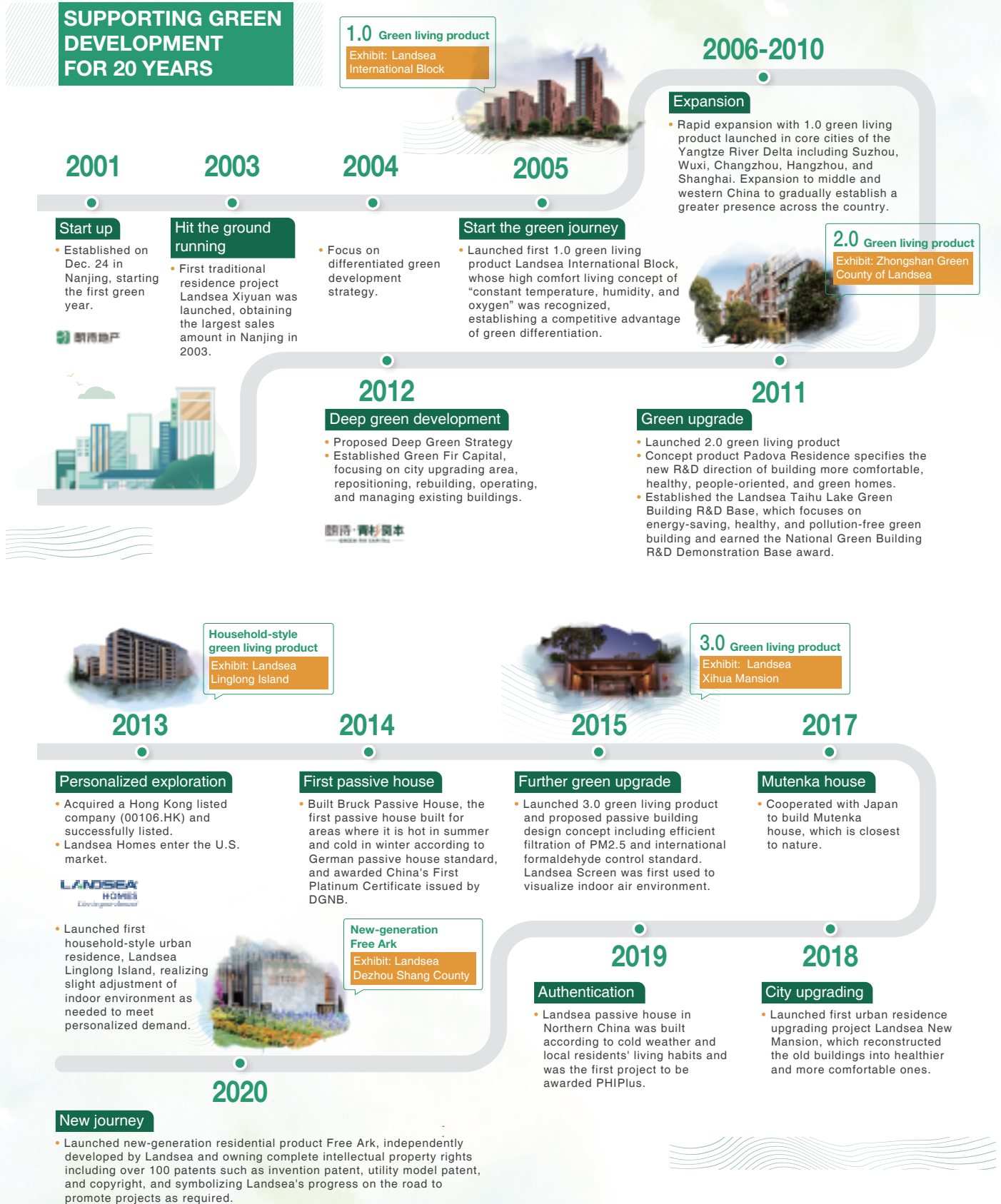
In 2010, Landsea became the first Chinese property developer to join the Climate Neutral Network^①, marking an important step toward achieving carbon neutrality in buildings. Following that, Landsea adopted a range of emission reduction technologies to make buildings greener. Its low-emission, green building projects included China's first zero-emission public building, the ZED Pavilion at Shanghai EXPO 2010; the first house in China to receive certification from Germany's Passive House Institute (PHI); and the Landsea Green Centre in Shanghai, a demonstration project certified by five international green building certification programs for its ultra-low emission and energy consumption.

As of June 2021, Landsea had built 141 green buildings, of which 51 received 3-star certification under China's Green Building Evaluation Standard and 21 received international green building certifications. The first three-star green buildings in Shanghai, Nanjing, Hangzhou, Suzhou, Wuxi, and four other cities were all Landsea-made. After China introduced new national green building standards in 2019, two of the first six projects to receive three-star certification were also from Landsea. Several of Landsea's previous green residential projects delivered energy-saving rates of 80% or above, exceeding the 65% national requirement in force at the time. At the time of writing, 70% of all of Landsea's past projects were green building projects.

Landsea's strong growth momentum was the result of 20 years of commitment to a differentiated green strategy and research into low-carbon, green building technologies.

^① The Climate Neutral Network is an initiative of the United Nations Environment Programme (UNEP) to promote regional, national, and global collaboration to reduce carbon emissions and address climate change.

SUPPORTING GREEN DEVELOPMENT FOR 20 YEARS



Landsea's strategic roadmap

Pursuing a green strategy

Landsea was founded in Nanjing in 2001. In 2004, the company pivoted towards green technologies in a bid to set itself apart from competitors. This positioning was informed in part by Tian's vision of establishing a time-honored brand that valued nature, people, sunshine, and green living. At the same time, as a latecomer to the real estate business, Landsea had no choice but to adapt strategically to survive in a cutthroat market, which was teeming with "tigers and wolves", as Tian once described it.

Products

While Landsea was working on its second real estate project, it found itself encircled by these "tigers and wolves". "The big players—Vanke, Wanda, and China Overseas Land & Investment—are the 'lions and tigers' in this game. Their brand awareness, capital, and power are at levels beyond our reach. Meanwhile, the well-connected local developers are 'hyenas' who can acquire land at low prices, giving them a cost advantage that just isn't available to us," recalled Tian. Therefore, he decided to adopt a different approach, and after researching the Chinese and overseas markets, he determined to focus on green buildings, which were still a novel concept in China at the time. Green buildings, according to him, were buildings that minimized resource and energy consumption throughout their life cycle, from construction, utilization, operation, to demolition. Their competitive edge was derived from providing a better living experience by countering negative climatic or environmental conditions. For example, in the Yangtze River Delta, the weather was often damp and cold in winter but suffocatingly hot in summer. Moreover, the East Asian rainy season could be extremely humid. However, with green buildings, it was possible to keep temperature, humidity, and oxygen levels within set limits all year round, providing a living environment that was healthier and more comfortable.

When Landsea embarked on its green building journey, Europe boasted the world's most advanced technologies at the time for delivering constant temperature, humidity, and oxygen levels in buildings. However, instead of importing these mature core technologies from Europe, Landsea decided that it would develop its own technologies in-house, with the guidance of European experts. As a consequence, Landsea's first green residential project took two and a half years to complete, much longer than a typical cycle. "It was too costly to import all of the equipment. Consumers couldn't afford it. Moreover, developing these technologies in-house allowed us to enhance our R&D capabilities for green buildings," said Tian, "this also provided an opportunity to adapt products to local needs in China to further reduce energy consumption. For example, we decided to use more energy-efficient ground source heat pumps as a heating source."

From 2004 to 2020, Landsea Green Properties launched green housing projects in over 30 first and second-tier cities and key economic regions across China while upgrading and iterating its products. To offer a personalized living experience, it also developed green apartments, condos, and a complex nicknamed "Green Ark" in addition to its original products which delivered centralized energy control.

The first three generations of Landsea's products all used large-scale, centralized systems that served an entire residential compound, including ground source heat pump stations, radiant ceiling heating and cooling systems, and air purification systems. However, these centralized systems didn't allow for customization. For example, if a temperature control system was set to 24 degrees, the actual temperature experienced by residents of the same community would vary depending on the location, height, and aspect of their homes. Some might find the temperature too high and would need to leave their windows open for fresh air, while others might find it too cold. Therefore, to cater to individual needs, Landsea began researching distributed systems so that they could provide individual air purification, radiant ceiling, and energy supply systems for each home. In this way, residents could adjust systems to suit their own preferences. Landsea began to roll out its distributed system technology in 2013.

In addition, Landsea also built two "Padova Residences" that featured cutting-edge green technologies. Located in the Nanjing Zhongshan Green County project, these buildings incorporated glass louvers into the balcony design, which

allowed for solar heating in winter and natural air cooling on hot summer days. Homes were also supplied with hot water around the clock. These two experimental buildings became Landsea's most energy-efficient project at the time. However, due to their high construction costs, these "buildings of the future" ultimately didn't scale.

In 2020, Landsea launched Free Ark, a green residential complex supported by more than 100 patented Landsea technologies. Free Ark featured a hybrid energy control system that combined the advantages of centralized and distributed approaches. Compared with a fully distributed system, the hybrid model improved energy efficiency by 10–20%. However, unlike centralized systems, each home also had a sub-system that allowed residents to control their own settings, including pre-set modes such as "at home", "away", or "on vacation". Users could use the touch-screen control panel in their home, or adjust settings remotely through a smartphone app.

Landsea's green properties commanded a 20–30% premium over regular homes in the same neighborhood. However, these higher prices didn't drive consumers away. For example, in Nanjing's Hexi District, three properties from different developers hit the market at around the same time: Wanda began its sales first, and Vanke's project followed within ten days, while Landsea was the last to open. The opening prices for these three companies' developments were RMB 5,100, 5,200, and 8,200 per square meter, respectively. On their launch days, Wanda sold 17 units, Vanke 22, and Landsea 79. The new Free Ark development commanded an even higher premium. Meanwhile, properties at "The Mansion", a Landsea project in Chengdu that emulated the original Free Ark model, sold at RMB 27,000 per square meter, while the average price of neighboring properties was 20,000.

The price of Landsea properties also held firm in the second-hand market. For example, at the time of writing, second-hand homes at the Suzhou Landsea Nanmen Green County development could fetch RMB 57,000 per square meter, almost 70% higher than the regional average.

Landsea's initial target customers were teachers, professors, and overseas returnees, who, according to Landsea, appreciated the quality of life and health benefits offered by green buildings, and were willing and able to pay a premium for these things.

In 2009, as the government introduced property controls to rein in rising housing prices, the demand for high-end residential properties in China plateaued. In response, Landsea started to market its products to young first-time homebuyers. It developed cost-effective homes equipped with air filtration systems, thermal insulation, and energy-saving airtight doors and windows to attract young homebuyers.

Building operations

Landsea's green strategy extended beyond the design and construction stages, and continued to be applied once buildings were completed and entered into use. To ensure continued low emissions once buildings were operational, Landsea made plans for green operations early in the product design phase.

Landsea designers would carry out a feasibility study of a project's floor area ratio, landscaping ratio, building density, and product specification based on its location, surroundings, geological conditions, climate, and local culture. They would then use a computer model to calculate the wind speed, temperature, sunlight, and noise levels for the site, based on which they would determine the layout of facilities, building orientation, and landscaping plan to optimize both the indoor and outdoor environment. For example, it was important that homes were heated by the sun during the winter, shaded by trees, and cooled by a natural breeze in the summer; similarly, outdoor activity areas needed to be sheltered from strong winter gales but equally benefit from a cool breeze in the summer. According to Landsea, natural ventilation alone could cut energy consumption by about 10%, while captured solar radiation could save a further 5%.

To fully harness the benefits of green buildings once operational, in 2005, Landsea founded Landsea Green Life, a property management company. The Green Life team was actively involved in the planning, design, and construction of



Landsea's green buildings, giving them in-depth knowledge of the technologies and products involved, and ensuring that they could effectively operate and maintain facilities and systems.

In addition, Landsea Green Life also reduced the carbon emissions of the communities it managed through recycling. Waste was sorted and re-used: worn-out tires could be transformed into shelves for potted plants, while food waste and other bio waste were used as organic fertilizer.

In shared indoor spaces and common areas, Green Life used smart controllers to adjust lighting, which reduced energy consumption. It also used AI technology to manage elevators so that they always took the most efficient route, and shut down idle facilities to conserve energy.

The supply chain

From its very first green building project, Landsea sought to develop a green supply chain. It required suppliers to not only deliver products that met green standards but also practice environmental compliance.

Starting in 2016, Landsea began using the "Blue Map" website published by the Institute of Public and Environmental Affairs (IPE), a non-profit organization, to check the environmental compliance records of suppliers. It also included environmental compliance clauses in its tendering documents. In the event that environmental violations occurred, Landsea's suppliers were required to make disclosures on the IPE website and take corrective measures; suppliers who failed to rectify violations in a timely manner were disqualified.

Landsea's suppliers not only included manufacturers of environmentally friendly equipment (such as HVAC equipment, canopies and blinds, and ground source heat pumps) that had grown alongside the company but also world-renowned brands such as BASF, a leading supplier of high-tech, environmentally-friendly materials. Moreover, as Landsea's projects gained in popularity, its suppliers were also rewarded. Some were able to draw on endorsements by Landsea to win new contracts. In the case of BASF, its partnership with Landsea to build passive homes provided an opportunity for it to bring its innovative thermal insulation materials to the Chinese market.

Landsea stood by sustainable forest operations and responsible trade in forest products. It published a *Wood Product Procurement Commitment*, in which it undertook not to source wood from protected forests, not to use CITES-listed tree species unless suppliers could obtain a permit from an endangered species management authority, and not to purchase wood from areas with indiscriminate logging or disputed forest rights, nor from plantation forests that were converted from natural forests. In 2020, 100% of Landsea's timber products were traceable.

Thanks to its continued efforts in establishing and operating a green supply chain, Landsea ranked first among developers on the Corporate Information Transparency Index (CITI) in China's real estate sector for five consecutive years. CITI, developed jointly by IPE and the Natural Resources Defense Council (NRDC) in 2013, was the world's first quantitative system to assess the environmental management performance of brands with supply chains in China.

Landsea understood that the entire sector needed to work in unison to build a greener supply chain. Therefore, it called on its peers to work together. In June 2016, Landsea launched the China Real Estate Industry Green Supply Chain Initiative ("Green Chain Initiative") together with SEE Conservation, the China Urban Realty Association (CURA), China Real Estate Chamber of Commerce (CRECC), and Vanke. The initiative urged developers to procure only from green suppliers, which forced upstream suppliers to comply with environmental protection laws, conserve energy, and reduce emissions.

By 2021, the number of Green Chain Initiative members from the real estate and related sectors grew from 48 to 100, the number of whitelisted building material categories that met the industry's environmental standards grew from 4 to 13, and the number of whitelisted suppliers increased from 159 to 3,874. Whitelisted suppliers were eligible to receive large bulk orders that were placed jointly by Green Chain Initiative members.

Green building technologies

As the cornerstone of Landsea's green strategy, the company's green building technologies were the accumulation of its 18 years of in-house R&D.

From 2004 until the time of writing, Landsea invested more than RMB 100 million annually in technology R&D. Landsea's vice president Xie Yuanjian joined the company in March 2004 as CTO, making him the first person to assume this position in China's real estate industry.

Xie founded Landsea's R&D department and led the team that developed the technologies used in the company's very first green building project. In 2008, Landsea leveraged its strong R&D capabilities to launch Shanghai Landsea Building Technology Company, a subsidiary specialized in technology. In 2013, this subsidiary was transformed into a standalone entity named Shanghai Landleaf Building Technology Company (Landleaf). Landleaf not only provided services to Landsea, but also offered technological support to external clients. It became one of the three pillars of Landsea's "deep green" strategy.^②

In addition, in September 2010, Landsea founded Landsea Europe R&D GmbH, which was its Europe-based technology arm. Landsea Europe connected the local project management team with over 20 European companies and facilitated cooperation in green building projects, offering project management, technological consulting, contracted construction, and project development services to Chinese and German companies.

In 2011, Landsea invested RMB 220 million in a 40,000-sqm green building R&D base near Taihu Lake in Huzhou, Zhejiang Province. The R&D base would focus on research into integrated green building design, smart and efficient energy consumption, environmental protection, renewable energy development and utilization, and testing of new products.

As of mid-2021, Landleaf had obtained 271 technological patents (including 62 invention patents).

"Real estate is not a technology-oriented industry. The technologies used in green buildings are mostly generic, well-established technologies. The key is to find a way to identify and integrate existing technologies to provide a healthy, comfortable living environment with a pleasant temperature, humidity, and ventilation while saving energy and resources. We've spent years researching this subject, which constitutes our technology moat against the competition," said Xie.

An asset-light business model

As Landsea grew its expertise in green building R&D, it also developed the capability to provide technical services to external clients. This not only diversified Landsea's revenue streams, but also enabled it to move from an asset-heavy to an asset-light business model.

When Landsea started developing green homes, like many other developers, it had to go through the usual asset-heavy process of raising capital, acquiring land, construction, and sales. However, around 2010, Tian increasingly realized that this model would prevent the company from scaling up. After listing in Hong Kong through a reverse IPO in 2013, there was growing investor pressure on Landsea Green Properties to grow the business. Moreover, China's real estate market was already past its peak. Within this context, Tian determined: "Quality (of operations) would become the most important factor in the real estate industry, and the market would be increasingly driven by capital. If Landsea continued with its asset-heavy model and focused its efforts on just a few projects, one problematic project could endan-

^② In August 2012, Landsea launched its Deep Green strategy, extending its business scope from green real estate development to green technology services, green elderly care, and green financial services. Green technology services were delivered mainly through Greenleaf. For green elderly care, Landsea leased apartments from its existing projects, refitted them, and used them to provide an age-friendly living environment for senior citizens. Green financial services were delivered mainly by Green Fir. (Please refer to the Green Fir Investment chapter for more information.)



ger the entire company. However, if Landsea leveraged its technologies, brand, and capital to participate in more projects as a stakeholder, it could greatly diversify its portfolio and hedge risks.”

It was a combination of this focus on scaling up, Tian’s outlook on the industry’s future, and Landsea’s formidable technological capabilities that led the company to pivot toward an asset-light model in late 2014.

This transformation was three-pronged. First, Landsea established partnerships to work on new projects, introduced new developers or financial backers to invest in Landsea’s existing projects, or invested in projects spearheaded by other developers. In principle, Landsea would no longer develop any projects on its own. Second, Landsea used its technological expertise to acquire the management rights for projects in which it was a minor shareholder, which earned it returns on capital investment plus management fees. Thirdly, Landsea developed asset-light services, for example, contracted construction, customized design, and development services.

|| A new approach for developing properties

In July 2014, Landsea experimented with this new, asset-light model under which it managed projects while holding a minority stake. Nanjing Langming, a Landsea subsidiary, acquired a piece of land in Suzhou in partnership with the Suzhou Science and Technology Park Cultural and Tourism Company. Landsea held a 20% stake in the project, and was responsible for its development and management. In addition to the share of profits it was entitled to as a shareholder, it also charged development management fees, product integration fees, and brand loyalties as the project manager. In addition, because Landsea’s properties were high-tech, the property management work was naturally awarded to Landsea’s property management company.

The Suzhou project revealed to Landsea the value and appeal of its green building brand, technologies, and management skills. This strengthened the company’s conviction in the merits of its new asset-light business model.

For subsequent projects, in addition to partnering with other developers, Landsea also sought collaboration with companies or institutes beyond the real estate sector. In 2015, Landsea typically held a 70% stake in joint projects it was involved in. However, from 2017 onward, that ratio dropped to just 30% as a result of Landsea’s asset-light transformation. Tian wanted to reduce Landsea’s equity stake in projects, while still retaining the right to manage them.

|| Breaking into the renovation business

The role of Green Fir Investment

Later, Landsea expanded its asset-light model to include the renewal and renovation of existing developments. Green Fir Investment, the real estate finance platform under Landsea, became an important pathway to revamp existing housing projects.

Founded in 2012, Green Fir was initially a financial service vehicle for Landsea’s green building projects. In 2015, as Landsea was transitioning to an asset-light model, Green Fir diversified its services to cover financing, investment, and asset management.

In 2016, Green Fir established an urban renovation investment vehicle together with CITIC Capital, Ping An Real Estate, and Zhongrong International Trust to support the renovation and transformation of existing property developments in first-tier and leading second-tier cities. Green Fir would first identify old buildings that were undervalued, energy-intensive, and poorly operated, draw on its expertise to redesign, renovate, and manage these buildings, and finally exit investments.

Through this model, Green Fir brought Landsea new business opportunities in the renovation market, enabling Landsea to put its technologies to use to make cities better and greener, while also fuelling its own business growth. By mid-2021, it had invested in over 20 urban renewal projects, including apartment and residential buildings, long-term rental apartments, offices, and apartments for the elderly. During this period, Green Fir managed 12 equity funds and six



co-investment vehicles. The size of the equity funds under its management exceeded RMB 12 billion.

Launch of the Landsea Bespoke brand

In February 2021, Landsea launched its high-end brand Landsea Bespoke, which offered premium, customized interior design services to transform clients' homes into low-emissions, healthy, and comfortable eco-homes.

According to Landsea, this service included revamping doors and windows, installing equipment and appliances, fitting out interiors, and ongoing operation and maintenance. "The installation of our products will turn the home into a smart living environment. Our smart systems and equipment automatically adjust parameters according to the preferences of occupants and real-time weather conditions."

Through an asset-light model, Landsea grew its business, tapped more opportunities, and branched out to offer services including project management, investment and financing, engineering and construction, marketing, and



customized interior design. This expansion into new areas also diversified Landsea's revenue streams.

During the first half of 2021, Landsea's operating revenue was around RMB 3.54 billion, a 24% year-on-year increase. The net profit of the core business increased by 30% to RMB 130 million. Gross profit increased by 58% to RMB 800 million. Signed sales contracts had a total value of around RMB 23.4 billion, up 81.6% from the previous year, of which the added construction capacity available for sales grew at a three-year compound rate of 220%, and the contracted construction business accounted for 46% of Landsea's real estate business in China, a year-on-year increase of 29%.

Although Landsea was still not in the same league as China's biggest property developers, its status as a pioneer of carbon-neutral buildings, as well as its strong brand, technologies, and products would give it a compelling advantage as China stepped up its efforts to become carbon neutral. Moreover, Landsea's relationship with other developers was also in the process of evolving from competition to cooperation.

37 Interactive Entertainment

By Yang Wei and
Cao Zhijing*

A Gaming Company with a Sustainable Development Strategy



Zeng Kaitian

CEIBS EMBA 2013 Alumnus

Cofounder and Vice President of 37 Interactive Entertainment

“37 Interactive Entertainment’s mission is to become a leading player in the cultural and entertainment industry and pursue a sustainable development strategy that will help us make a contribution towards China’s targets of peaking carbon emissions, achieving carbon neutrality, and delivering common prosperity. In order to be a sustainable company, we believe that we need to remain committed to our founding purpose and live up to our responsibilities.”

Review

“It is the shared responsibility of all companies to make a contribution to reducing emissions and achieving carbon neutrality. As this case study demonstrates, low-carbon concepts can be integrated into corporate strategies at various levels—even for industries and companies that are not particularly energy or emissions-intensive—and enable them to achieve a sustainable balance between corporate interests and social responsibilities. At the same time, policy support is also needed to engage more companies in this drive and raise awareness of sustainable development and the transition to a low-carbon economy.”

Yang Wei

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Introduction

It was the end of 2021, and Zeng Kaitian, cofounder and Vice President of 37 Interactive Entertainment, had just finished another debriefing on the construction plan for the company's new global headquarters. In light of the company's vision to improve quality of life and provide a better working environment, and in response to the government's targets of peaking carbon emissions and achieving carbon neutrality, the company's executives decided to construct the headquarters in accordance with China's most stringent environmental building standards (3-star rated building).

Over a period of several years, 37 Interactive Entertainment developed a range of measures to reduce its carbon emissions. These included establishing an industry-leading method for calculating the company's carbon footprint, committing to become carbon neutral, purchasing renewable energy, and developing games with environmental themes. The company's executives, including Zeng Kaitian, were committed to finding more ways to ensure that the company lived up to its environmental responsibilities, especially by wielding its advantages as a gaming company to influence society. In addition, Zeng also held discussions with the board's Sustainable Development Working Group on integrating social responsibilities into the company's strategy and day-to-day operations.

About 37 Interactive Entertainment

37 Interactive Entertainment was established in 2011, and went public on the Shenzhen Stock Exchange in 2015 via a backdoor listing.

The company's marketing and R&D headquarters were located in Guangzhou. By 2021, the company's main lines of business were mobile and browser games. In addition to its in-house studio THREE SEVEN GAMES, the company also operated the publishing platforms 37 Online, 37 Mobile, and 37GAMES (for overseas users), as well as MiaoCode, an online programming education platform for children aged 4 to 12.

Following the launch of its first products, 37 Interactive Entertainment became a highly influential brand. Its two browser games, *Empire of Heros and Archangel's Sword*, which were adapted from classic mobile games, helped it to accumulate a vast user base. In 2016, in light of the increasing popularity of mobile gaming, the company developed various games for mobile devices, including big hits such as the *Song of the Cloud City* and *Soul Land: Duel of Soul Masters*.

According to its financial statements from 2020, 37 Interactive Entertainment reported an operating revenue of 14.4 billion RMB, a YoY increase of 8.86%. Its mobile game business generated 13.3 billion RMB in revenue (92.33% of total revenue), a YoY increase of 10.9%, while revenue from overseas markets increased by 104.34% to reach 2.14 billion RMB, or 14.88% of total revenue. The net profit attributable to shareholders was 2.76 billion RMB, a YoY increase of 30.56%.

Corporate social responsibility: become a leading player in the cultural and entertainment industry and pursue a sustainable development strategy

The founders of 37 Interactive Entertainment, including Zeng Kaitian, defined the company's vision as "become a leading player in the cultural and entertainment industry and pursue a sustainable development strategy". This was formally incorporated into the company's culture in 2020—several of the founders were keen marathon runners, and hoped to apply the "marathon" mindset to help the company create a more sustainable future. They also believed that

integrity and innovation were the two central pillars of the company's social responsibilities. As Zeng explained "Integrity means that we need to ensure our content is compliant with regulatory requirements, particularly with regard to the protection of minors, while innovation means that we need to fulfill our social responsibilities in an innovative way, i.e. by wielding our advantage as a game company to provide educative and innovative content"¹.

Like many companies, the first stages of the CSR strategy implemented by 37 Interactive Entertainment consisted of charity work, with a particular focus on poverty alleviation—a national strategic priority. For this purpose, in 2014 the company established the Guangdong Youxin Foundation, with Li Weiwei, the company's President, as the Chairperson and Zeng Kaitian, the company's Vice President, as the Director. In the seven years after the Foundation's establishment, it provided funding for over 2000 senior high school students in remote mountainous areas. In 2018, the scope of the company's CSR strategy was expanded to include other issues, such as the protection of traditional culture and the development of tools for managing public services and government affairs. Zeng explained the reasoning behind the company's strategy: "Many people associate social responsibility with charity work, but that's not the whole picture. For us, living up to our social responsibilities is an integral part of our overall corporate strategy."

In 2013, 37 Interactive Entertainment began to prepare for listing on the stock market, prompting the company to establish a CSR governance strategy. This was followed by changes in China's regulatory environment and expectations from international investors, which impelled the company to enhance CSR performance. As Zeng explained, "External supervisory and regulatory pressure encouraged us to go the extra mile. If you want to develop a successful brand, become an industry leader, and expand overseas, you need to do much more than just sell good products and be profitable—as well as making money, you also have to demonstrate that you're socially responsible and willing to engage with society. Our CSR strategy sends a signal to investors that we have a long-term commitment to sustainable development."

The company also launched its products in overseas markets, targeting consumer groups who valued CSR performance. By 2021, 37GAMES, the company's overseas subsidiary, had become one of the top ten platforms for new game releases with a monthly operating revenue of 600 million RMB, covering over 200 countries and regions. As it gained influence in overseas markets, the company began to prioritize feedback from European and American users in its branding strategy. Compared with domestic users, overseas users attached more importance to companies' values, business philosophy and CSR performance. As a result, the management team decided to adopt an international positioning strategy and benchmark the company's CSR system against international standards. "We want to emulate great companies such as Microsoft and Apple in brand building and make a positive contribution to society", said Ye Guoying, Vice President of Branding at 37 Interactive Entertainment.

Organizational and management reform

Shortly after going public, the company began to overhaul its organizational structure in order to improve CSR governance. Four special committees were established under the Board, namely the Audit Committee, Nomination Committee, Salary and Assessment Committee, and Strategy Committee, three of which were directly charged with CSR governance: the Audit Committee was responsible for reviewing the implementation of anti-fraud and other business ethics systems; the Salary and Assessment Committee was responsible for evaluating sustainability performance and determining the remuneration of management-level staff; and the Strategy Committee was responsible for assessing CSR-related risks and opportunities and formulating the company's sustainable development policy. In 2020, 37 Interactive Entertainment proposed 8 CSR objectives, including strengthening governance mechanisms, improving compliance, implementing laws and regulations, managing data security, and nurturing talent.

The same year, the company established the Sustainable Development Management Committee (later renamed the Sustainable Development Working Group) under oversight of the Strategy Committee. Its role was to carry out CSR risk assessments and coordinate with the company's various departments to ensure that they each fulfilled their respective

responsibilities. Sustainable development was also factored into the development of the company's core businesses. According to Ye, many game products were assessed by the Working Group at the time of their inception to ensure compliance with the company's CSR strategy. "We act as a bridge between the various departments and the Board to ensure that we develop in line with the company's values."

CSR and carbon neutrality practices in the gaming industry

Improving living standards led to an increase in demand for cultural and recreational activities. This was evident from the increasing popularity of mobile games, which offered numerous advantages over conventional games—they supported a wide range of devices, could be played while on the go, and were generally easy to play. According to statistics from 2021, the total number of game players was approaching 3 billion globally—approximately 40% of the world's population². As a result of this trend, game companies were under pressure to develop better products and live up to their social responsibilities.

Starting in 2018, the Chinese government issued a series of regulations and established a number of self-regulatory organizations to oversee the successful development of the gaming industry. Companies started to place more emphasis on launching better products, making a positive contribution to society, and promoting technological empowerment. They also enacted a range of measures on data security, addiction prevention, and child protection, and actively engaged in charitable causes. The 2021 CSR Report on Gaming Companies released by People.cn evaluated the CSR performance of gaming companies from four different perspectives: the economy, society, industry, and culture and technology³.

Efforts to achieve carbon neutrality in the gaming industry

Against the backdrop of a rapidly changing climate and an increase in extreme weather events, reducing emissions became an issue of common concern across the international community. In response, countries launched a range of plans and initiatives. China, for its part, set itself the target of achieving peak carbon emissions by 2030 and carbon neutrality by 2060.

According to experts, carbon emissions in the gaming industry were primarily caused by hardware manufacturing and replacement, streaming media, and data centers. Compared with other industries, the gaming industry was less energy-intensive and generated fewer emissions, and was therefore not a focus of government regulation. However, its rapid development led to an increase in its contribution to total energy consumption. Achieving peak carbon emissions and carbon neutrality required cross-sector collaboration, forcing gaming companies to live up to their environmental responsibilities and integrate environmental protection into their strategic planning.

In September 2019, the UN Environment Program launched the "Playing for the Planet Alliance" at the UN Climate Change Conference, leading many internationally renowned game companies to respond with their own environmental action plans. For example, Microsoft committed to manufacture 825,000 carbon-neutral Xbox consoles and set up a \$1 billion Climate Innovation Fund to accelerate the development of carbon reduction, capture, and removal technologies⁴.

Race to zero

In 2018, hundreds of companies, including 37 Interactive Entertainment, were included in the MSCI Emerging Markets Index. In the same year, MSCI launched its ESG Ratings service, and 37 Interactive Entertainment was given a B rating—the industry average. This provided the company with a key impetus for making further progress. Although carbon emissions were not a significant factor in the ESG rating for tech companies, the fact that carbon emissions were considered at all encouraged 37 Interactive Entertainment to attach greater priority to its carbon footprint.

In the same year, the company invited SGS, an internationally renowned certification agency, to help it obtain data on its carbon emissions. The company then used this data as a benchmark for its carbon neutrality planning, with the aim of realizing carbon neutrality by 2025. In addition, it also set an interim target of reducing carbon emissions by 15% by 2022, with 2019 as the base year. Zhang Junwei, Social Responsibility Director of 37 Interactive Entertainment, explained the reasoning behind the company's decision. "The fact that international agencies provide these standards indicates that carbon neutrality is the trend for the industry's future. Based on our calculations, the cost of reducing emissions would not place a significant burden on the company's operations, so we set ourselves the ambitious goal of realizing carbon neutrality by 2025."

The company's decision to go carbon neutral predated the peak emissions and carbon neutral targets set by the central government. "We set these goals not as a response to policy mandates, but rather as part of our own strategy." Nevertheless, based on the company's survey of relevant stakeholders in 2020, the government's emissions-reduction targets significantly increased external pressure on the company to act on environmental issues, including conserving energy, reducing CO₂ emissions, and using renewable resources.

In order to ensure effective governance of emissions reduction targets, the Strategic Committee under the Board was responsible for setting goals and carrying out assessments, reviews, approvals, and oversight. The Sustainable Development Working Group was responsible for carbon accounting and reporting, while the Personnel and Administration center was responsible for implementing measures to reduce energy consumption.

Options for reducing emissions

At the time of writing, game companies were not under great pressure from policymakers to reduce emissions. For 37 Interactive Entertainment, which focused on digital games and did not manufacture games consoles, there was not much scope for reducing direct emissions. However, in order to support the government's targets, the company still adopted a range of measures to save energy and reduce emissions in its daily operations. These included more stringent oversight of daily energy consumption, such as by controlling the use of air conditioners and other energy-intensive appliances, and switching off unnecessary power supplies. It also continued to improve the management of resources, such as by purchasing drinking water filters and promoting the use of digital tools to reduce plastic and paper waste and carbon emissions.

Given the limited scope for reducing direct emissions, 37 Interactive Entertainment chose to offset its emissions by purchasing renewable energy on the energy trading market. "Currently, there are three main market channels for companies to join the green transformation, namely Green Electricity Certificates (GEC), green electricity, and emissions trading."

China's GEC system was established in 2017, under which renewable energy companies were issued uniquely coded GECs for each 1,000 kWh of green electricity they supplied to the grid. GECs were sold by approved generators—primarily onshore wind and solar power companies—to users who could purchase them in recognition of the environmental value of the green electricity for which they were issued. Revenues from GEC sales were directly deposited into the accounts of generating companies, which were then no longer subsidized for the equivalent amounts of electricity⁵. By the end of November 2021, a total of 30.97 million GECs had been issued for subsidized green power projects. Of these, 78,000 had been sold, at an average price of 145 RMB for wind power and 660 RMB for solar power. The number of GECs for non-subsidized projects reached 5.76 million, of which 45,550 had been sold, at prices ranging from 30 to 50 RMB⁶.

The green electricity trading system, on the other hand, offered a more direct proof of green electricity consumption. In September 2021, China formally launched a pilot scheme for green electricity trading, which allowed companies to purchase green electricity directly from generating companies, or from power grid companies that purchased green electricity from generating companies under guaranteed purchase schemes. Provincial-level grid companies and power consuming entities could purchase through centralized bidding or listing mechanisms. The price of green electricity



included both its economic cost and the environmental value it generated, making it 5-10% more expensive than the benchmark price. Additional profits from transactions were retained by the generating companies⁷.

In terms of emissions trading, trial schemes were successively rolled out in Shenzhen, Shanghai, and Beijing from 2013. In 2017, China launched preparations for the national emissions trading system, and in July 2021, the market was officially opened, enabling the rights and responsibilities associated with carbon emissions to be explicitly measured and commoditized. According to forecasts by researchers at the time of writing, the price of CO₂ emissions was expected to gradually increase from 49 RMB/metric ton in 2021 to 71 RMB/ metric ton in 2025 and 93 RMB/ metric ton at the end of the decade⁸. By December 31, 2021, the emissions trading system in China had been in operation for 114 trading days, during which time 179 million metric tons of emission quotas were traded, amounting to a total transaction value of 7.67 billion RMB. The closing price on that day was 54.22 RMB/ metric ton, 13% higher than the opening price on July 16th, the first day of trading⁹.

The coal power industry was one of the first sectors to be included in the emissions trading system. Other energy-intensive industries, such as steel, cement, chemical engineering, and metallurgy were also subjected to controls on total energy consumption and energy intensity¹⁰. In 2019, 37 Interactive Entertainment released its first carbon accounting report, which put the company's greenhouse gas emissions for the reporting year at 2830.51 metric tons of CO₂ equivalent, over 95% of which were indirect emissions from purchased electricity.

Given that the company was not energy or emissions-intensive, GEC and green electricity trading were the most feasible ways for it to reduce carbon emissions. As Zhang Junwei explained, "Currently, the cost of direct emissions trading is still high. After calculating the cost, we believe that GEC and green electricity trading would be more feasible." However, as the company had to share the same office building with other companies, it was not able to open its own account for purchasing green electricity. Supported by the Beijing Office of the WWF (World Wide Fund for Nature), the company consulted with the State Grid and finally chose GEC trading to meet its emissions reduction commitments. From 2019 to 2020, the company purchased 3 million kWh of electricity in the form of International Renewable Energy Certificates (I-RECs) via the China Emissions Exchange to support green power projects such as the Qinhuangdao Datan Wind Farm and the Chaohu Guanhu Wind Farm.

In addition to participating in market-based mechanisms, 37 Interactive Entertainment also adopted low-emissions and eco-friendly designs for its new global headquarters. According to statistics at the time of writing, construction accounted for nearly 40% of the world's total carbon emissions, with China's construction sector—the world's largest—accounting for 20% of the world's emissions¹¹. Developing green buildings was therefore of great importance to China's transition to a low-carbon economy. "The global HQ building that is currently under construction is benchmarked against the 3 Stars Green Building Standards and has incorporated low-emissions designs in its elevators, air conditioning, lighting, and greening systems, creating a new low-carbon and eco-friendly landmark", said Ye. He also noted that the inauguration of the HQ building would allow the company to have its own account for purchasing green electricity.

Emissions reduction performance

37 Interactive Entertainment was the first company in the industry to voluntarily disclose its carbon emissions to the Carbon Disclosure Project (CDP). The project identified three categories of greenhouse gas emissions—Scope 1, Scope 2, and Scope 3 emissions. As the company did not manufacture any physical products, its direct (Scope 1) emissions were primarily generated by fire extinguishers, fuel for business vehicles, and refrigerating facilities. Scope 2 (indirect) emissions were mainly generated by electricity that the company purchased for office use. Its Scope 3 emissions consisted of other indirect sources of emissions generated by upstream and downstream activities.

CDP mainly evaluated emissions using the first two categories. In the latter half of 2020, in light of domestic and overseas policies, and given that its carbon emissions were mainly generated by day-to-day business operations, the company decided to raise the share of renewable electricity in its energy mix to 48% in order to facilitate its zero-carbon

transition. In 2020, the company reduced its emissions by 11.33% compared with the previous year, after taking into account the offsetting effect of the green electricity it purchased. By the end of 2021, it was expected to have reduced its overall emissions by almost 30%.

Thanks to its continued efforts, the company's MSCI ESG Rating continued to improve, from B in 2018 to A in 2021, becoming the first public online media company in China to attain an A rating, ahead of most of its global peers (among the top 20%).

Digital empowerment

The increasing popularity of digital technologies led to steady growth in the market for online games. In addition to their entertainment value, online games could also be used for educational purposes, knowledge dissemination, and promoting positive values. At the 2019 UN Climate Summit, some companies stated that the mobile game sector should play a leading role in promoting climate change awareness among the billions of users in emerging markets¹². 37 Interactive Entertainment also pledged to “fully utilize our advantages as a gaming company and use games to influence public awareness and behavior.”

Compared with conventional games that were mostly for entertainment, functional games focused more on raising people's awareness of social and sector-specific issues. Their accessibility, diversity, and scenario-based approach made them better positioned to educate and inspire their audience. 37 Interactive Entertainment developed a range of functional games such as “I'm a Scroll Painter” (designed to inform users about cultural heritage), “Go! The Cyber Warrior” (designed to promote awareness of cybersecurity), “Sanitation War” (designed to teach users about household sanitation and hygiene), and “What Kind of Garbage Is It?” (for educating people how to separate waste). Compared with conventional educational methods, functional games were more interactive and more likely to be well-received by the general public.

In 2020, to promote awareness of International Biodiversity Day, 37 Interactive Entertainment teamed up with the Wildlife Conservation Society (WCS) to launch the functional game “Rally! Save Wildlife” supported by the EU's wildlife crime program. The WeChat-based game took more than two years to develop, with WCS providing a range of expertise. Thanks to the worldwide network of WCS offices, the game even reached Chinese communities in Southeast Asia. Following the launch of the new game, 37 Interactive Entertainment also joined hands with The Nature Conservancy (TNC) to develop a functional game named Oyster Reef Defense. By completing the various stages of the game, users were able to learn more about marine ecosystems. Although the two games were not directly related to reducing emissions, they fell under the general umbrella of environmental protection and received a positive response, demonstrating the potential of games to promote positive social values.

Although using games to raise awareness of scientific concepts and social values could be highly rewarding, Zhang acknowledged that such a strategy also came with many difficulties. “Functional games cost less to develop and are compatible with many different devices, but their user base is much smaller compared with popular games. If we choose to incorporate environmental protection concepts into our popular games, these concepts need to be aligned with the product R&D cycle and launch schedule. There are also numerous other challenges, from the initial conceptualization phase to subsequent software updates and publicity work.”

The company also developed “MiaoCode”, an online programming education platform for adolescents, and used the platform to promote awareness of environmental protection among more than 10,000 adolescent users. In April 2021, it organized a programming contest in collaboration with The Nature Conservancy (TNC), calling for entries related to species protection, climate change, wetland protection, and other environmental issues. As explained by the company's spokesperson, “Protecting the environment is not something we can achieve overnight, and requires dedication over many generations. These types of events can help to raise awareness of environmental issues among young people.”¹³



In July 2021, 37 Interactive Entertainment joined the Playing for the Planet Alliance—one of the second cohort of Chinese companies to make this decision—committing itself to support the development of renewable resources and raise awareness of the environment, such as by embedding environmental protection concepts in game scenes, and by promoting low-carbon practices through its games and welfare programs. As Zhang explained, “Joining the alliance will help us to stay up-to-date with the CSR projects launched by our peers, establish partnerships with cutting-edge companies to drive industry-wide improvements, and establish a positive image in overseas markets.”

As the company’s charitable foundation, the Guangdong Youxin Foundation launched a series of support initiatives and scholarships for student groups, in close alignment with the company’s talent strategy. In September 2021, it launched a sustainable development contest for college students, which featured themes related to the UN’s 2030 Agenda for Sustainable Development (such as tackling climate change and protecting biodiversity), and gave students the opportunity to propose awareness campaigns or innovative solutions based on their knowledge. Companies could provide help by offering sustainable development courses and expert Q&As. The contest attracted entries from more than 600 teachers and students from around 50 leading universities. “We want to raise students’ awareness of CSR-related concepts, including carbon neutrality. In the future, the company may also help these students to turn their valuable ideas into innovative projects or business startups”, said Zhang.

International initiatives

In 2020, 37 Interactive Entertainment became the first Chinese gaming company to join three UN initiatives: Race to Zero, the Science based Targets Initiative (SBTi), and Business Ambition for 1.5°C.

“Initially, we did not give much thought to how to reduce our carbon emissions—as a CSR-minded company, we just wanted to make a contribution to combating climate change. At that time, CSR for us just meant having a positive impact on society”, said Zhang. Later, as the company engaged itself in a wider range of CSR activities and came into greater contact with international organizations, it began to realize the value of integrating CSR into its own operations. “Whether a company lives up to its social responsibilities, performs CSR-related risk assessments and takes proactive measures not only affects its reputation, but also has a direct impact on its operations.”

“Joining these initiatives involved more than just obtaining a few certificates. It required us to revamp our entire management system, including how we assign responsibilities and coordinate tasks between different departments.” Tasks such as purchasing green electricity and developing games with environmental themes required engagement from all departments—in order to oversee this process, the company’s Social Responsibility Department was responsible for raising specific objectives and orchestrating their implementation among relevant departments. “Ensuring that we live up to our social responsibilities is not the job of a single department or team. Rather, it requires engagement from various departments within the company, including different departments at different stages.”

In addition, by joining international emissions reduction initiatives, the company was able to gain an insight into potential operational risks, including risks associated with day-to-day operations. Headquartered in the subtropical city of Guangzhou, the company was vulnerable to extreme weather events such as typhoons, storms, and heatwaves. When implementing its carbon neutrality objectives, the company enacted risk control measures to safeguard its long-term development, such as enabling staff to work remotely, and backing up important data in inland cities less susceptible to extreme weather.

The company’s low-carbon transition also presented a number of risks, including the risk of greater economic and management costs in the short-term for purchasing clean energy. However, at the time of writing, the low-carbon transition was encouraging more and more companies to invest in green and sustainable resources. “International organizations have introduced a series of CSR indicators into their evaluation methods, so we have to assess the reasons behind their decisions”, said Zhang.

Working together for a better environment

37 Interactive Entertainment believed that its long-term success hinged on sound industry-wide institutions. It adopted this stance towards various CSR-related issues such as child protection, data security, and carbon neutrality. “Emissions targets cannot be achieved by a single company alone—they are the shared responsibility of the entire industry.”

In December 2020, at the invitation of the British Embassy in China, the company joined Longi, Rolls Royce, and Unilever in kicking off the “Race to Zero (China) Initiative. As Zhang explained, “This demonstrates that we have a solid record in terms of fulfilling our social responsibilities”.

In 2020, together with 13 organizations and companies including the Guangdong Game Industry Association, Tencent, and NetEase, 37 Interactive Entertainment played a leading role in drafting the standards for the Social Responsibility Management System for Video Game Companies, which were ratified by the Internet Society of China in April 2021. As the representative of the drafting group, Zhang believed that the gaming industry needed to constantly update its understanding of corporate social responsibility. “If corporate philanthropy was CSR 1.0 and its continued improvement was CSR 2.0, then our CSR management system could be called CSR 3.0.”¹⁴

At the end of 2021, the Carbon Disclosure Project was still calculating company emissions in terms of Scope 1 and Scope 2 emissions. With regard to Scope 3 emissions—namely other indirect sources of emissions generated by upstream and downstream activities—companies were required to make disclosures, but did not need to make any commitment to reducing these emissions. Given the possibility of Scope 3 emissions being included in future emissions calculations, 37 Interactive Entertainment believed that companies should start to address them. “This would require collaboration with upstream and downstream companies across the entire industry. Previously, industry-wide efforts were almost impossible due to a lack of data. However, I believe that the greater the challenges we face, the greater the potential for progress. All companies with CSR strategies should think of more ways to achieve their targets.”





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Saint-Gobain

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A Commitment to Net-Zero



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“Today’s generation faces multiple challenges, including climate change, environmental degradation, and workplace inequality. All of these challenges require us to live up to our responsibilities with an effective CSR strategy. Despite the higher costs involved, a successful CSR strategy is incredibly valuable, both for companies and individuals.”

Review

“Saint-Gobain believes in the power of long-term growth. It incorporates CSR into its long-term development strategy, which has proven very effective. The company has been particularly successful in reducing carbon emissions, adopting emissions management strategies from which we can draw valuable lessons. Firstly, it takes accurate measurements of its carbon emissions and has established an internal carbon pricing system. This has facilitated innovation in emissions control technologies and helped to optimize manufacturing processes. Secondly, it has linked emissions reductions to remuneration and incentive policies. This motivates employees to reduce emissions, improve efficiency, and innovate. Thirdly, it has embraced the circular economy concept and promoted the recycling of resources. In addition to making the economy more resilient, this also creates win-win outcomes for the environment and stakeholders. As Saint-Gobain has demonstrated, CSR is not, as traditionally perceived, a burden for companies. On the contrary, it provides them with a valuable channel to leverage internal and external resources and become more competitive.”

Rui Meng

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Introduction

Saint-Gobain was an international company headquartered in France. Established in 1665, it ranked 266th on Fortune Global 500 companies list in 2021.¹ The company specialized in designing, manufacturing, and distributing high-performance materials and provided a range of integrated solutions. Its products included glass, construction materials such as gypsum and adhesives, piping materials, abrasives, highly functional plastics, and ceramic materials. The company employed 170,000 people worldwide, providing services in over 70 countries and regions for the construction, transportation, infrastructure, and industrial sectors. It first entered the Chinese market in 1985, and subsequently opened 54 manufacturing bases in Mainland China with over 8,000 employees.

Saint-Gobain embedded CSR into its development strategy² and attached particular importance to sustainable development, making sustainability one of the pillars of its value proposition.³ In 2003, the company signed the UN Global Compact, accepting the ten principles of human rights, labor, the environment, and anti-corruption. In 2015, in response to the UN's Sustainable Development Goals, the company set itself a number of ambitious environmental targets for 2025: a 20% reduction in CO₂ emissions, an 80% reduction in water consumption, and a 50% reduction in unrecycled waste. In 2019, as part of the Climate Action Summit convened by the General Secretary of the UN, Saint-Gobain signed the "Business ambition for 1.5°C" pledge, committing itself to reach net-zero emissions by no later than 2050. "The 2050 vision is critical to driving our medium and long-term investment policy as well as industrial roadmaps, R&D programs, and product development strategy", explained Pierre-André de Chalendar, Chairman and CEO of Saint-Gobain.⁴

Saint-Gobain aligned its growth strategy with its net-zero targets – a process that involved reducing the company's carbon emissions while seeking new business opportunities in the low-carbon economy.

Saint-Gobain's net-zero roadmap

Clear emissions targets

The first stage of Saint-Gobain's emissions-reduction strategy was to develop an accurate mechanism for calculating its emissions. To eliminate the impact of its manufacturing and operational activities on climate change, the company categorized its emissions into Scope 1 (direct emissions from the company), Scope 2 (indirect emissions from the company's electricity consumption), and Scope 3 (all other indirect emissions in the company's value chain, including from purchasing, sales, and logistics). Its goal was to reduce emissions from all three scopes.

Saint-Gobain's manufacturing processes depended on fossil fuels and chemical reactions, resulting in the generation of large amounts of CO₂. In 2019, Saint-Gobain emitted more than 8 million metric tons of Scope 1 CO₂, 15% of which was attributable to the production of raw materials and 85% to direct energy consumption. Its Scope 2 emissions amounted to 2.7 million metric tons, and were primarily attributable to electricity consumption in its factories and offices (27% of Scope 2 emissions were generated in the Asia Pacific region, 28% in the Americas, and 45% in Europe). The company's Scope 3 carbon emissions were approximately 24 million metric tons, of which procurement and distribution accounted for 22%, shipping 37%, and raw materials and energy supply 39%.

Key milestones in emissions reduction

To achieve its net-zero target, Saint-Gobain set itself two key milestones. The first milestone focused on cutting

emissions from manufacturing activities to reduce total Scope 1 and Scope 2 emissions by 33%, and Scope 3 emissions by 16% by 2030. The second milestone was set for 2050, when the company expected to reach its net-zero goal by delivering widespread emissions reductions across all its operations. As an international company, Saint-Gobain had numerous subsidiaries worldwide—some of these operated in countries or regions without stringent emissions regulations, but the headquarters applied the same targets to all of the company’s subsidiaries. The company also used benchmarking methods to manage its factories, motivating them to emit less by ranking their emissions.

Action plans

Saint-Gobain formulated action plans to reduce its emissions across all three scopes. Reductions in Scope 1 and 2 emissions focused on improving energy efficiency through technological advancements and innovations, such as data analysis and Industry 4.0 technologies, as well as by developing more clean energy technologies (Cleantech). Regarding Scope 3 emissions, Saint-Gobain utilized its leading position in the value chain to leverage its influence on suppliers, starting with shipping carriers before expanding its efforts to include all suppliers.

The implementation of Saint-Gobain’s net-zero roadmap was overseen by the company’s CSR Committee, which operated under the supervision of the board of directors and was tasked with ensuring alignment between Saint-Gobain’s corporate strategy and its net-zero roadmap. In addition, the Executive Committee, which was responsible for overseeing the company’s operations, carried out regular evaluations on emissions reduction performance, and also managed risks and identified corresponding opportunities. All business units and overseas subsidiaries were required to set emissions targets, action plans, and priorities based on the company’s overall roadmap.

	Short-term goals	Long-term goals
Scope 1 & 2	<ol style="list-style-type: none"> 1. Improve energy efficiency <ul style="list-style-type: none"> · Increase the number of sensors and utilize Industry 4.0 technology · Improve data acquisition and analysis; optimize manufacturing processes 2. Recycle more resources <ul style="list-style-type: none"> · Recycle and reuse waste heat · Improve product designs and increase the recycling rate · Use more recyclable materials in manufacturing processes 	<ol style="list-style-type: none"> 1. Reduce use of raw materials <ul style="list-style-type: none"> · Replace with lightweight materials · Replace with less carbon-intensive materials · Reinvent products and industrial processes 2. Use fewer fossil fuels; use more biofuels, solar, and wind power 3. Develop and employ carbon capture technologies <ul style="list-style-type: none"> · Use carbon capture and reuse technologies in manufacturing processes · Use high-efficiency technologies at all manufacturing sites
Scope 3	<p>Reduce carbon emissions from logistics</p> <ul style="list-style-type: none"> · Encourage carriers to reduce carbon emissions · Install more monitoring sensors on transport vehicles to optimize transportation routes and improve efficiency. · Encourage carriers to use vehicles powered by clean fuel, such as low carbon fuels (natural gas, hydrogen, etc.) · Replace road transport with rail and waterway transport 	<p>Encourage all suppliers to reduce carbon emissions</p> <ul style="list-style-type: none"> · Revise requirements for suppliers; make carbon emissions a criterion for supplier selection · Collect detailed data on suppliers’ carbon emissions · Benchmark suppliers’ carbon emissions · Encourage suppliers with high carbon emissions to adopt a science-based target framework

Saint-Gobain’s emissions action plan

Net-zero management strategy

Internal carbon pricing

Saint-Gobain established an internal carbon pricing mechanism to put its net-zero measures into practice. For example, the headquarters required subsidiaries to put a price tag on carbon emissions when evaluating investment, M&A, and R&D projects. The carbon price was set at €75 per ton for industrial investments, and a higher rate of €150 per ton for R&D investments to incentivize the development and use of new technologies.

According to Paul Sheng, CEO of Saint-Gobain China, the internal carbon pricing mechanism had a number of effects. Firstly, it prepared managers for future challenges associated with a potential carbon tax. Secondly, a fixed internal carbon price helped decision-makers within the company to reach a consensus, such as how to set priorities for cutting emissions. Thirdly, pricing carbon emissions encouraged the adoption of low-carbon technologies and equipment. Fourthly, it incentivized management to improve the company's business model. "Saint-Gobain has higher manufacturing costs than its competitors in emerging markets, and now we also have to control costs associated with carbon emissions. This means that we have no choice but to optimize our products and manufacturing processes", explained Sheng.

In May 2021, Saint-Gobain commissioned a new construction material factory in Yangzhou, which used a material called FGD gypsum, a by-product from a local power plant, to cut costs associated with emissions and recycle waste from the power plant. In addition, most of the factory's manufacturing equipment was low-carbon. These measures helped the factory save at least 20,000 metric tons (approximately €1.5 million) of carbon emissions every year. The construction materials produced by the factory were able to replace high carbon steel, concrete and other traditional materials, enabling the construction industry to save 500,000 metric tons of carbon emissions every year—equivalent to the carbon capture capacity of nearly 6,600 acres of forest.

Driven by the internal carbon pricing policy, Saint-Gobain's Chinese factories drew up a diverse range of emissions reduction plans in preparation for future changes in emissions regulations or increases in the company's internal carbon prices.

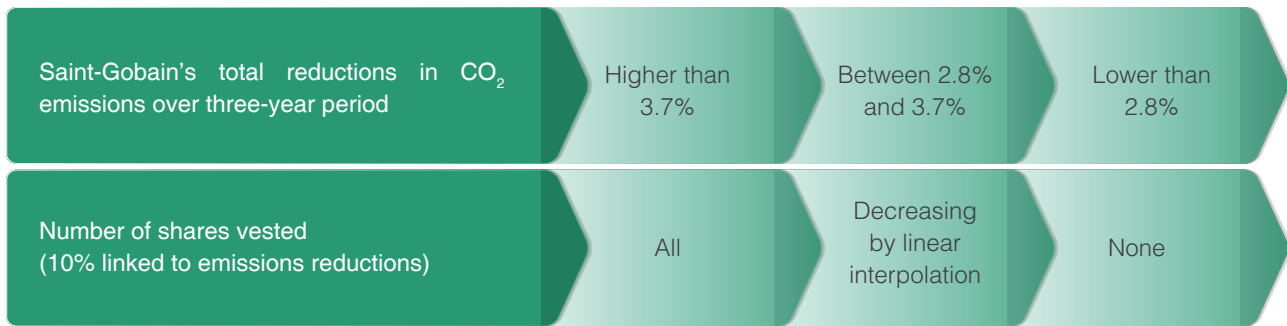
Incorporating emissions reductions into remuneration and incentives

Saint-Gobain incorporated emissions reductions into the company's remuneration and incentive policies to motivate employees to drive reductions in emissions. For core management staff and high-potential employees with management potential, the company offered a package of long-term incentives, including a performance share plan, performance unit plan, and stock options.

In 2020, the board of directors decided to adjust the weighting of various indicators for assessing staff performance. The importance of return on capital employed (ROCE), an economic indicator, dropped from 65% to 60%, while the weighting of CSR indicators rose from 15% to 20%. The remaining 20% was linked to the company's share price. Among the CSR indicators, the weighting of emissions reduction performance was raised from 5% to 10% to reflect its increasing importance. These adjustments covered 2,313 employees over the period from 2021 to 2023.

Internal carbon fund

In light of the need for innovation and broad participation, Saint-Gobain launched an internal carbon fund to engage all its employees on the road to carbon neutrality, and pledged to allocate around €100 million to the fund each year until 2030. Every employee was eligible to make investment or R&D proposals, which were evaluated and selected by the fund's management committee not according to their financial profitability, but on their ability to reduce carbon emissions. When evaluating proposals, the committee compared the total emissions that each proposal would generate, and then determined whether the proposals were worth investing in, factoring in the company's internal carbon prices.



Long-term remuneration plans linked to emissions reductions

New opportunities

Transformation into a provider of decarbonization solutions

As a major emitter, the construction industry was under considerable pressure to join the transition to a low-carbon economy. Given that many of Saint-Gobain's products were construction materials, it sought to grasp the opportunities presented by the low-carbon transition. To this end, the company headquarters established a new "sustainable solutions" department, mainly responsible for providing low-carbon solutions to customers and coordinating with internal business units to transform Saint-Gobain's business model from a product supplier to a solution provider.

Saint-Gobain developed a series of solutions to facilitate the full lifecycle management of buildings and reduce their carbon footprint. The company aimed to achieve two goals—to make buildings more energy-efficient, and to develop more lightweight building materials. The first goal required solutions for improving temperature control and energy efficiency in buildings by developing high-performance insulation materials and surface coatings. To achieve the second goal, Saint-Gobain replaced carbon-intensive materials with lightweight alternatives, such as by replacing steel and concrete with prefabricated, 3D-printed gypsum components. These lightweight construction materials helped reduce industrial emissions and had multiplier effects on the whole value chain thanks to their ease of shipment, installation, and disassembly.

To promote the widespread use of its low-carbon solutions, Saint-Gobain developed an online platform called "Green Building"⁵, which helped clients certify their sustainable building projects according to leading standards such as LEED, BREEAM, WELL, and HQE International.

Circular economy

In light of the worldwide trend towards reducing carbon emissions, Saint-Gobain also developed a circular economy strategy to reduce its energy consumption. The company was committed to using recyclable and renewable materials in all its business units and overseas subsidiaries, a task overseen by one of its vice presidents.

Saint-Gobain's circular economy strategy focused on three key areas: replacing virgin raw materials with recycled materials, prolonging the life cycle of products by making them easier to repair and disassemble, and expanding the company's service portfolio by offering disposal and recycling services for construction waste. Following collection, construction waste was sorted by a third party and reused in the manufacturing of gypsum powder, plastic board, vitreous enamel, glass wool, and other materials.

At some Saint-Gobain factories, recycled materials accounted for over 30% of all materials used, with no adverse impact on product quality and performance. The company also used digital technologies to make waste recycling services more efficient and accessible for customers. For example, if a customer wanted to have their construction waste



collected, they could upload a photo of the waste to a mobile app, which automatically analyzed the image and generated a suitable recycling plan. The customer could then select a convenient time for the waste to be collected. The company also participated in a project called ILOOP, which was funded by the European Union and investigated how to produce glass wool with materials recycled from landfill sites. ILOOP was a win-win project: in addition to addressing landfill waste, it also generated economic value.⁶

Saint-Gobain's Chinese factories also made efforts to recycle waste. For example, outfalls were not required, as all wastewater was reused in manufacturing processes following sedimentation and filtration. Some factories also enhanced their recycling technologies to reuse waste residues, thus becoming zero-waste factories.

According to Joyce Zhu, vice president of Saint-Gobain China, the circular economy created a more resilient growth model. "If a company attempts to cut its carbon emissions without an effective strategy, it is likely to face higher costs and lose competitiveness. The circular economy, on the other hand, enables companies to balance their various interests, such as using fewer resources, becoming more sustainable, developing cheaper and better products, and increasing returns for shareholders."

Cooperation with stakeholders

Working with governments and social organizations to drive the industry's low-carbon transition.

In addition to reducing its own emissions, Saint-Gobain also worked with governments and social organizations to drive the industry's transition to a low-carbon growth model. As one of the 55 members of the European Round Table of Industrialists, the company participated in regular meetings with top EU leaders, and lobbied policymakers to introduce carbon taxes for more industries. To enable more companies to achieve net-zero by 2050, Saint-Gobain also urged other players in the construction industry to adhere to stricter emissions standards.

In addition, Saint-Gobain launched and participated in numerous social initiatives and established emissions-focused cooperation frameworks that brought together governments, universities, social organizations, and professional communities. For example, the company played an active role in the Corporate Leadership Group founded by Cambridge University, aiming to cap global carbon emissions at no more than one trillion tons and achieve carbon neutrality by 2050. The Corporate Leadership Group also called on leading companies to act as role models, share experiences, and influence policymakers.

Saint-Gobain was also a member of the Energy Transitions Commission (ETC), an organization dedicated to achieving carbon neutrality in the production and consumption of energy and comprised of representatives from 50 industry-leading companies and organizations, each of which had a proven track record in developing net-zero roadmaps and identifying new business opportunities for a zero-carbon economy.

Saint-Gobain was also committed to facilitating the net-zero transition of the global construction industry. Driven by rapid changes within the industry, all stakeholders agreed on the need to make buildings greener. In light of this trend, and to expand its influence, the company played an active role in the Green Building Council and chaired the council committee. The Green Building Council was a global network dedicated to promoting green building technologies and best practices. Through its network of over 70 branches in different countries and regions, it mobilized and coordinated support from businesses and government agencies, and promoted the implementation of the United Nations Sustainable Development Goals and the Paris Climate Agreement within the construction industry.

Saint-Gobain was also a founding member of the Global Alliance for Building and Construction. Based at the United Nations Environment Program (UNEP), this organization was an essential pillar of the Paris Agreement. It aimed to build an efficient, resilient, and net-zero future for the construction industry.

Training for downstream distributors and end-users

Saint-Gobain also offered comprehensive training and support to encourage downstream distributors and end-users to reduce emissions. For example, it launched an online training website (seformeravecsaint-gobain.com), while branches and subsidiaries provided offline courses for local customers, teaching them how to make buildings more energy-efficient and environmentally friendly. End users were provided with a convenient toolkit to demonstrate how different building materials and construction plans would affect carbon emissions. The company also built several “green building centers” at various sites worldwide, which allowed architects and designers to learn more about environmentally-friendly building practices. In addition to giving customers a better understanding of the concepts behind green buildings, these measures also helped promote the company’s low-carbon products.

Helping upstream carriers to switch to cleaner fuels

Owing to its use of heavy raw materials and production of large finished goods, Saint-Gobain required an extensive worldwide shipping network. Most smaller carriers in the Asia-Pacific region relied on fossil fuels, resulting in high carbon emissions during transportation. To motivate carriers to switch to low carbon natural gas or hydrogen fuels, Saint-Gobain provided subsidies and acted as a guarantor, enabling carriers to access low-interest loans from financial institutions. At the time of writing, Saint-Gobain China was working with its logistics suppliers to explore the feasibility of a green urban logistics program, with financial backing from its strategic financial partners.

Progress in reducing emissions

According to the latest annual report released by Saint-Gobain at the time of writing, the company had made significant progress in reducing its emissions.⁹ In 2020, its Scope 1 emissions amounted to 7.9 million metric tons, down 2% from the previous year. Combined Scope 1 and 2 emissions were 10.4 million tons, a decrease of 3.7%, while Scope 3 emissions totaled 17.4 million tons.^① In the same year, Saint-Gobain’s CO2 impact (Scope 1 & 2) on revenue was 0.27 kilograms per euro. At its peak ten years earlier, the corresponding figure was 0.47 kilograms per euro. By 2020, the company had achieved a 22.2% reduction in Scope 1 and 2 emissions, and was therefore well on its way to achieving its first milestone—a 33% reduction in total emissions by 2030.



^① Saint-Gobain re-measured Scope 3 emissions based on the methodology of the Science Based Targets initiative. Due to a change in the measurement methodology, a reduction in Scope 3 emissions was not announced in 2020.

Embedding CSR in corporate strategy

Saint-Gobain demonstrated a steadfast commitment to CSR. We interviewed numerous individuals from various levels of management, all of whom reported that their managers would frequently highlight the value of CSR, and that they would convey CSR concepts and values to their subordinates. The CSR strategy was presented in a separate section on the company's website, demonstrating its philosophy of "CSR Embedded in Strategy".⁸ Although the focus of Saint-Gobain's CSR strategy shifted from health and safety to sustainability and carbon neutrality, the underlying logic remained the same: "addressing the major challenges facing humanity".⁹

In light of the challenges posed by climate change, Saint-Gobain updated its strategy in 2021: to become a purpose-driven company.¹⁰ Saint-Gobain defined its purpose as "making the world a better home", stating a wish to expand its impact beyond specific industries or regions. To achieve this goal, the company employed 4,000 researchers at eight research centers worldwide to develop new materials and solutions. At the time of writing, the research teams were focusing on three key areas: reducing the weight of materials, improving recycling rates, and enabling the full lifecycle management of materials. Developed in response to growing pressure to reduce emissions, these solutions were both economical and environmentally friendly.

Joyce Zhu explained the role of Saint-Gobain's CSR strategy in the company's long-term success. "In the short term, adhering to high CSR standards will increase our costs, and even make us less competitive, but in the long run, it will generate huge value. CSR forces us to enhance our operational efficiency and control risks. It also helps us build trust among our stakeholders, including customers, employees, and government agencies."

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INCOM Recycle

By He Jinyu and
Daisy Qiu*

Venturing into the Circular Economy



Liu Xuesong

CEIBS EMBA 2001 Alumna

Deputy General Manager of INCOM Recycle

Collaboration makes a difference. If the government and industry work together, then the circular economy will gain traction and achieve leapfrog development. Environmental protection requires a comprehensive system in which everyone must play their part.

Review

The “30-60” decarbonization goals^① present new challenges and opportunities for businesses in China. The INCOM case has three implications for other companies that do not want to miss the boat: first, seize momentum generated by government policies and growing public [environmental] awareness; second, integrate technology, marketing, systems, and partnerships in innovative ways; third, design aesthetically appealing products that impress consumers.

He Jinyu

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① In September 2020, China announced it would hit peak carbon emissions by 2030 and achieve carbon neutrality by 2060. These targets are referred to as the “30-60 goals”.

Introduction

At the time of writing, China was by far the world's largest producer and consumer of plastic, accounting for nearly one third of global production. In 2019, around 30%¹ of China's plastic waste was sent for recycling, compared to 34.6% in the EU². About 45% of unrecycled plastic waste was incinerated, while the rest went to landfill or was otherwise discarded. Clearly, the country still had a long way to go in improving its waste recycling.

In 2005, Beijing INCOM Recycle Co., Ltd. ("INCOM") established what was then Asia's largest PET plastic bottle recycling factory. In the ensuing decade or more, INCOM strived to promote the sustainable use of renewable resources. The company took innovative and practical steps to develop a sustainable green business model that was profitable, while also benefiting the environment.

More recently, INCOM's management drew inspiration from other industries by incorporating Internet technologies and fashion industry management concepts into the plastic waste recycling business. The management also addressed pain points in the recycling industry, which included low efficiency, secondary pollution, and a focus on mainly low value-added use cases. INCOM subsequently developed its own smart recycling solutions, food-grade recyclables, and eco-friendly fashion brand (BOTTLOOP), which enabled it to close the loop on its circular supply chain.

Within the context of China's 30-60 goals, there was growing government, corporate, and public awareness about the importance of recycled plastics in energy saving², carbon emission mitigation³, and environmental protection⁴. The plastic recycling industry faced unprecedented opportunities, as well as technological and competitive challenges.

About INCOM

Founded in 2003, INCOM specialized in PET plastic recycling⁵. In 2005, it built what was then Asia's largest PET plastic bottle recycling factory, pioneered China's bottle-to-bottle recycling efforts, and created high value-added applications for recycled PET in China. By replacing virgin plastic with recycled PET plastic, INCOM reduced CO₂ emissions by around 110,000 tonnes per year⁶.

² As shown in a report of the Ellen MacArthur Foundation, in 2020, 6% of global fossil fuel consumption was devoted to the production of plastics, which was equivalent to the annual oil consumption of the global aviation sector. The report found that if strong growth of plastics usage continued, the plastics sector would account for 20% of total fossil fuel consumption by 2050.

Source: "The New Plastics Economy: Rethinking the Future of Plastics & Catalyzing Action", Ellen Macarthur Foundation, 2016, accessed December 28, 2021.

³ The Ellen MacArthur Foundation estimated that the plastics sector would account for about 15% of the global annual carbon budget by 2025. Higher plastic waste recycling rates and lower CO₂ emissions by the plastics sector are critical to achieving the goal of holding global warming to well below 2°C. Three key options were outlined for handling plastic waste: recycling, incineration, or disposal in landfill. According to published research findings, based on the Life Cycle Assessment (LCA), 5 to 10 tonnes of CO₂ are released per 1 tonne of plastic over its life cycle, including production, product manufacturing, waste collection, transport and incineration. Using recycling as an alternative to incineration can reduce CO₂ emissions by 50-70%. Source: Van Cauwenberghe L, Janssen C, "Microplastics in Bivalves Cultured for Human Consumption, Environmental Pollution," 2014, 193, 65-70; "Beyond Mechanical Recycling: Giving New Life to Plastic Waste", *Angew. Chem. Int. Ed.* 2020, 59, 15402-15423.

⁴ Research shows that a staggering 60 million tonnes of plastic waste enters the world's rivers and oceans every year. If current trends continue, our oceans could contain more plastic than fish by 2050. In addition to plastic waste, microplastic particles, which are too small to be easily seen with the naked eye, are ingested by both humans and animals through food and drinking water. Researchers from the University of Ghent in Belgium believe that European shellfish eaters ingest an average of 6,400 tiny pieces of plastic per year. But the impacts of microplastics on human health remain difficult to measure. As our planet is drowning in plastic pollution, there is an urgent need for systematic solutions to change the way we produce, use, and dispose of plastics.

⁵ According to a research report of Martec Group, there are approximately 140 types of plastics commercially available, among which more than 30 are in daily use, but only 7 are widely produced and recycled, namely PET, HDPE, PVC, LDPE, PP, PS, and PC. For example, PET is short for polyethylene terephthalate, the chemical name for polyester. It boasts good transparency, nontoxicity, high hardness and density, and strong wear resistance. At the same time, however, it is neither heat-resistant nor alkali-resistant, and cannot be used repeatedly for a long time. It is only safe for use at a temperature between 20–65°C, and may otherwise release hazardous substances. PET is used as a raw material for making packaging materials such as bottles, containers, casings of electrical and electronic appliances, and accessories.

⁶ Figure provided by the company. Compared to virgin plastic, each tonne of recycled plastic produced reduces carbon emissions by 2.1 tonnes, which means that an annual production of 50,000 tonnes of recycled plastic can reduce carbon emissions by 110,000 tonnes.

In 2008, INCOM was designated as the official PET drinks bottle recycling partner for the Beijing Olympics. Later, in 2010, the company also received a visit from China’s then Vice Premier Li Keqiang. In 2012, the company developed China’s first smart drinks bottle reverse vending machine^⑦, which it launched in China and overseas the following year. In 2017, INCOM received an investment from Sino-Ocean Group. Following that, in 2018, Liu Xuesong gave a presentation on INCOM’s eco-friendly ideas and technology at a high-level meeting of the 73rd session of the UN General Assembly, where she represented one of just three global companies attending. In March 2019, INCOM established its sub-brand BOTTLOOP, enabling it to close the loop on its circular supply chain.



INCOM's closed-loop business model

In 2019, INCOM's deposit-refund solution for the recycling of pesticide packaging was successfully piloted and rolled out across various Chinese counties and cities. The solution helped local governments to recycle pesticide packaging waste and agricultural non-point source pollution. In 2020, INCOM's recycling factory was moved to Baodi District in Tianjin and entered into operation. The factory’s production processes and products passed FDA, GRS, ISO9000, and ISO14000 certification, and the recycled materials it produced met food contact material standards.

INCOM was also designated an “urban mineral[®]” demonstration base both in Beijing and at the national level, as well as a national leader in recycling transformation.

In-House R&D and global sales

In 2010, Liu Xuesong waved goodbye to a successful fashion career in Japan to join INCOM, where she hoped to become involved in environmental protection. Despite applying for a branding position, she was instead unexpectedly asked to fill a vacant waste recycling management role. She soon found that the ugly underbelly of plastics recycling was a far cry from the romantic image of environmental protection that she had originally envisaged.

A shortage of waste plastic bottles posed a major challenge for the company. In those early years, INCOM was only able to collect 20,000 tonnes of used plastic bottles a year, far below its factory’s design capacity of 50,000 tonnes. Due to this shortage of raw materials, the factory had to suspend production from time to time, which cost the company RMB 100,000 or more per shutdown. China’s topsy-turvy waste collection market was partly to blame. Beijing’s waste collection market employed around 200,000 laborers, half of whom collected waste, and half of whom sorted it. However, much of the work was done by small, informal workshops that were relatively inefficient. Moreover, poor waste sorting and clean-

^⑦ A reverse vending machine (RVM) is a machine that allows a person to insert a used or empty glass bottle, plastic bottle or aluminum can in exchange for a reward.
^⑧ Urban mining is the process of reclaiming raw materials from spent products, buildings, and waste.



Company milestones

ing practices often resulted in secondary pollution. The informal, dispersed, and rather chaotic nature of this business made it difficult for INCOM to source a reliable supply of raw materials for its production line.

Chang Tao (CEIBS EMBA2005 alumnus) joined INCOM as a general manager at a time when the company was struggling. Drawing on his years of experience in the IT industry, Chang suggested borrowing the RVM concept used overseas to address supply chain shortages and pollution issues. In 2012, shortly after joining the company, Chang and his team independently developed China's first RVM for drinks bottles. The machines automated the collection, sorting,

and processing of used drinks bottles, and reduced bottle contamination and secondary pollution. By adopting Internet of Things (IoT) technology, it also became possible to trace bottles throughout the recycling process, helping to optimize processes and boost efficiency.

At the time of writing, and following almost a decade of independent R&D, INCOM had registered more than 100 copyright claims and patents for its proprietary software. Moreover, the RVMs it developed were getting smarter. Its latest generation of machines could read and identify drinks bottles by barcode and transmit data to a central monitoring platform in real time. Consumers could enter their mobile phone number on the machine's touch screen and choose to claim their container refund, or donate it.

INCOM's smart RVMs were mainly installed in busy public spaces such as subway stations, schools, and residential areas. By the time of writing, these smart machines had safely collected over 60 million PET bottles from more than 2 million users nationwide, equivalent to a CO₂ emissions reduction of 3,240 tonnes, an energy reduction of 5.31 million kWh in electricity, or the planting of 648,000 trees.

In 2015, INCOM set up a joint venture with TOMRA Group, a Norwegian multinational corporation that manufactured collection and sorting products, to expand into overseas markets. TOMRA exported its smart RVMs to more than 60 countries and regions worldwide, including the Netherlands, Brazil, South Africa, UAE, India, Thailand, and Ukraine. By the end of 2021, INCOM and TOMRA had jointly exported more than 75,000 smart RVMs, accounting for 85% of the global market. Together, these machines collected over 35 billion drinks containers on average every year.

Getting young people on board

When INCOM first unveiled its RVMs to the public in Beijing in 2012, it was mainly focused on generating publicity and promoting awareness, rather than monetization. The machines were still very expensive, and the gross profit generated from bottles collected each day were only enough to cover bottle transportation costs. Although consumers could earn twice as much for selling a bottle to an RVM as they could from a human bottle collector, the machines were initially not very popular, as most consumers were still used to doing things the old way.

However, this early cost hurdle only fuelled Chang and Liu's desire to achieve success. They racked their brains to think of every possible way they could make money from RVMs and identified two possible revenue streams: One was advertising, as the two side panels and screens of RVMs provided an ideal space for advertising, which could help to offset manufacturing costs; the other revenue source was forming partnerships with beverage companies. RVMs were capable of scanning the barcodes on bottles, which could provide beverage companies with valuable market data, such as the popularity of brands by region or the time of day when drinks were bought or consumed. In addition, beverage companies could jointly hold environmental protection events with INCOM to promote a more socially responsible corporate image. Such events would also increase consumer exposure to and usage of INCOM's RVMs, helping to foster consumer recycling habits.

While holding these events, Liu noticed that it was primarily the older generation who deposited bottles in their RVMs. This made her think, "How can we engage young people in waste recycling?" As a result, younger consumers became a major focus for Liu and her team. In June 2017, INCOM hosted the Bottle Safe China Program, an event organized by the China Association of Circular Economy (CACE) and supported by the China Environmental Protection Foundation (CEPF). The two-month-long event aimed to leverage the influence of celebrities on fans to raise awareness about recycling and environmental protection. Pictures of different celebrities were scrolled across the screens of INCOM's RVMs. Fans could "vote" for their favorite stars by collecting used drinks bottles and depositing them in the RVMs. The celebrity with the most votes (bottles) would receive an honorary award from the CEPF, in addition to free publicity from INCOM, which would use RVM screens to promote them as the company's environmental ambassador for one month. This event enabled INCOM to collect a total of 380,000 plastic bottles free of charge.



Liu still recalls the final day of the event: she was about to clock off work when she received a phone call asking her to help process more than 40,000 drink bottles that a fan group had amassed during an event held in Nanjing.

Inspired by the success of the Bottle Safe China Program, Liu began to think, “Can we do recycling in the same way as we do fashion or branding? Can we make it fashionable for young people to get involved? The passion of young people can bring value and help our industry to develop!”

Moving up the value chain

In March 2018, Liu and her team set about creating a sustainable lifestyle brand. The brand would use the high-quality recycled fibers produced by INCOM to develop fashionable packaging, clothing, backpacks, stationery, and peripheral products for events.

The brand’s name, “BOTTLOOP”, was a play on words in Chinese that conveyed two meanings: plain living and recycling. The first drew inspiration from the ancient Chinese philosopher Laozi, who called for “simple views and plain and true causes” in his work, the Tao Te Ching. This literary reference expressed the brand’s appreciation and respect for nature and simple plastic products. The second meaning highlighted the brand’s mission to fuse traditional culture with modern technology and fashion trends to give a second lease of life to waste products, and to follow the laws of nature to achieve sustainable development.

During her exchanges with fans of celebrities, Liu found that young people liked products with quantifiable and shareable features, which was something that INCOM could deliver on. RVMs provided a safe, controllable, and traceable bottle recycling process. Meanwhile, every BOTTLOOP product bore a QR code that consumers could scan to learn the number of plastic bottles used in its production, as well as its CO₂ emission reductions relative to virgin plastic.

After months of preparations, BOTTLOOP finally landed its first contract with the Local Organizing Committee (LOC) of the 2018 FIFA World Cup in Russia. The LOC initially approached INCOM to purchase RVMs for the tournament, but finished by concluding a joint promotion deal with the company: 450 Olympic volunteers would wear BOTTLOOP’s inaugural Eight-Bottle t-shirts^⑨ in a joint effort to promote a greener World Cup.

By 2021, less than three years after its establishment, BOTTLOOP was finally profitable and had become an influential eco-friendly fashion brand in China. Big names featured on its list of customers, including drinks brands such as Starbucks, Pepsi, Nestlé, Nongfu Spring, and Genki Forest; cosmetics brands such as L’Oréal and Shiseido; car brands such as BMW and Mercedes-Benz; internet platforms such as Meituan, Xianyu, and Airbnb; as well as sports brands such as Adidas.

Reflecting on INCOM’s progress, Liu remarked, “**We are glad to see so many business partners joining us and adding value to the recycling industry.**”

In the case of Starbucks, BOTTLOOP harnessed INCOM’s logistics system to recycle cold cups from Starbucks, which were combined with drinks bottles collected from RVMs to produce high-quality recycled fibers. BOTTLOOP wove these fibers into beautiful bags and silk scarves that Starbucks used to package gift products. Another example was BOTTLOOP’s partnership with Meituan, a shopping platform. BOTTLOOP turned disposable takeout containers collected from Meituan into business cards, which were used by all of the company’s senior executives.

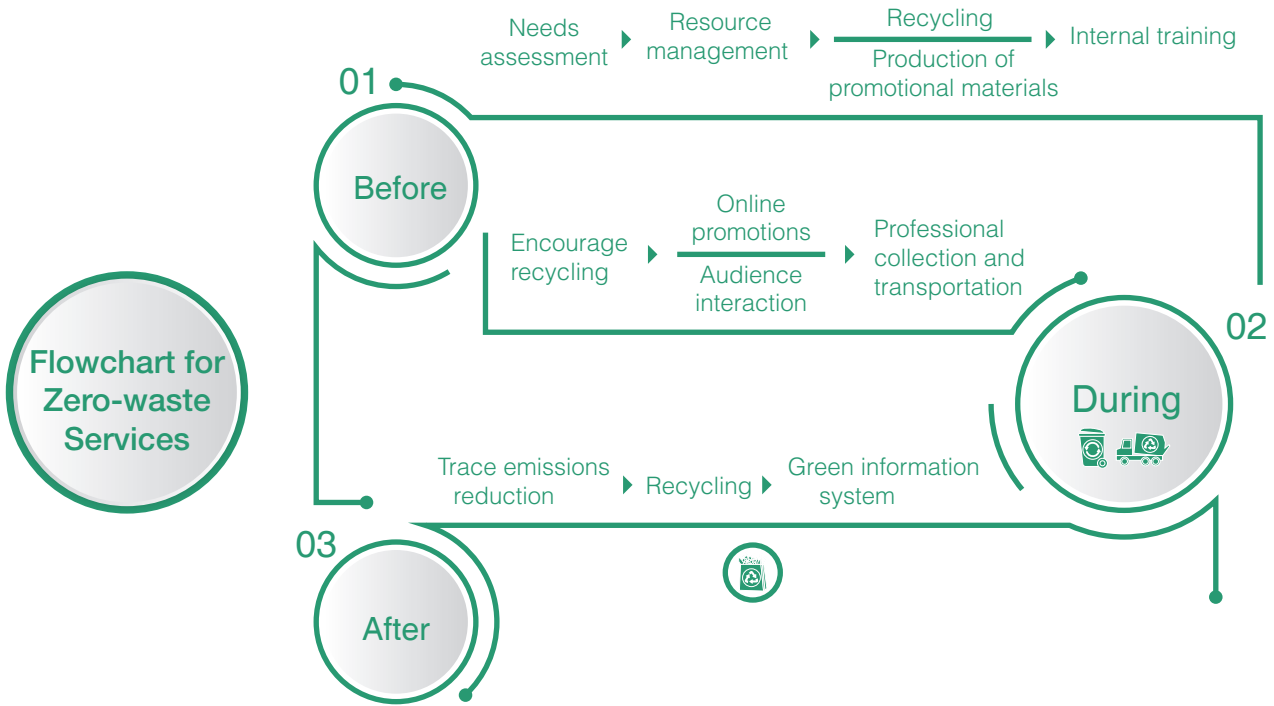
In the summer of 2021, BOTTLOOP partnered with Adidas for a series of charity runs in Beijing, Shanghai, and Shenzhen. Through this partnership, it collected a total of 10 tonnes of waste plastic from 2,000 INCOM collection sites, as well as via activities organized by JoyRun[®]. At INCOM’s factory, this waste was converted into recycled plastic pellets through 12 separate processes, including sorting, pulverizing, cleaning, extending, and weaving. The pellets were then used to manufacture co-branded crossbody bags, sports towels, and drawstring bags, which were presented to customers as

^⑨ Made from 100% recycled materials, each t-shirt used the plastic from eight used water bottles.

[®] A sports app for runners that integrated services, social features, and content.

gifts at Adidas stores.

In addition to producing products, BOTTLOOP also offered one-stop zero-waste solutions for customers by drawing on INCOM's logistics network and food-grade polyester chip factory. These solutions included event planning, event construction, sorting guidance, public awareness, eco-friendly visual design, waste collection and recycling, and emissions reduction reporting for large-scale events, conferences, music festivals, and everyday workplace campaigns. BOTTLOOP's services enabled organizations to reduce the amount of waste generated at events and in workplaces and make progress toward net-zero emissions. In the two years preceding the publication of this case, BOTTLOOP was involved in the organization of major events such as Strawberry Music Festival, the National Sailing Championships, and Caixin's annual summit in China.



BOTTLOOP's operations provided Liu with new insights into "ecological aesthetics", a subject that she had studied during a graduate program in Japan.

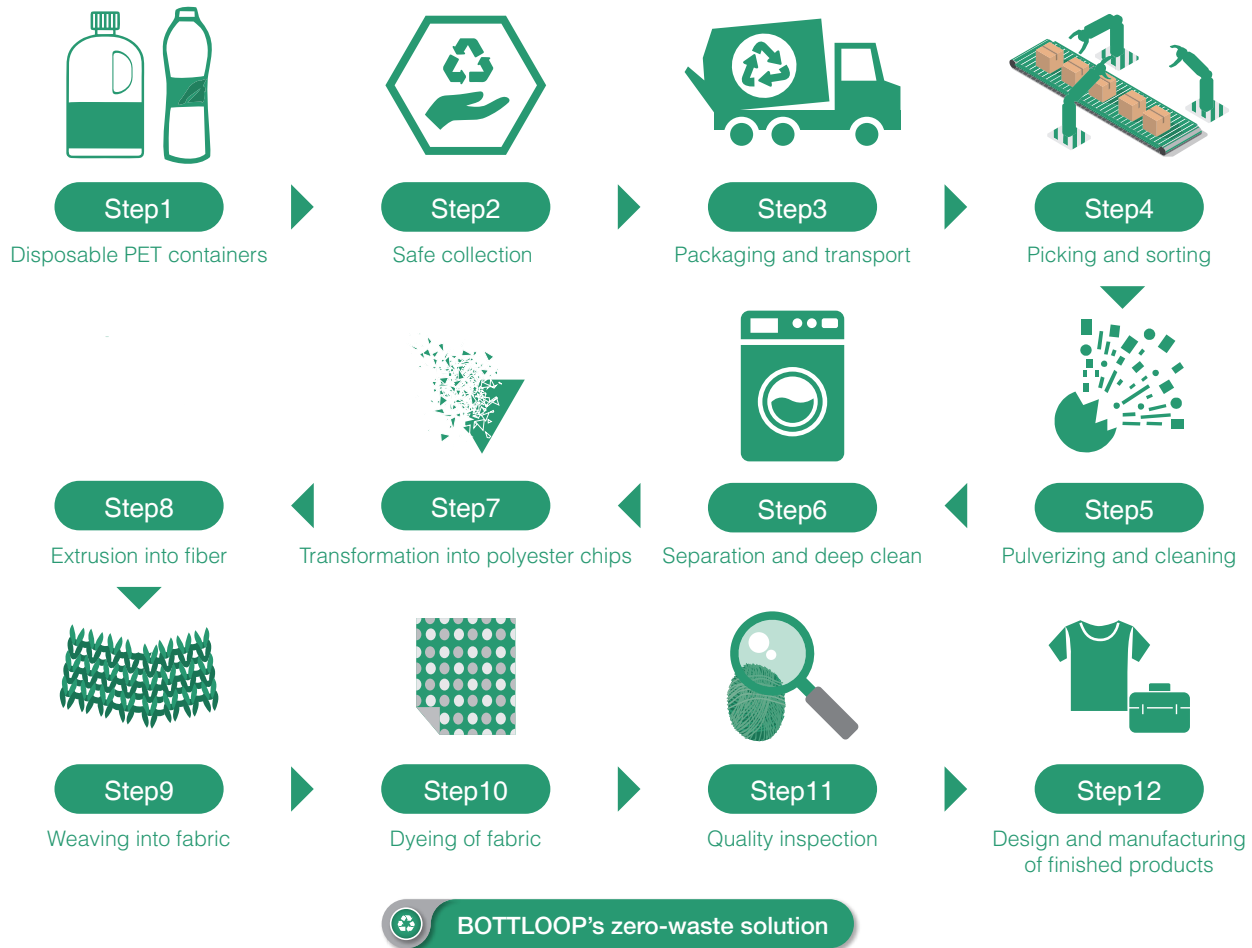
As Liu described, "Using moral coercion to promote eco-friendly products cannot sustainably generate repeat purchases. Instead, our products must be attractive, useful, and meet the real needs of consumers, while also providing environmental benefits. For this reason, we've invited outstanding designers from Japan, Italy, and other countries to join our product design team."

Using innovation to address recycling challenges

According to Chang, RVMs could accurately recognize standard recyclables such as cans, glass bottles, and plastic bottles, but didn't function so well with pesticide containers, which came in different shapes and sizes, including plastic bags, plastic bottles, and glass bottles. As a result, pesticide containers were often improperly disposed of, causing soil contamination and environmental pollution.

In light of this problem, INCOM decided to design a deposit-refund scheme suited to the Chinese market that drew on common Extended Producer Responsibility (EPR)^① practices and similar schemes overseas. The scheme provided a

^① EPR is a strategy that holds producers responsible for various parts of the life cycle of their products, including product take-back, recycling, and final disposal. An application of the EPR concept, deposit-refund schemes have been adopted in more than 50 countries and regions, including Canada, the US, Australia, and the European Union.

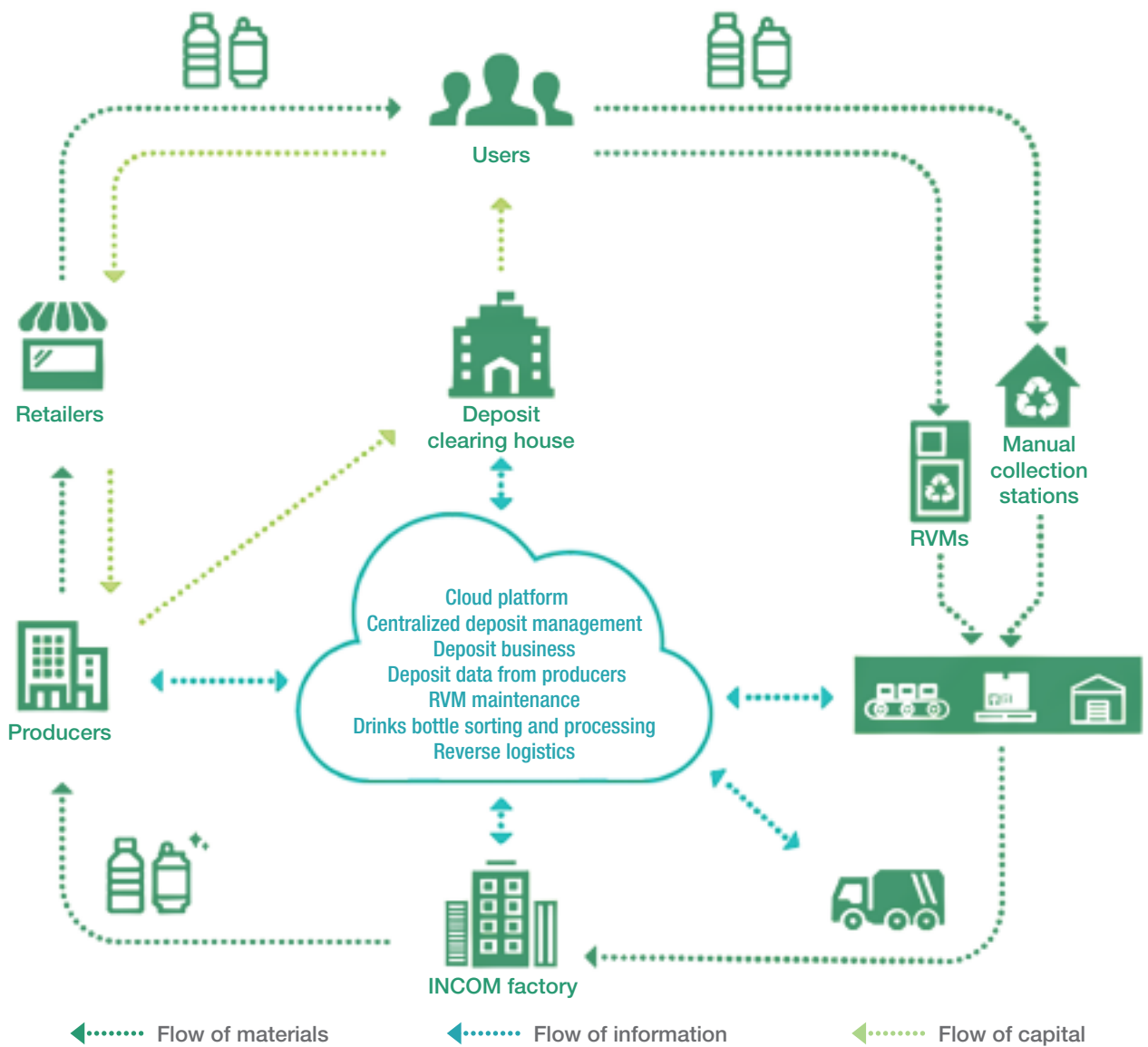


one-stop solution for pesticide container collection, transportation, storage, and safe disposal, and featured hardware and software systems that delivered container traceability, verification, and account reconciliation, as well as a dedicated customer service team.

As of January 2021, INCOM's deposit-refund scheme had been piloted and demonstrated in more than 50 Chinese counties and cities, including the counties of Qingshen and Lu in Sichuan province, and the city of Baoding in Hebei province. By offering a full suite of services, from business consulting to program design, investment, construction, and operations, INCOM provided local governments with a cost-effective solution to the perennial problem of pollution from pesticide containers. One year after the scheme was launched, the recycling rate of empty pesticide containers increased from 5% to over 85%, leading to reduced agricultural non-point source pollution and an improved rural environment.

Deposit-refund schemes are nothing new in China. Back in the 80s and 90s, people would return empty glass beer bottles to convenience stores for deposits. However, this system was never widely adopted by China's recycling industry due to its lack of traceability, susceptibility to fraud, complicated procedures, and high transaction costs. However, following the turn of the century, the emergence of new technologies such as IoT and mobile payments made it possible to revive such deposit-refund schemes, and Chang and his team seized upon this opportunity. INCOM's deposit-refund scheme provided a streamlined and efficient way for consumers to return empty pesticide containers: they could register effortlessly with their phone numbers and use their mobile phones to scan barcodes on containers. The system would then trace and verify the container and complete payment.

Chang believed that INCOM's deposit-refund scheme could be extended to other waste categories that had low recycling rates and were environmentally damaging, including glass bottles, coffee cups, and shampoo and body wash containers. At the time of writing, he was expecting a boom in deposit-refund schemes in the coming decade.



←····· Flow of materials

←- - - - Flow of information

←····· Flow of capital

INCOM's integrated deposit-refund scheme for pesticide container recycling

Overcoming challenges on the road ahead

In 2022, as Spring Festival approached, Liu couldn't help recalling one Spring Festival 11 years earlier when the INCOM factory was temporarily shut down due to a shortage of raw materials. As a result, the company had struggled to pay bottle collectors on time. During that period, creditors came knocking every day. On one occasion, a waste collector with three children rushed into Liu's office and begged her for payment so that their family could travel home for Spring Festival. The company ultimately made good on financial commitments and paid off its creditors, but Liu was forever haunted by that experience.

Environmental entrepreneurs are often motivated by the goal of preserving a pristine environment for future generations. However, the road to success is not easy, and they must often make tradeoffs between short-term profits and long-term benefits to society. As Chang highlighted, recycled materials may be more environmentally friendly, but they often cost more to produce than virgin materials. Moreover, companies and consumers are not always able to absorb these costs. INCOM recognized that it wouldn't have achieved so much without the support of government policies and investors. More generally, in the years before the publication of this case, China's policy and social environment had improved significantly: many cities had made garbage sorting mandatory; progress had been made on the circular economy and waste management legislation; the country had been piloting a "zero-waste city" project; and there were plans to implement EPR systems. Companies needed to play an important role if China was to achieve its 30-60 goals, which would provide motivation for them to adopt more recycled materials. Moreover, as low-carbon lifestyles entered the mainstream, it was likely that consumers would be more willing to pay a premium for recycled products.

"Some brands have long been making products from recycled polyester, but they never mentioned this because consumers didn't care. But now, things are different. Recycled materials have become a selling point".

— Liu Xuesong

"A favorable macro environment is undoubtedly a significant force that drives the development of an industry. When an opportunity presents itself, a company must have the wherewithal to seize and exploit it."

— Chang Shou

In 2021, driven by the Chinese government's decarbonization goals, INCOM reported revenue growth of 250%, despite the impact of Covid-19 on its export business. Chang said that over the following five to ten years, INCOM would continue to expand and strengthen its three core businesses, namely smart recycling, food-grade recycled material production, and BOTTLOOP branded products.

While acknowledging that the road ahead would be full of challenges, INCOM was determined to carve out a bright future.

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04

**PERSPECTIVES
OF CEIBS FACULTY
ON ESG**



Unethical Pro-organizational Behavior

By Jiing-Lih Farh

A Double-edged Sword*



Jiing-Lih Farh

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Unethical pro-organizational behavior (UPB) refers to the unethical behavior of members of an organization with a view to safeguarding their organization's interests. As our research reveals, when executives/leaders engage in unethical behavior that benefits their organization, employees tend to imitate their behavior, and then engage not only in similar UPB, but also in unethical behavior that may damage their organization.

* This paper is adapted from the Leader Unethical Pro-Organizational Behavior and Employee Unethical Conduct: Social Learning of Moral Disengagement as a Behavioral Principle by Huiwen Lian, Mingyun Huai, Jiing-Lih Farh, Jia-Chi Huang, Cynthia Lee and Melody M. Chao in the September 2020 issue of the Journal of Management, available at <https://journals.sagepub.com/doi/abs/10.1177/0149206320959699>.

In recent decades, there has been a series of scandals involving unethical behavior among company executives, including the Facebook data breach, Volkswagen emissions scandal, and the delayed recall of the Ford Pinto. These instances of unethical behavior are often perpetrated by executives with the intention of benefiting their organization. Our research reveals that employees tend to imitate their executives' unethical behavior, which, in addition to benefiting their organization, can also inflict damage.

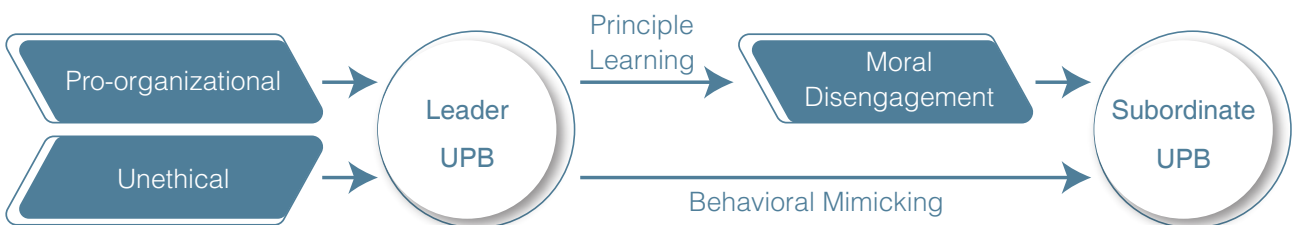
Unethical pro-organizational behavior

Unethical pro-organizational behavior (UPB) refers to the unethical behavior of members of an organization with a view to safeguarding their organization's interests. As the term implies, UPB is "unethical" and driven by "pro-organizational" intentions. For example, in order to boost sales, employees may deliberately conceal the defects of a product from customers or exaggerate its functions. Existing research on UPB primarily focuses on non-executive members of organizations, but executives may also see reason or be pressured to engage in UPB in order to help their organizations reach their goals.

Where UPB goes unnoticed, it may benefit the organization. For example, Volkswagen manipulated emissions tests for many years before the scandal was exposed. In cases where executive-driven UPB goes unnoticed by the general public, a key determinant of whether UPB might result in benefit or harm to the organization is the reactions of witnesses within the organization.

Social learning theory suggests that people often learn how to behave by observing role models in their social environment. For example, employees mimic supervisors who abuse their authority and engage in similar conduct toward subordinates or coworkers. In addition, observers can abstract the principles exemplified in the behavior of role models and use them to generate novel patterns of behavior. For example, by observing how a role model constructs sentences with a set of nouns, participants can abstract the principle used by the role model, and then use the same principle to construct new sentences with a different set of nouns.

One behavioral principle that governs UPB among executives is moral disengagement, which reflects a set of cognitive mechanisms through which people justify their unethical conduct. These mechanisms involve cognitively re-framing unethical behavior to make it appear less harmful, minimizing responsibility for its consequences, and lowering awareness of any perceived distress it has caused to victims. Employees may abstract the principle of moral disengagement from executives who engage in UPB. Once they can justify their actions (e.g., for the benefit of the organization), they may conclude that unethical behavior is permissible. They may then adopt this principle to engage in other types of unethical behavior, including not only UPB, but also unethical self-interested behavior that harms the organization.



How does UPB among executives influence employees?

We conducted two major studies on the real estate industry to explore how UPB among executives influences employee behavior. In each study, we distributed questionnaires to real estate agents and their direct supervisors in different real estate companies. The questionnaires focused on UPB among executives ("If it helps the organization, my boss bends the facts to make the organization look good"), moral disengagement ("It is okay to spread rumors to defend those I care about"), employee UPB ("If it helps the organization, I bend the facts to make the organization look good"),

and unethical self-interested behavior (“I falsify receipts to claim fictitious expenses.”). The agents answered each question and accurately described the extent to which they or their direct supervisors engaged in unethical behavior, while their direct supervisors assessed the agents’ unethical self-interested behavior on a 5-point scale (e.g., 1 = strongly disagree, 5 = strongly agree).

Our research reveals that real estate agents not only imitate their leaders who engage in UPB, but also learn the principle of moral disengagement by finding justifications for unethical sales behavior, both for pro-organizational motives (helping the organization achieve its sales goals) and self-interested motives (earning a higher bonus).

|| The unintended consequences of UPB

Our research sheds light on the negative impact of UPB among executives on employee behavior, and provides some useful suggestions on how companies can effectively combat UPB.

Firstly, media reports on business scandals tend to focus on malicious forms of unethical behavior. As a result, managers may overlook unethical behavior which aims to benefit the organization. Our research, which shows that executives who frequently engage in UPB out of a sense of responsibility to attain collective goals, can help raise managers’ awareness of this form of unethical behavior.

Secondly, executives should be aware that employees may learn to morally disengage by observing UPB among their executives, and ultimately engage in unethical behavior that comes at a major cost to the organization. As a result, executives should refrain from engaging in UPB (even for the benefit of the organization).

Finally, given the potential negative impact of UPB among executives on employees, companies should work to eliminate such behavior by formulating a zero-tolerance policy and reinforcing it with monitoring, training, or mentoring. Moreover, by raising awareness among executives of how UPB can do more harm than good, companies can discourage their executives from engaging in UPB.





Developing a New Approach to Corporate Communications

By Guo Wei

in an Age of Uncertainty*



Guo Wei

Associate Professor of Strategy and Entrepreneurship, CEIBS

Under the new crown epidemic, enterprises face a communication environment that is clearly different from the traditional one. Faced with a new environment of high uncertainty, rampant falsehoods and misinformation, and a flood of information, companies must respond by dramatically improving the precision, clarity and repetition of their communications. Let's learn from Dr. Anthony Fauci how to use a new communication mindset to deal with this challenging new communication environment!

* This paper is adapted from the No Need to Know It All: Implications of COVID-19 for Corporate Communication Research published by Wei Guo and Albert Cannella in the July 2021 issue of the Journal of Management Studies, available at <https://onlinelibrary.wiley.com/doi/10.1111/joms.12705>.

Today's media landscape is characterized by the rapid development of communication technologies and an ever increasing number of communication channels. As a result, an effective communications strategy is essential for companies that wish to grow successfully on the world stage. Businesses routinely use public relations to influence stakeholders. However, the COVID-19 pandemic has brought about three major changes to the media landscape: a decrease in the reliability of information; an increase in disinformation and misinformation, affecting people's ability to process information and make decisions; and information overload. Our research focuses on these challenges and offers some insights into how companies should change their approach to communications.

|| The need for a new approach to corporate communications

The COVID-19 pandemic has resulted in three major changes to the corporate communications landscape:

Shared uncertainty

In traditional communication settings, companies often choose to withhold or obfuscate information to gain an edge over their competitors. Information asymmetry is usually beneficial to communicators, and creates uncertainty for listeners and readers. However, the pandemic has created a great deal of uncertainty for both communicators and their audiences—something that is believed to be accurate today may well be discredited tomorrow. Furthermore, when information becomes discredited, people tend to question the reliability of its source.

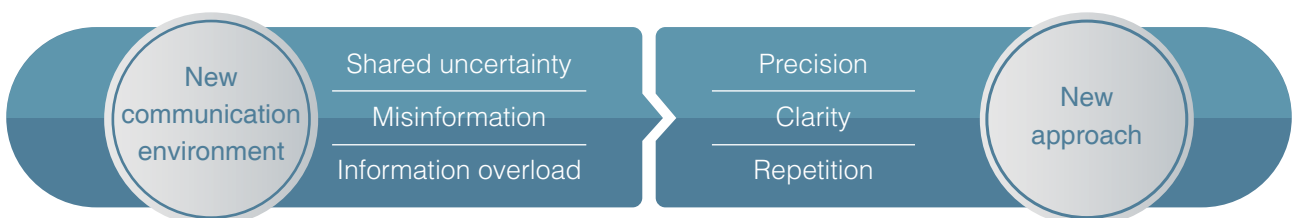
In this challenging landscape, it may no longer make sense for companies to selectively share information in order to take advantage of information asymmetry. A more viable approach would be to use communication as an opportunity to openly and honestly share information with recipients, enabling both parties to make sense of an uncertain situation.

Misinformation

Messages with nearly identical content can have substantially different effects depending on the type of language used to construct them. For this reason, companies tend to convey information in different ways depending on the stakeholder. Complex and ambiguous language has proven to be a valuable tool in corporate communications, as it can help communicators to stay flexible in organizational settings. However, the COVID-19 pandemic has given rise to new challenges for corporate communications in the form of misinformation and disinformation. Information which is proven to be erroneous, misleading, or contradictory shatters confidence in established rules that govern the credibility of information and sources. At the same time, the pandemic has also caused people to demand access to round-the-clock information from a variety of sources in order to keep up-to-date with the latest news. This has inevitably resulted in confusion—in such a landscape, businesses should use a simple and clear message to communicate with their audiences.

Information overload

Conventional wisdom suggests that companies should refrain from repeating the same message, as repetition does not provide any novel information and often leads to negative reactions. However, the pandemic has motivated people to seek information from a variety of sources in order to stay up to date with the latest developments. As a result, the flow of information from a large number of different sources can easily exceed people's capacity to process it. A key challenge for communicators is therefore ensuring that their messages are heard and retained by their audience. As repetition leads to familiarity and preference, delivering the same message repeatedly is perhaps the best way for communicators to influence their audience in today's chaotic media landscape.



Developing a new approach to corporate communications

Amidst the frenzied media landscape during the pandemic, Dr. Anthony Fauci has stood out for his exceptional communication skills. He has become one of the most trusted and influential communicators on COVID-19, despite his initial mistake of telling the public that facemasks were of marginal benefit in limiting the spread of the virus. We analyzed 338 speeches by Dr. Fauci between February 2020 and January 2021, and identified three distinguishing features of his communications: precision, clarity, and repetition.

Firstly, Dr. Fauci communicates with precision, being transparent about what he knows and doesn't know. When he knows the answer to a question, he gives a clear and accurate response. If he doesn't know the answer, he admits his lack of related knowledge (*"We don't have enough information now", "I can't quantitate it accurately now"*). We noted that Dr. Fauci uses a relatively large number of negatives—equivalent to an average of 14 negative words per briefing. We believe this is attributable to his ability to communicate frankly when he is not able to provide an answer.

Secondly, Dr. Fauci communicates clearly, using direct language and breaking complex topics down into understandable components. Our analysis revealed that Dr. Fauci uses language that requires only nine years of formal education to understand (equivalent to senior high school students). In contrast, other members of the White House Coronavirus Task Force use language that requires 12 years of education to understand. For example, when talking about "aerosol transmission", he explained this technical term in a sentence of short and easy-to-understand words: "Aerosol means that it can stay in the air for a period of time because it's in a droplet that's very small and doesn't go down".

Last but not least, Dr. Fauci frequently repeats his messages. Phrases such as "I've said many times, and I'll repeat it" and "I think it's worth reiterating", occur repeatedly in his speeches. For instance, on March 16, 2020, he introduced a two-pillar approach to containing the pandemic, and repeated his strategy on March 21, March 31, April 4, and numerous other occasions. The word "repeat" occurred a total of 21 times in his speeches in the White House briefings alone.

The COVID-19 pandemic may represent a rare event, but executives also encounter situations characterized by widespread uncertainty, misinformation and information overload, such as downturns in the global economy or specific sectors. The lessons from the COVID-19 pandemic can therefore provide a useful roadmap for the future of corporate communications.





Effectiveness of Emotive Charity Appeals

By Hyun Young Park*

in Soliciting Donations



Hyun Young Park

Associate Professor in Marketing, CEIBS

When raising donations, are you communicating a right message to potential donors? For instance, does your message elicit sadness of those in need, happiness of those being helped, or guilt of not giving? Know your donors and choose the right emotional message. Consider ethical issues related to your message choice as well.

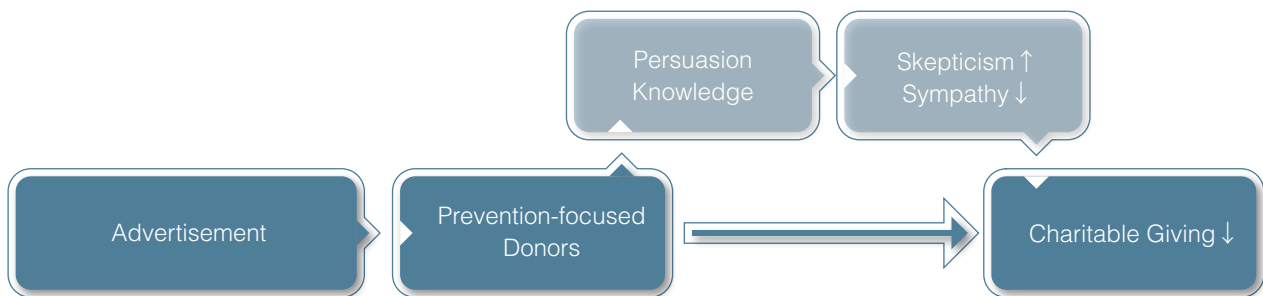
* Hyun Young Park is Assistant Professor of Marketing at the China Europe International Business School. This paper is adapted from How donor's regulatory focus changes the effectiveness of a sadness-evoking charity appeal published by Hyun Young Park and Jungsil Choi in the September 2021 issue of the International Journal of Research in Marketing, available at <https://www.sciencedirect.com/science/article/pii/S016781162030063X>.

Since the founding of the People’s Republic of China, and especially since the initiation of China’s reform and opening-up, common prosperity has been the nation’s shared goal. Given its potential to redistribute wealth, charity has an important role to play in helping China achieve its goal of common prosperity. Our research into charitable organizations has revealed that they and other NGOs often use emotive appeals in their fundraising campaigns in order to persuade people to make donations.

Regulatory focus theory

Charitable organizations routinely analyze the effectiveness of eliciting emotions (such as sadness, guilt, or happiness) in fundraising campaigns in order to determine an optimal combination that will appeal to their audience. Our recent studies have explored how people react to emotive charity appeals from the perspective of regulatory focus theory, which proposes that people perceive and attain their goals differently depending on their regulatory focus (“promotion” or “prevention” focus).

Prevention-focused individuals perceive their goals as duties and obligations, while promotion-focused individuals see their goals as hopes and aspirations. For example, in an academic setting, both promotion-focused and prevention-focused students may strive for an “A” grade, but they perceive and attain this goal in different ways. Promotion-focused students, who see an “A” grade as an achievement, have an appetite to learn more, and therefore do more than just complete the assignments from their teacher. On the other hand, prevention-focused students, who regard an “A” grade as a duty or obligation, complete assignments assiduously in line with grading criteria.



Do emotive charity appeals persuade people to donate to charity?

We conducted six primary studies (each involving hundreds of participants) and two supplementary studies to explore whether emotive charity appeals persuade people to donate to charity, and how an individual’s regulatory focus can impact the effectiveness of such appeals. In each study, participants were tested to determine their regulatory focus, and then randomly assigned to different groups to view a range of emotive charity appeals.

According to our findings, if a charity appeal elicits sadness, prevention-focused donors are more likely not to donate. On the other hand, if a charity appeal evokes feelings of guilt or happiness, an individual’s regulatory focus does not affect the likelihood of them making a donation, nor does it affect the amount they are willing to donate.

In addition, we were able to determine why sadness-evoking charity appeals discourage prevention-focused donors from donating—namely because these appeals activate their “persuasion knowledge” (i.e., awareness of and beliefs about the tactics charities use to persuade them) and reinforce their skepticism, thereby dampening their sympathy toward potential victims and/or beneficiaries. If “persuasion knowledge” is not activated, prevention-focused donors are not discouraged from donating (or are at least not so reluctant to donate), even if a charity appeal elicits feelings of sadness.

In light of our findings, we tested two ways to prevent the activation of persuasion knowledge. In the first test, we asked participants to complete a memory task while viewing an advertisement in order to distract their attention and limit their cognitive capacity; in the other test, participants were informed in advance that the charitable organization

mentioned in the advertisement had an excellent reputation. The first test highlighted potential ethical issues related to the use of emotive charity appeals—namely that busy lifestyles have the potential to limit people’s cognitive capacity; the second test underscored the importance of the reputation of charitable organizations in light of growing concerns among the general public.

How do charitable organizations raise money?

Our findings provide charitable organizations with useful insights into how an individual’s regulatory focus affects the way they react to fundraising campaigns.

Firstly, if charitable organizations want to make emotive appeals more effective in their fundraising campaigns, they should deliver their message directly to promotion-focused individuals and avoid targeting prevention-oriented groups (through data analytics technologies, such as text mining). For example, they could emphasize promotion-focused goals or benefits (e.g., helping victims realize their dreams) rather than prevention-focused goals or benefits (e.g., ensuring the safety of victims) in their ad messages in order to improve the effectiveness of their message.

Secondly, sadness-evoking fundraising campaigns are less effective in Asian societies, where people are more likely to be prevention-focused, and more effective in promotion-focused Western societies.

Finally, our findings can help policymakers and regulators assess whether it is ethical for charitable organizations to target increasingly busy individuals (who therefore have limited cognitive capacity) using emotive appeals.

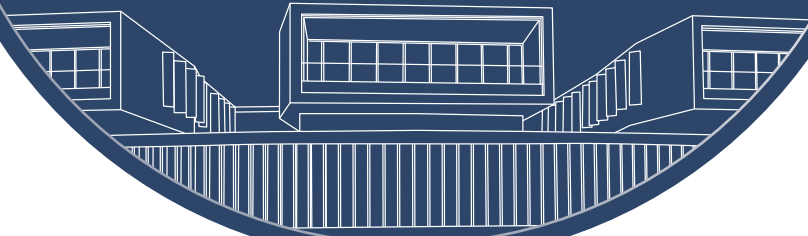






05

**STUDY ON THE CSR
REPORTS OF A-SHARE
LISTED COMPANIES
(CONDENSED)**



Study on the CSR Reports of A-share Listed Companies (Condensed)*



Rui Meng

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Corporate social responsibility is not equal to the waste of corporate resources. On the contrary, in the process of solving social problems with business logic, actively fulfilling social responsibility not only wins rich strategic resources for long-term, healthy and sustainable development of enterprises, but also helps alleviate social conflicts and build a harmonious society. In the context of the national promotion of "common prosperity", fulfilling social responsibility has an important value at present.

Introduction

Version

This is a condensed version of the study that only includes highlights from 2020. To access the full study, see “About the Authors”.

Research subject

2020 annual CSR reports published by A-share listed companies between January and June 2021.

Methodology

The “2021 Study on the CSR Reports of A-share Listed Companies” uses a distinctive corporate social responsibility (“CSR”) indicator system that combines Chinese and international methodologies, CSR reporting guidelines from authoritative bodies, key societal concerns in China, and big data technology.

Data sources

Most data used in the study was derived from digital CSR reports and annual reports of listed companies published on official websites. Other sources include the “CSR Database”, “Listed Company Governance Database”, “Violation and Punishment Database”, and “Litigation and Arbitration Database” of the Chinese Research Data Services Platform (CNRDS); the China Stock Market & Accounting Research (CSMAR) CSR database; the “Actual Controllers of Listed Companies” and “Basic Information of Chinese Listed Companies” sections of the WIND database; and relevant news from Baidu and the Genius Finance database.

The High Carbon Emissions Companies List (HCECL) was compiled from China's 2021 Carbon Emission Ranking for Listed Companies, the first ranking of its kind in China that is jointly published by the magazine *Caijing*, that magazine's leading business report platform *Caijing Eleven*, and SinoCarbon.

Data processing

A range of big data techniques was used to derive the indicators in this study, including data collection, data cleaning, data mining, and data cross comparison, and data was also manually corrected where necessary:

1. Data collection: Big data techniques were used to collect large amounts of raw data from the websites of companies and regulatory authorities, as well as popular search engines;
2. Data cleaning: Data was cleansed according to predefined rules to correct errors and eliminate duplicates and outliers for consistency;
3. Data matching: The required information was precisely matched from a massive number of social responsibility reports, news reports, and announcements;
4. Data mining and visualization: Manual processing and machine learning techniques were combined to extract and mine information from vast quantities of data (such as text) and visualize relevant findings.

About the authors

Center for Wealth Management, CEIBS

The CEIBS Center for Wealth Management (“The Center”) is committed to creating and sharing financial knowledge and promoting exploration and innovative research in the fields of finance and wealth management, while maintaining the highest academic and pedagogical standards. The Center endeavors to promote the standardization and specialization of the industry and generate sustainable value for the world of finance. In addition, the Center prepares high-net-worth individuals and families, financial advisors, and wealth management professionals to be well-intended and responsible stakeholders, enabling people, capital, and society to be forces for good.



Please scan the QR code, follow our official account on WeChat, and enter the keyword “CSR” in the dialogue box to view the full study.

We thank the following authors for their contributions to this study:

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Abstract

In December 1990, China's stock market was formally established. Initially, only eight stocks were available on the Shanghai Stock Exchange (SSE) and five on the Shenzhen Stock Exchange (SZSE). However, following three decades of reform and innovation, China has since evolved into a multi-tiered capital market that offers exchange-based and over-the-counter spot and futures markets in equities and bonds, public and private share offerings, and several boards, including the Main Board, SME Board, ChiNext, STAR Board, and NEEQ.¹ Over this period, China's market has made remarkable progress: by the end of 2020, there were over 4,100 companies listed on the SSE and the SZSE, with a total market capitalization of RMB 77 trillion, ranking second in the world. The average daily trading volume of the two exchanges has increased from a few hundred thousand yuan in the early days to hundreds of billions of yuan today, also placing China second globally. As manual trading gave way to automated order matching, the average number of daily transactions surged from just a few dozen to more than 46 million. Today, China boasts the world's second-largest bond market and the biggest turnover in commodity futures.² In addition, in 2020, Chinese regulators imposed stricter compliance requirements on listed companies for the third year in a row, with increased emphasis on information disclosure and corporate social responsibility. As a result of the above, China's capital markets are now much bigger and more mature.

CSR reports are an important source of non-financial information disclosed by listed companies. The information that they provide can help investors to evaluate a company's sustainability. In most developed Western capital markets, investors include CSR and ESG reporting in their valuation models. In addition, there is a broad body of empirical evidence to show that socially responsible practices can enable companies to boost their corporate image and attract cheaper financing, thereby improving their financial performance and social capital.

As with previous research, this study uses seven main indicators to analyze the CSR disclosures and performance of A-share listed companies, and presents eight main findings:

1. In 2020, a total of 1,106 A-share listed companies published CSR reports (hereinafter "reporting companies"), 114 more than the previous year. The number of disclosures has been rising steadily over the past 15 years.

2. On the STAR board, a total of 21 companies disclosed their CSR reports in 2020, 2.6 times higher than the previous year.

3. In 2020, more than 90% of reporting companies conducted in-house education and training on CSR, a significant increase from the previous year.

4. 76.49% of reporting companies disclosed their business integrity practices in 2020, 6.03% more than the previous year, while 59.86% of companies stepped up anti-bribery and anti-corruption efforts, up 8.25% from the previous year.

5. In terms of employee wellness, in 2020, 49.2% of reporting companies, or 544, disclosed their remuneration incentives, representing a slight increase from the previous year. Companies also attached greater importance to employee benefits and qualities.

6. In terms of diversity and equal opportunities, in 2020, 64.9% of reporting companies, or 718, reported having at



least one female executive; 18.3% disclosed inclusive policies for vulnerable groups, an increase of 12.4% or 143 companies from the previous year.

7. Environmental disclosures in all industries increased from the previous year. This was mainly driven by China's national commitments to peak carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060 (referred to as the "30-60" targets).

8. In terms of charitable activities, in 2020, 958 companies disclosed their engagement in social welfare programs, up 103 from the previous year. Total donations stood at RMB 12.13701 billion. Performance improved across the board in terms of contributions to education, charitable causes, volunteering activities, international aid, job creation, and economic growth.

In sum, in 2020, the weighted CSR score for the 1,106 reporting companies (excluding HCECL companies) was 49.69 (out of 100), an increase of 1.1 points or 2.2% from the previous year, but slightly lower than the weighted score of 56.29 for the 55 HCECL companies.

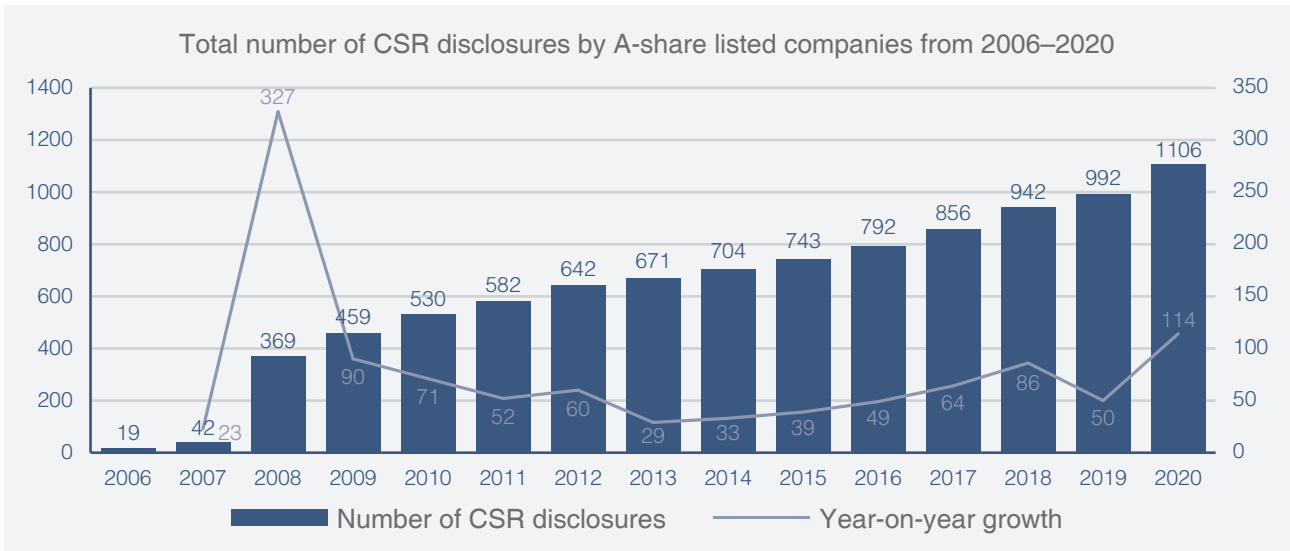
To measure the economic value of CSR disclosure, we built an investment portfolio composed of companies with composite and component CSR scores that were all above 60. We then bought this portfolio on January 1, 2021 and sold it on December 31, 2021 to measure excess returns relative to the SSE Composite Index. It was found that this portfolio (which comprises seven categories) generated an annualized return rate of 11.52%.

Overview of CSR disclosures by A-share listed companies

Total disclosures: The total number of annual disclosures has grown steadily, recording triple-digit growth in 2020 and an average disclosure rate of 25.36% for the five years from 2016–2020. However, there is still considerable room for future growth.

Michael E. Porter and Mark R. Kramer from Harvard University identified four prevailing justifications for CSR based on their research findings: (i) Moral obligation: Companies have a duty to achieve commercial success in ways that honor ethical values; (ii) Sustainability: Companies should meet the needs of the present without compromising the ability of future generations to meet their own needs; (iii) License to operate: Companies need permission from governments to do business; and (iv) Reputation: CSR initiatives will improve a company's image, strengthen its brand, and enhance its relationships with stakeholders such as customers, investors, and employees. They also argue that CSR runs through the entire value chain of a company and influences all value chain components. Therefore, companies can gain a unique competitive advantage by incorporating CSR into their strategy.³

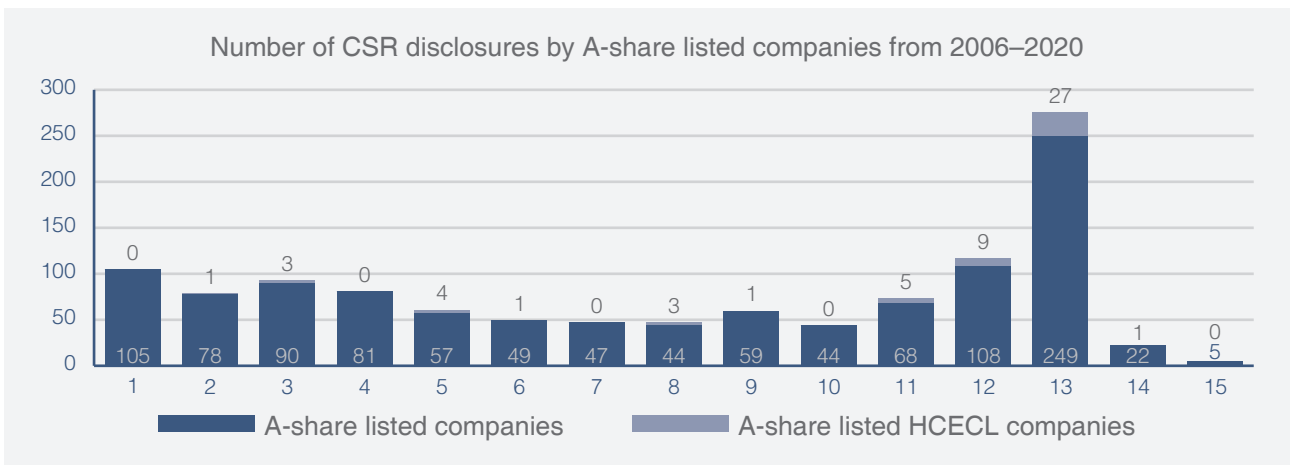
In 2006, the Shenzhen Stock Exchange issued the *Social Responsibility Instructions to Listed Companies*, which encouraged companies to disclose their social responsibility reports. It remains one of the most influential and epoch-making documents on CSR. In 2008, the Shanghai Stock Exchange made CSR disclosure mandatory for (i) companies included in the SSE Corporate Governance Index, (ii) companies listed in both domestic and overseas markets; and (iii) financial companies, while encouraging other types of listed companies to do so where possible. Today, after over a decade of development, CSR practices are covered by a number of government acts and guidelines, even if they are not emphasized by relevant regulatory bodies. A typical example is the *Civil Code of the People's Republic of China* which took effect on January 1, 2021, Article 86 of which indicates that CSR is becoming an essential part of companies' daily operations: "A for-profit legal person shall, when engaging in operational activities, observe commercial ethics, maintain the security of transactions, subject itself to the supervision of the government and the public, and assume social responsibilities." Taking the above into account, it is clear that the application of China's CSR policies is shifting from being optional to something that is actively encouraged or mandatory.



During the 15 years from 2006 to 2020, the number of companies that made CSR disclosures rose steadily. In 2020, a total of 1,106 A-share listed companies made CSR disclosures, 11.5% or 114 more than the previous year, representing the largest single-year increase in the past 12 years and the highest growth rate in the past five years. Only 55 reporting companies were on the HCECL. Between 2016 and 2020, on average, 25.36% of A-share listed companies made CSR disclosures each year, while the median rate was 25.95%. This shows that there is still considerable room for improvement in overall disclosure rates.

Per-company disclosure count: There were 249 companies that disclosed 13 times between 2006 and 2020, forming the largest group and accounting for 22.51% of total disclosures in 2020. Meanwhile, 105 companies, or 9.5% of the total, only disclosed once. The distribution of per-company disclosures was U-shaped.

Between 2006 and 2020, a total of 9,460 CSR reports were disclosed by A-share listed companies. By 2020, 22.5% and 9.8% of these companies had disclosed 13 and 12 times respectively, while 105 companies had disclosed only once during this period, accounting for 9.5% of the total. Only five companies disclosed CSR reports every year. The overall distribution of the chart was U-shaped. The number of disclosures in 2020 was higher than the previous year, indicating that A-share listed companies were increasingly aware of and paying more attention to CSR. The disclosure count for HCECL companies was less evenly distributed: only one company disclosed every year, while 27 companies disclosed 13 times, forming the largest group, followed by the nine companies that disclosed 12 times. The number of companies for each other disclosure count was fewer than six.

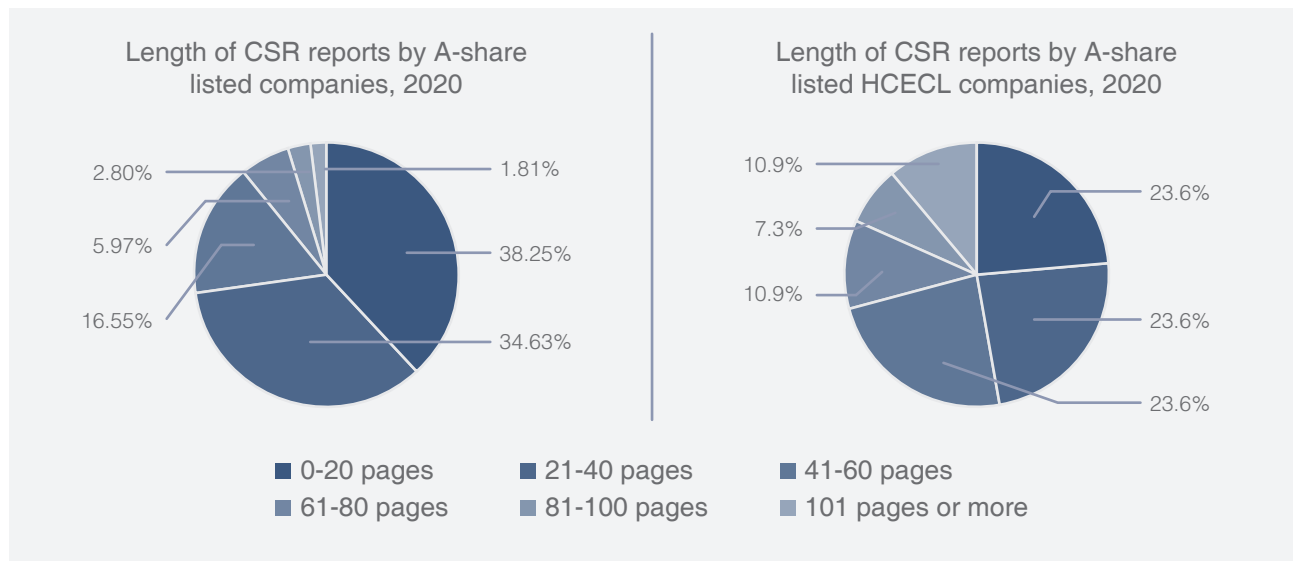




Length of CSR reports: In 2020, 70% of the CSR reports surveyed from A-share listed companies were no more than 40 pages long, a much higher proportion than in previous years. There was also a larger gap between the shortest and longest page counts.

In 2020, the shortest CSR report disclosed by reporting companies was one-page long, while the longest was 191 pages, a difference of 190 pages. The average report length was 32 pages and the median 27, a slight increase from previous years. 38.35% of the reports were between 0–20 pages, while 34.63% totaled 21–40 pages, together accounting for 72.88% of the total. 27.12% were over 61 pages long, of which 2.80% and 1.81% were over 80 and 100 pages, respectively. There were 13 HCECL companies with CSR reports of 0–20 pages, 21–40 pages, and 41–60 in length respectively, each accounting for 23.6% of the total. Six companies produced CSR reports with 61–80 pages, four companies with 81–100 pages, and six companies with 101 pages or more. Their CSR reports generally highlighted efforts to reduce carbon emissions and embrace new technologies.

After reading through the CSR reports, we discovered that those with fewer than 20 pages featured mainly descriptive language and were narrower in scope. By contrast, those ranging between 21–100 pages were more detailed, better designed and formatted, and more appealing to the reader.

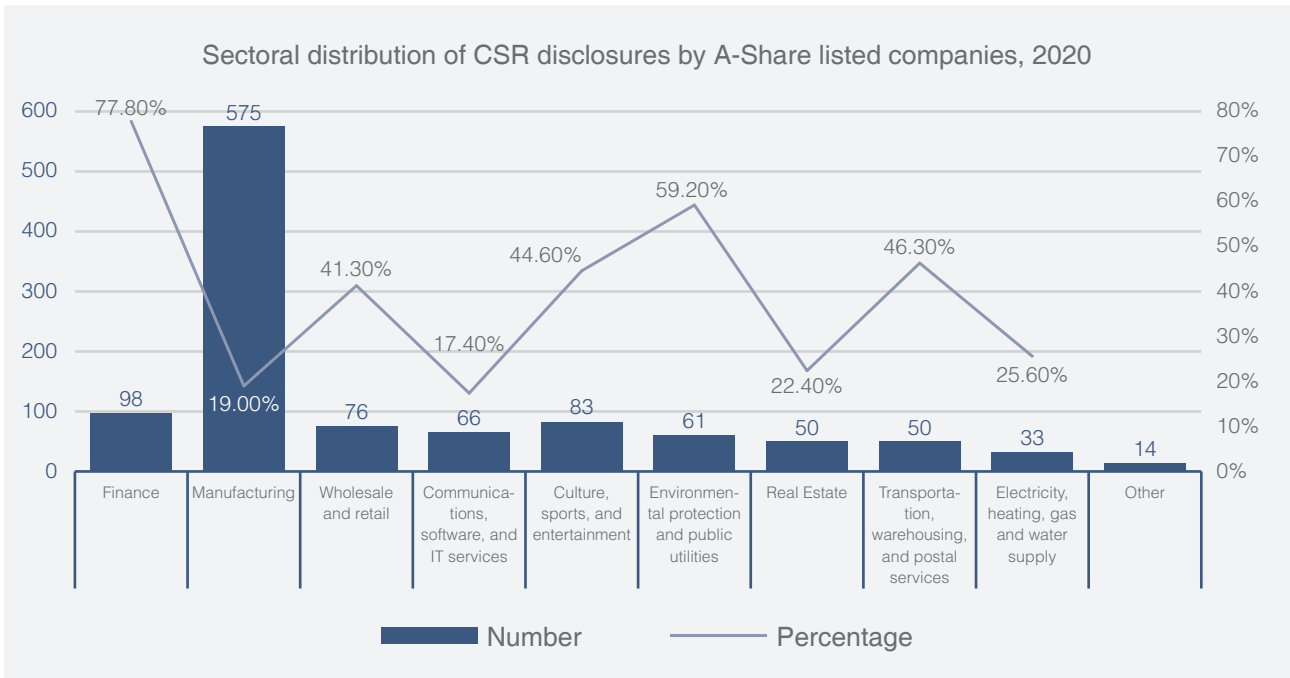


Based on statistics from 2016–2020, there were between 400 and 450 reports of 0–20 pages in length; the number of reports with 21–40 or 41–60 pages increased every year, with a sharp jump in 2020; and the number of reports with 61–80, 81–100, or over 101 pages increased more moderately. Over the same period, the longest, shortest, and average page counts held relatively steady, while the median number of pages trended upward, suggesting that A-share listed companies were attaching greater importance to CSR reports.

Analysis of CSR reporting companies in 2020

Sectoral distribution of reporting companies: In 2020, 90% of industries registered an increase in CSR disclosures over the previous year. This increase was sharpest in the manufacturing sector, while the financial sector saw the highest rate of disclosures.

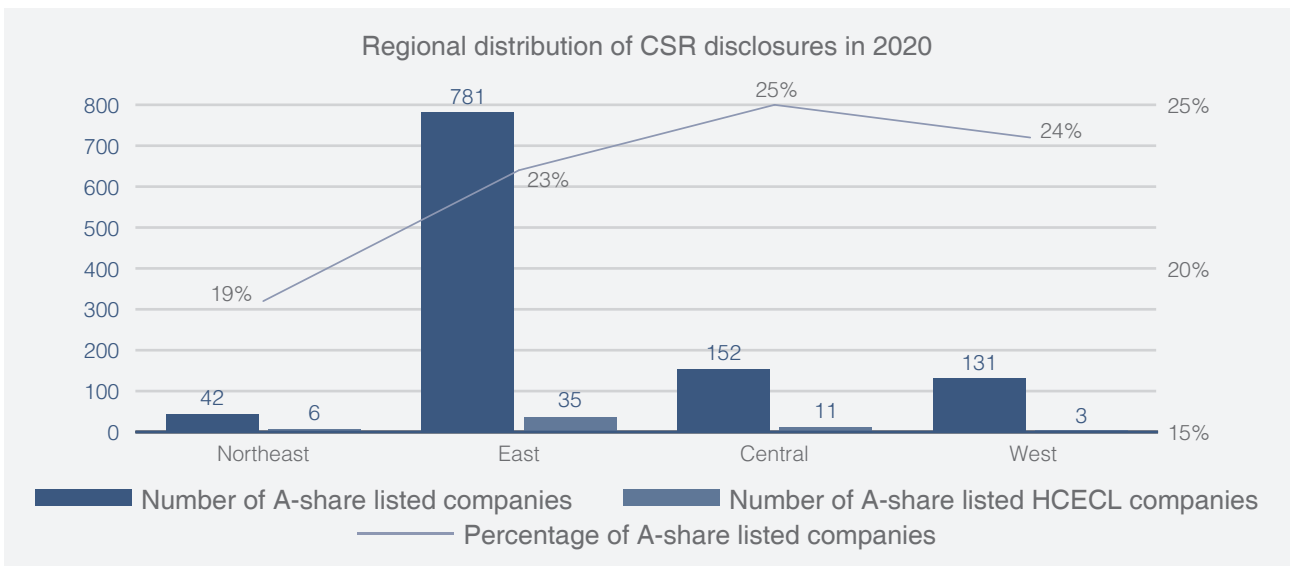
In 2020, the manufacturing sector had the highest number of CSR disclosures at 575, up 79 from the previous year. The financial sector placed second, with 98 reports in total, four more than the previous year. Other sectors recorded an average of 54 reports, up 20 from the previous year.



The manufacturing sector made the most disclosures in absolute terms, but the disclosure rate was low, at just 19%. The financial sector, which only produced 98 reports, boasted the highest disclosure rate at 77.8%, largely due to mandatory disclosure requirements from regulatory agencies. The environmental protection and public utilities sectors, and the transportation, warehousing, and postal services sectors had the second and third-highest disclosure rates at 59.2% and 46.3%, respectively.

For reporting HCECL companies in 2020, companies in the manufacturing sector made the most CSR disclosures, totaling 29, followed by 15 companies from the environmental protection and public utilities industry. Transportation, warehousing, and postal services; communications, software, and IT services; and electricity, heating, gas, and water supply contributed no more than six CSR reports each.

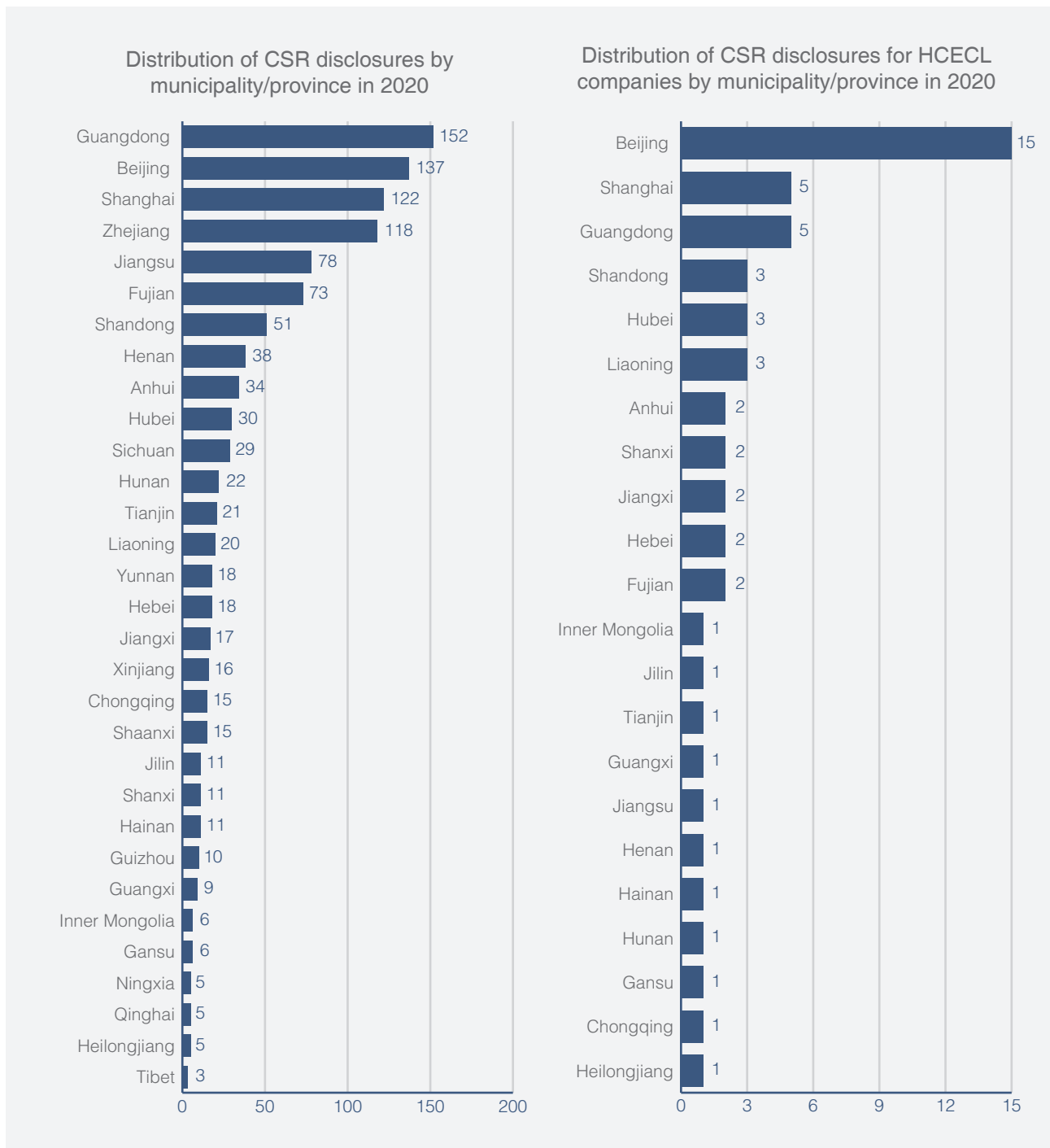
Regional distribution of companies: There were slight regional differences in disclosure rates among reporting companies, with central China taking the lead, followed by west and then east China, while a slight decline was seen in northeast China.





East China recorded the highest total number of CSR disclosures in 2020, accounting for 70.6% of the total that year and far more than in central, west, and northeast China. All regions saw positive year-on-year growth except for northeast China, where disclosures decreased by one. Disclosure rates varied by region, with the highest rate in central China at 24.8%, followed by west (24%), east (23%), and then northeast China (18.5%). For reporting HCECL companies in 2020, east China had the largest number of companies that made disclosures (35), followed by central China (11), northeastern China (6), and west China (3, the fewest).

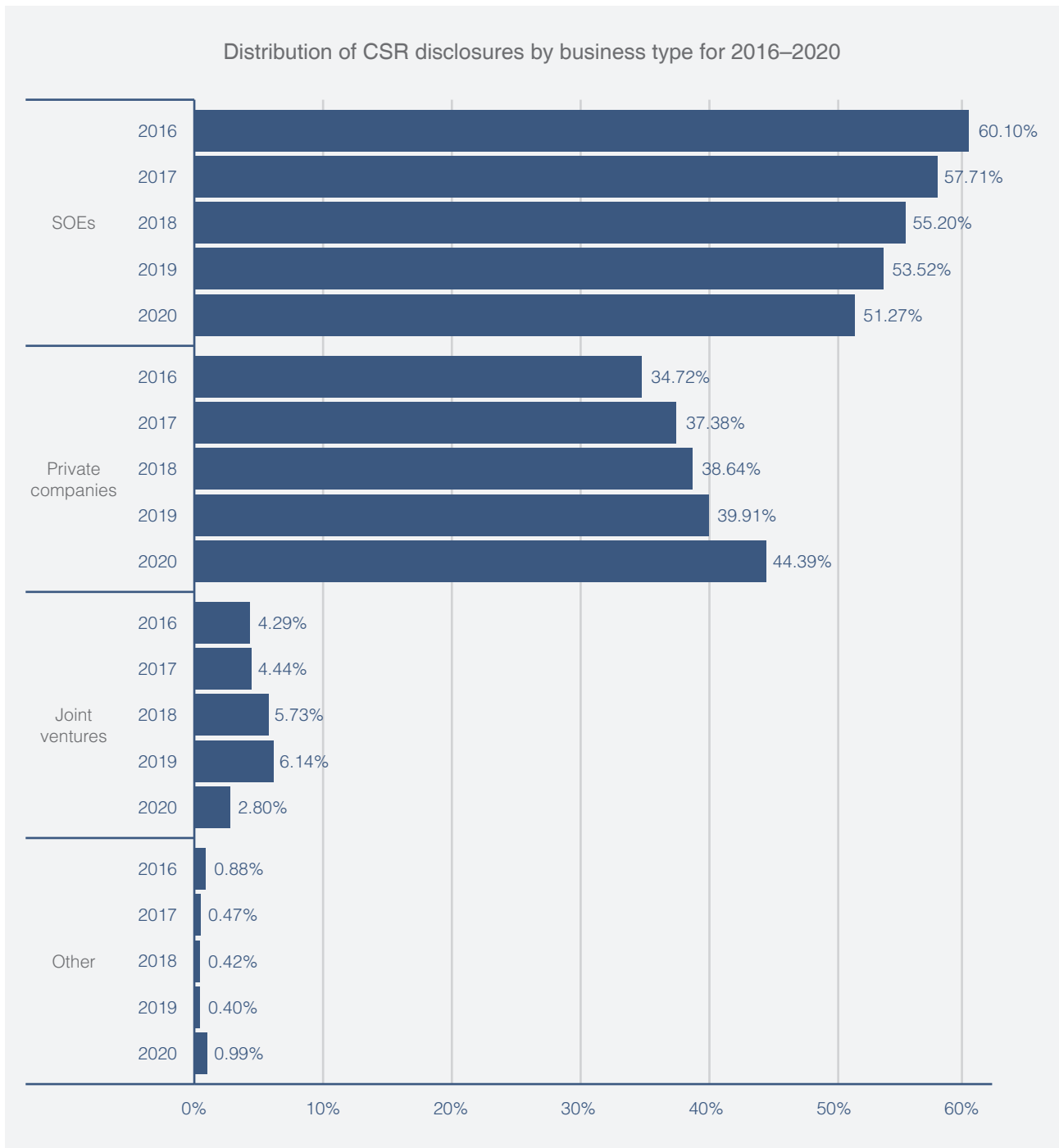
Distribution of companies by municipality/city: Guangdong, Beijing, and Shanghai had the highest concentration of disclosing companies, while all other localities saw a slight increase.



In 2020, about 76.5% of municipalities or provinces in China were home to companies that disclosed CSR reports, an increase from the previous year. As in 2019, Guangdong, Beijing, and Shanghai continued to top the list in 2020, with 152 reports recorded in Guangdong, 137 in Beijing, and 122 in Shanghai.

In terms of disclosures by HCECL companies, Beijing outperformed all other municipalities and provinces in 2020 with disclosures by 15 companies in total. Shanghai and Guangdong tied for second place, with five companies each. All other municipalities or provinces each had fewer than four disclosing HCECL companies.

Distribution of companies by business type: SOEs still accounted for more than half of reporting companies, but their proportion declined. In contrast, the share of reporting private companies rose steadily.

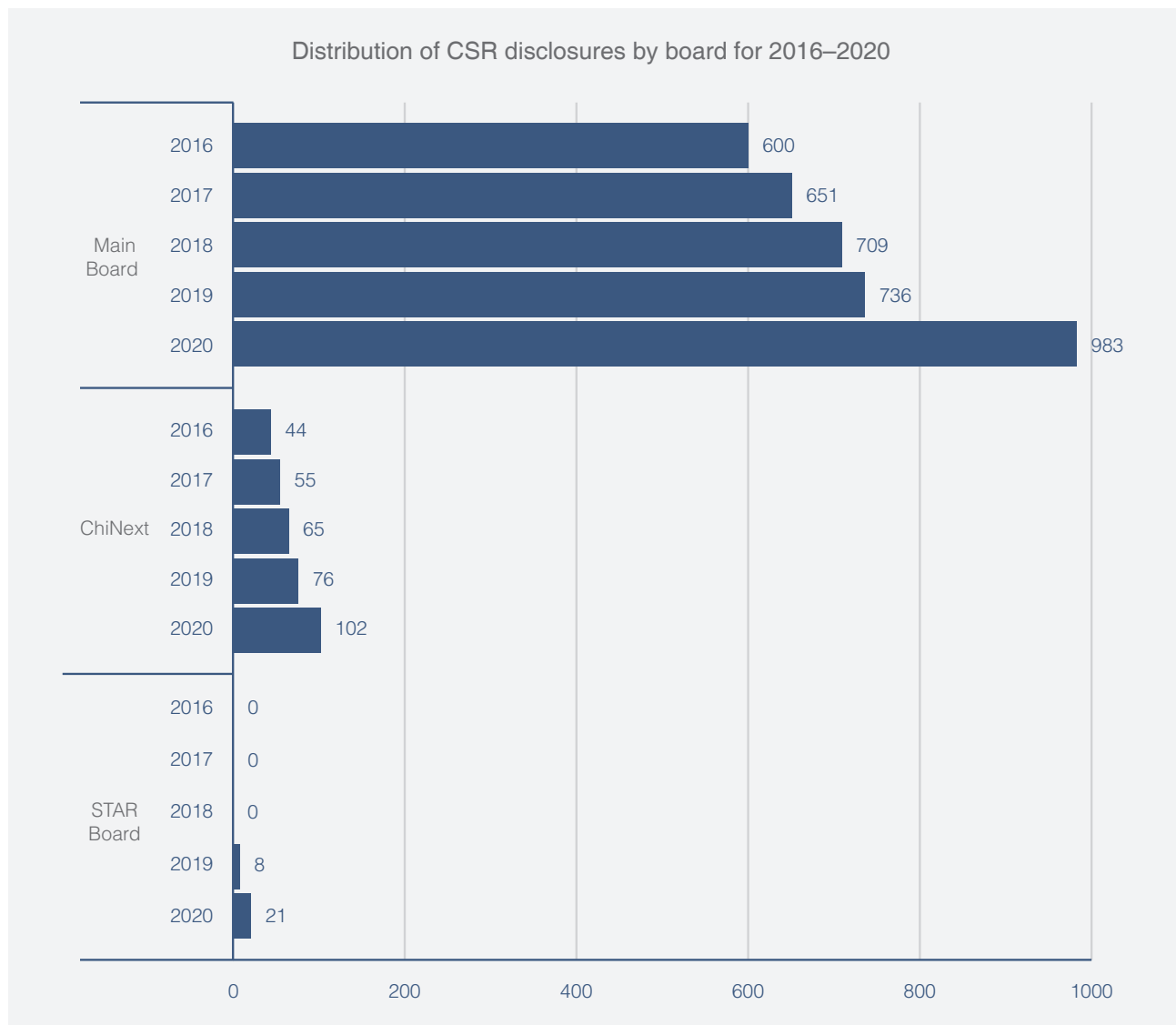




Of the 1,106 CSR reports published in 2020, 567 reports, or 51.27%, were from SOEs, an increase of 36 from the previous year; 491 reports, or 44.39%, were from private companies, an increase of 95 from the previous year; 31 reports, or 2.8%, were filed by joint ventures. Statistics from 2016–2020 show that the share of reports from SOEs continued to decline while that of private companies increased, although SOEs still had the largest share overall. By business type, SOEs led disclosures among HCECL companies in 2020, with a total of 51 CSR reports, while private companies disclosed 3 reports and joint ventures just 1.

Distribution of companies by board: In 2020, the number of CSR reports disclosed by Main Board listed companies rose significantly, while that of STAR Board listed companies was 2.6 times higher than the previous year.

Of the 1,106 CSR reports released by A-share listed companies in 2020, 983 or nearly 90% were from Main Board listed companies. From 2016 to 2020, the share of reports by Main Board and ChiNext listed companies both trended upward. Specifically, the number of CSR reports disclosed by Main Board listed companies increased by 247, or 33.6% in 2020. A total of 102 CSR reports were disclosed by ChiNext listed companies, 26 or 34.21% more than the previous year. It is also noticeable that the STAR board, which was launched in July 2019, disclosed 21 CSR reports in 2020. That is 2.6 times as many disclosures as the previous year, which shows considerable promise for the future. In 2020, all 55 reporting HCECL companies were listed on the Main Board.



Analysis of indicators in 2020 CSR reports

This condensed version of the study examined CSR reports by A-share listed companies in 2021. The analysis focused on seven indicators, namely (1) CSR management, (2) company operations and management, (3) product quality and innovation, (4) employee wellness, (5) diversity and equal opportunities, (6) environmental responsibility, and (7) social contributions and charity, each of which comprises five to nine sub-indicators.

CSR indicator system

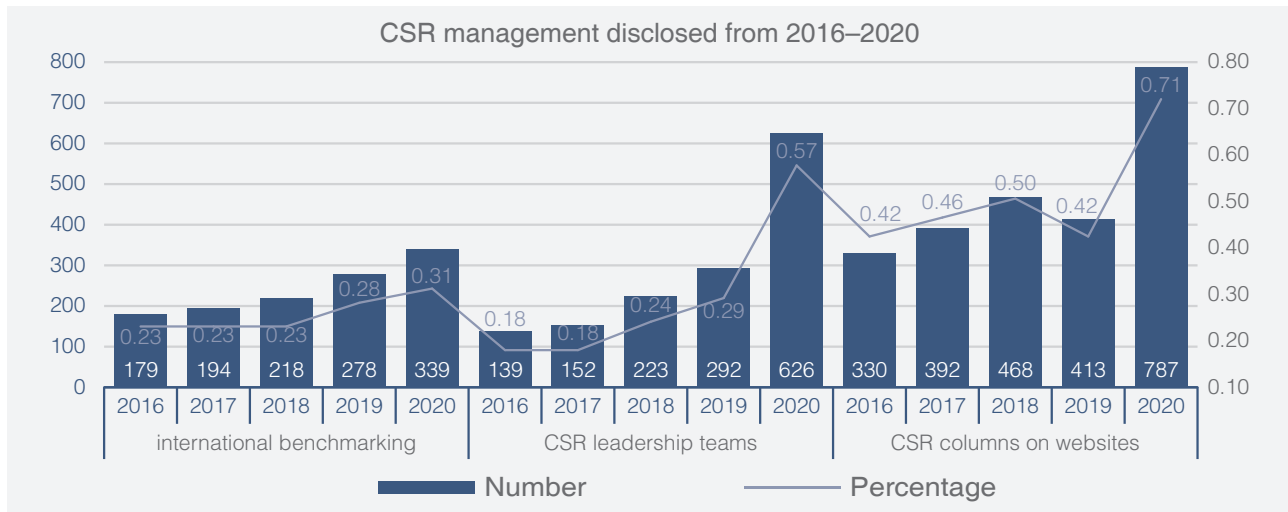
A. CSR management	(1) report assurance (2) use of international benchmarking (condensed) (3) report inclusiveness	(4) website column (condensed) (5) education and training (6) leadership team (condensed)
B. Company operations and management	(1) strategic cooperation and sharing (2) anti-bribery and anti-corruption (condensed) (3) business integrity	(4) accounting irregularities (condensed) (5) financing disputes
C. Product quality and innovation	(1) quality management (2) quality reputation (3) after-sale services (condensed) (4) customer satisfaction (condensed)	(5) patents (condensed) (6) R&D expenditure (condensed) (7) share of R&D personnel (8) share of technical personnel
D. Employee wellness	(1) remuneration incentives (2) supplementary benefits (condensed) (3) on-the-job training (condensed) (4) communication with employees (condensed) (5) staff care	(6) safety management system (7) training on production safety (8) occupational health and safety certification (9) disputes over staff health and safety
E. Diversity and equal opportunities	(1) female executives (condensed) (2) female directors (condensed) (3) all-male directors, supervisors, and executives	(4) vulnerable groups (condensed) (5) equal opportunities (condensed)
F. Environmental responsibility	(1) environmental benefits (2) energy conservation (3) reduction of three types of waste (condensed) (4) circular economy (condensed) (5) green office	(6) environmental protection and public welfare (7) environmental certification (condensed) (8) environmental commendations (9) environmental penalties
G. Social contributions and charity	(1) donations (2) social contribution value per share (3) contribution to education (condensed) (4) charitable activities (condensed) (5) volunteering (condensed)	(6) international aid (7) job creation (condensed) (8) contribution to economic growth (condensed) (9) layoffs

Note: Sub-indicators marked with “condensed” are presented in the condensed version of the study; for all other sub-indicators, please refer to the full study.



CSR management

This part includes six sub-indicators, namely report assurance, reference to global benchmarks, report inclusiveness, website column, education and training, and leadership team. The most noteworthy aspects for this category in the 2020 CSR reports are: use of international benchmarking, emphasis on internal management, and external publicity of CSR practices.



Use of international benchmarking

Use of international benchmarking means that more A-share listed companies willingly chose to refer to the Global Reporting Initiative (GRI) standards when preparing their CSR reports.

Of the 1,106 reporting A-share listed companies in 2020, 339 companies, or 30.65%, drafted their disclosures according to the Guide to Sustainable Reporting, up 2.63% from the previous year. From 2016 to 2020, the number of GRI-compliant companies increased by an annual average of 17.31%. The largest single increase took place between 2019 and 2020, when 61 companies joined the GRI standard. By municipality/province, Guangdong (55 companies), Beijing (52 companies), and Shanghai (48 companies) had the largest number of GRI-compliant companies. By sector, manufacturing had the most GRI-compliant companies, at 146 or 29.38% of the total; the financial sector had the highest GRI-compliant disclosure rate at 43.88%, followed by electricity, heating, gas, and water supply (42.42%), and transportation, warehousing, and postal services (42%).

Emphasis on internal management and external publicity of CSR practices

A company's emphasis on CSR is reflected in the establishment of a dedicated CSR leadership team or responsible department, as well as the publication of a CSR column on their website.

In 2020, a total of 626 companies established dedicated teams or responsible departments for CSR management, accounting for 56.6% of all disclosing companies that year, an increase of 334 companies, or 27.13% from the previous year. Figures from 2016 to 2020 show that the number of companies with dedicated in-house CSR departments was on the rise, offering further evidence that A-share listed companies increasingly view CSR as an important part of their daily operations. By sector, manufacturing had the largest number of companies with dedicated CSR teams or departments, at 290; next were the financial and pharmaceutical sectors, at 60 and 51 respectively; only 18 companies were from the electricity, heating, gas, and water supply sector. In terms of the disclosure rate, companies in the communications, software and IT services, pharmaceutical, and financial sectors had higher disclosure rates of 66.67%, 65.38%, and 61.22% respectively, compared to a lower rate of 44.74% for wholesale and retailing companies.

In 2020, of all the reporting A-share listed companies, 787 (71.16%) had published a CSR column on their websites where visitors could monitor their performance, an increase of 29.48% from the previous year. According to statistics from 2016 to 2020, both the number and proportion of companies that published CSR columns on their websites were increas-

ing, offering evidence of the growing importance of CSR among A-share listed companies. By business type, SOEs and private companies that published CSR columns on their websites were similar in number, accounting for 34.18% and 34% of the total respectively, up from 28% and 30.89% in 2019. By board, most of the companies with CSR columns were listed on the Main Board, accounting for 86.79% of CSR disclosures in 2020, while there were just 96 companies on ChiNext and eight on the STAR Board, accounting for 12.2% and 1.02% respectively.

Summary and analysis of CSR management

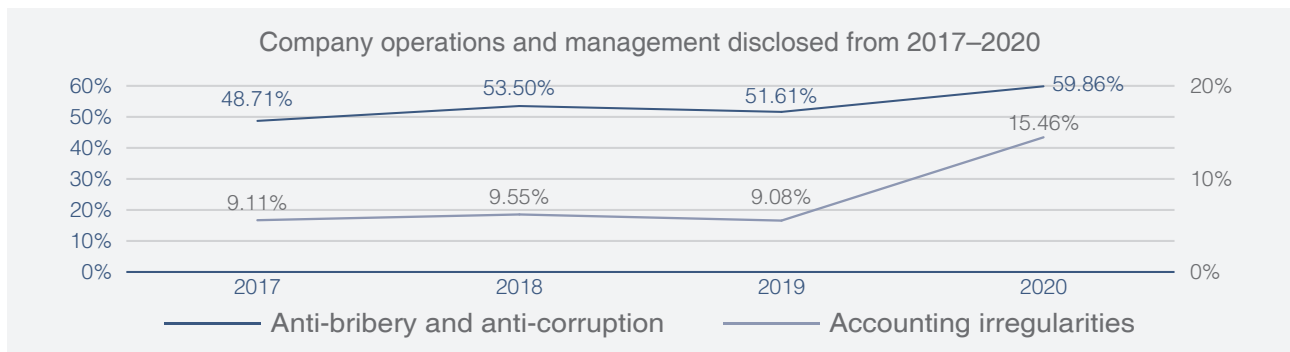
In the 1970s, there was heated discussion in academia about whether or not businesses should be socially responsible. The US economist Milton Friedman, a prominent naysayer, argued in his book *Capitalism and Freedom* that “there is one and only one social responsibility of business — to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud”.⁴ In contrast, scholars including Jean B. McGuire believed that an increase in perceived social responsibility could improve a company’s internal and external image, thus reducing its implicit costs.⁵ There will be no exhaustive list of arguments here about whether companies should fulfill their social responsibility, but as the theory matures and is put to the test of practice, it is clear that CSR is now an emerging trend in the business world. McGuire also noted that Friedman subsequently changed his standpoint in his later essay on “Social Responsibility of Business”, in which he asserted that companies were obliged to protect the interests of shareholders while obeying the laws and ethical customs of society.

After nearly 40 years of development, today CSR is not just part of a company’s business strategy, but also an increasingly important factor that outside investors use to evaluate a company’s financial competitiveness. Empirical studies based on years of publicly available market data have concluded that corporate financial indicators, such as return on assets and total assets, are significantly positively correlated with CSR performance. In addition, the absence of CSR practices in companies’ everyday operations may put them at greater risk of legal disputes and administrative penalties, thus impairing their strategic advantage and blurring their future development.

Despite the absence of a unified and sophisticated CSR system, Chinese companies have made full use of opportunities brought by China’s reform and opening-up since 1978 and its accession to the WTO in 2001 to learn from global enterprises and strive to improve their CSR performance. Over the five years from 2016 to 2020, changes in the six sub-indicators for CSR management reflected the growing importance attached to CSR by A-share listed companies. More and more listed companies began to pay attention to the quality and compiling standards of CSR reports, internal training, external publicity, and leadership buy-in as they developed their businesses. We believe that CSR practices will become the norm among Chinese companies over time, which will result in more socially responsible companies that give back to society.

Company operations and management

This indicator comprises five sub-indicators that measure the performance of A-share listed companies in terms of daily operations, business and social ethics compliance, and financial management, looking at both positive and negative aspects. These are namely strategic cooperation and sharing, anti-bribery and anti-corruption, business integrity, accounting irregularities, and financing disputes. The most noteworthy aspects for this category in the 2020 CSR reports are business integrity and accounting irregularities.





Business integrity

Anti-bribery and anti-corruption were among the keywords emphasized at China's annual meetings of the National People's Congress (NPC) and the National Committee of the Chinese People's Political Consultative Conference (CPPCC) in 2020 (also known as "the two sessions"), and will continue to be an important future focus. In 2020, 59.86% of all reporting companies disclosed rules and disciplinary measures that they had adopted to combat commercial bribery and corruption, up 8.25% from the previous year. From 2017 to 2020, the number and proportion of companies that made disclosures in this respect generally increased. By sector, 73.47% of reporting financial companies made disclosures, compared to just 44.58% for cultural, sports, and entertainment companies, which was nonetheless 15% higher than in the previous year.

Accounting irregularities

In 2020, possibly due to the impact of the Covid-19 pandemic, accounting irregularities by reporting companies increased significantly to 15.46% from 9.08% in the previous year. A total of 171 violations were reported, 81 cases more than the previous year. However, we see this as a short-term phenomenon that will reverse when the global economy recovers from the pandemic.

Conclusion on corporate operations and management

The academic world believes that CSR practices enable companies to reduce intermediate internal and external costs, indirectly improve financial performance, increase the efficiency of strategic partnerships, enhance their corporate image, and enhance their reputation and other intangible assets. Corporate reputation may not directly boost corporate profitability, but it is considered to be one element of corporate wealth. Dr. Charles Fombrun believes that good reputations create wealth.⁶ Ethicist McCoy and others believe that good reputations are an external manifestation of CSR.⁷ Good CSR performance leads to good reputations, while the opposite harms reputations. The collapse of Enron Corporation in 2001 is a case in point. Enron once ranked among the top ten companies on the Fortune 500 list and was an influential player in the US and global energy industry. However, from 1997, Enron's management neglected its duties, paid and accepted bribes, misrepresented financial statements, and defrauded investors, making over \$600 million in illegal earnings. The violation of laws and moral codes caused the company to lose its markets, corporate image, partners and customers forever. It follows that CSR violations, including but not limited to bribery, corruption, deception, and concealment, will seriously jeopardize a company's future operations.

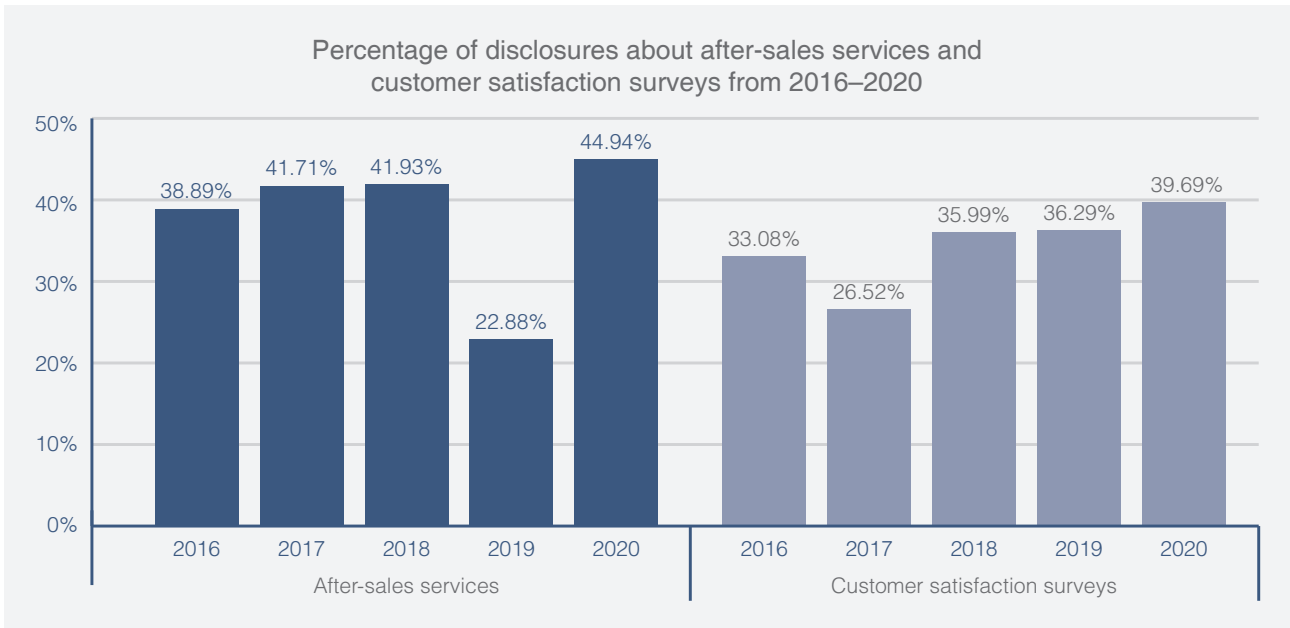
Based on data from 2016 to 2020, we can see that the reporting companies improved to varying degrees in the following three areas: strategic cooperation, anti-bribery and anti-corruption, and business integrity. The steep increase in financing disputes and accounting irregularities in 2020 can possibly be explained by the sudden outbreak of the Covid-19 pandemic. We do not believe that this will be a long-term trend, although that could depend on how long the pandemic lasts.

Product quality and innovation

This indicator comprises eight sub-indicators, namely quality management, quality accreditation, after-sale services, customer satisfaction, patents, R&D expenditure, proportion of R&D personnel, and proportion of technical personnel, which together measure the performance of A-share listed companies in terms of product R&D and services. The most noteworthy aspects for this category in the 2020 CSR reports are focus on the customer service experience, and R&D and innovation.

Focus on the customer service experience

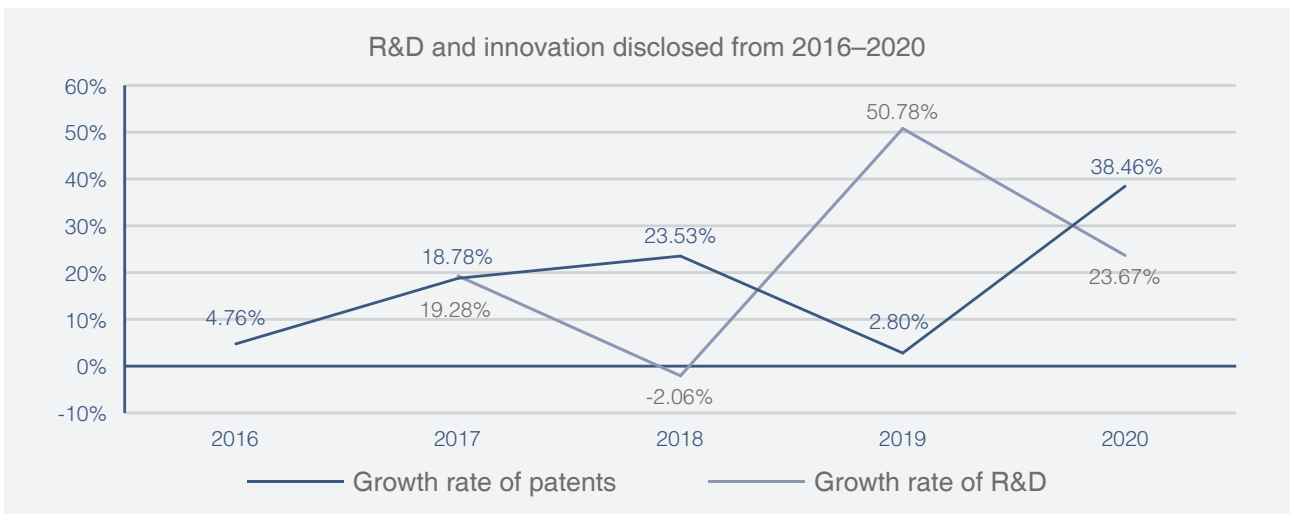
In 2020, reporting companies made significant progress in improving service quality and customer experience. Of the 1,106 reporting companies in 2020, 497 (44.94%) disclosed steps they had taken to improve after-sale services, an increase of 270 or 22% from the previous year. By sector, pharmaceuticals and wholesale and retail showed higher disclo-



sure rates, at 57.69% and 51.32% respectively.

In terms of improving customer satisfaction, 439 companies, or 36.69%, conducted customer satisfaction surveys, an increase of 79 companies or 3.4% over the previous year. By sector, the proportion of customer satisfaction surveys was highest in pharmaceuticals, at 55.13%, while the transportation, warehousing, and postal services; real estate; and financial sectors tied for second place, with a proportion of 50% each.

R&D and innovation



From 2016 to 2020, the number of patents disclosed by A-share listed companies kept increasing. A total of 172,391 patents were disclosed in CSR reports in 2020, 47,886 more than the previous year. The number of patents increased by 38.5% from 2019–2020, a record high during that five-year period, thanks to the Chinese government’s incentive policies and enhanced protection for intellectual property rights.

A total of RMB 613.5 billion in R&D expenditure was disclosed by A-share listed companies in 2020, up 23.7% from the previous year. From 2016 to 2020, overall R&D expenditure was on the rise, with growth peaking between 2018 and 2019 at 50.78%, compared to more moderate growth of 23.7% between 2019 and 2020. By industry, in 2020, companies in the manufacturing; communications, software, and IT services; and pharmaceutical sectors spent more on R&D, to a



tune of RMB 461.9 billion, RMB 58.4 billion, and RMB 28.6 billion, respectively, while real estate and financial companies spent less in this area.

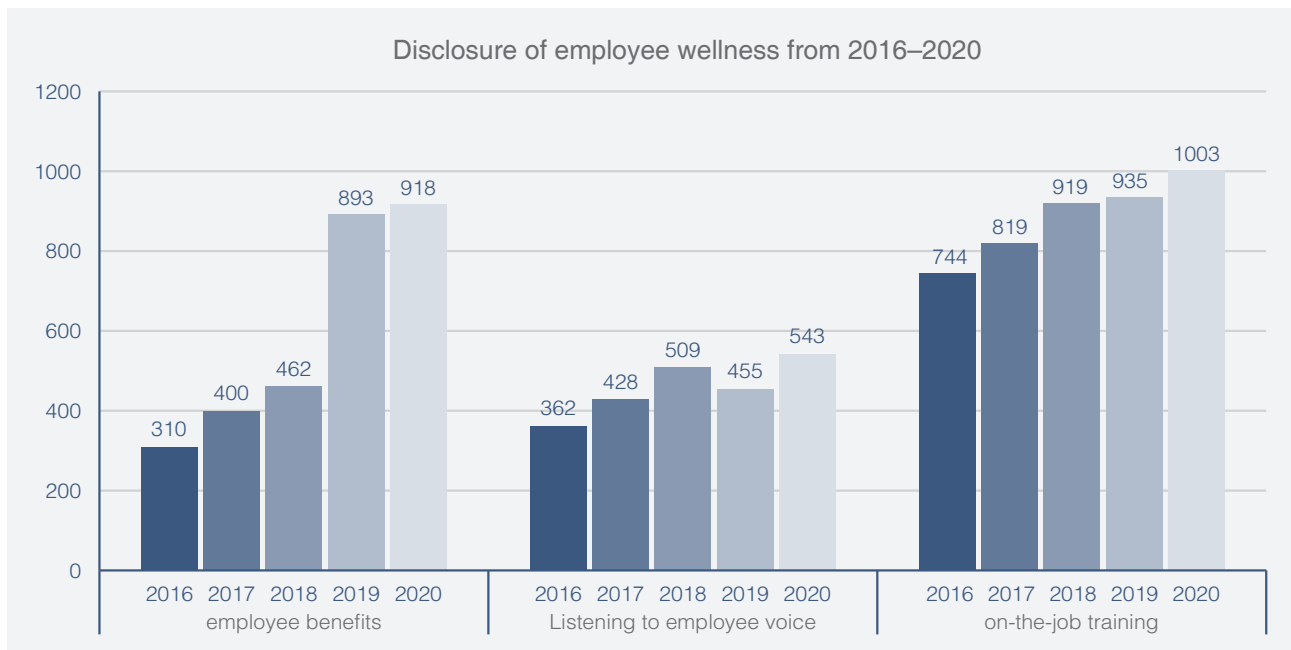
Summary of product quality and innovation

William A. Foster, a recipient of the US Medal of Honor, once made the following famous quote about quality: “Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction, and skillful execution; it represents the wise choice of many alternatives”.⁸ Consumers look for two kinds of superior experience when they buy goods: one is derived from high-quality products, and the other comes from a reliable and trustworthy corporate image. Product quality can reflect a company’s CSR performance, as well as dedication and commitment to its mission. A positive corporate image can bring more customers to the company. A market survey was once conducted that looked at the willingness of US consumers to buy products from companies with a socially responsible image. The results found that 81% of respondents said they would consider buying products from socially responsible companies.⁹ As we can see, quality products, and a positive and responsible corporate image are the key factors that influence consumers’ buying decisions.

Innovation also plays a big part. Good products can bring instant success to companies, while innovation fuels high-quality corporate development in the long run. During a company inspection tour in 2020, China’s President Xi Jinping, stressed the value and significance of innovation. He said, “Innovation is the most important ‘trait’ for companies. We must ensure key and core technologies are in our own hands, and this also applies in the manufacturing sector”.¹⁰ In 2020, sub-indicators for product quality assurance and innovation, such as the proportion of technical staff, overall quality management, and R&D expenditure rose across the board. This not only underscores the growing importance that A-share listed companies attach to product quality, but also reflects the transformation of China’s manufacturing industry from conventional processing and manufacturing to high-end, R&D-driven manufacturing.

Employee wellness

This category comprises nine sub-indicators, namely remuneration incentives, supplementary benefits, on-the-job training, communication with employees, staff care, safety management systems, training on production safety, occupational health and safety certification, and disputes over staff health and safety. The most noteworthy aspects for this category in the 2020 CSR reports are companies’ increased focus on employee benefits, employee voice, and professional qualities.



Focus on employee benefits

Of all CSR reporting companies in 2020, a total of 918 companies disclosed their supplementary benefits for employees such as pensions, medical insurance, and birthday bonuses, an increase of 25 companies from the previous year. From 2016 to 2020, companies' focus on employee benefits kept increasing, almost doubling from 2018–2019, before plateauing from 2019–2020.

By business type, SOEs and private companies accounted for the majority of companies that disclosed additional employee benefits in their CSR reports, with a share of 50% and 45% respectively. By comparison, all other business types had a disclosure rate of less than 5%. By sector, wholesalers and retailers headed the list with a 92.11% disclosure rate, followed by 84.85% for the communications, software, and IT services sector, and 84.51% for manufacturing. The disclosure rate in the real estate sector was relatively low at 68%.

Listening to employee voice

Of all CSR reporting companies in 2020, 543 disclosed communication channels between staff and top executives, such as a chairman's mailbox, staff suggestion box, or employee appointment system, an increase of 88 companies or 19.34% from the previous year. By municipality/province, A-share listed companies in Guangdong, Beijing, Shanghai, and Zhejiang were more willing to listen to employee voice, with 81, 62, 59, and 55 companies disclosing that they did so respectively.

Improving employees' professional qualities

Of all reporting companies in 2020, 1,003 companies disclosed their provision of on-the-job training for employees, 68 more than the previous year. According to data from 2016 to 2020, the number of companies providing on-the-job training was on the rise, with an average annual growth rate of 7.75%, indicating that companies had higher expectations for employee skills. In 2020, the manufacturing sector had the largest number of companies that disclosed on-the-job training for employees, at 452. The financial sector had the highest disclosure rate, at 98%, followed by the transportation, warehousing, and postal services sector, and the environmental protection and public utilities sector, at 94% and 91.8% respectively.

Summary of employee wellness

Human capital is an important input in companies' everyday business activities. In the era of knowledge and innovation, it is increasingly believed that competition between companies is ultimately over knowledge and talent. Robert Owen, who is regarded as the father of personnel management, ever urged fellow factory owners to pay attention to the human factor, stating that investments in improving the workforce would bring companies not a 5, 10, or 15% return, but would instead offer gains of 50%, and in many cases even 100%.¹¹ The management guru Peter F. Drucker also made it clear that, "The enterprise cannot be a mechanical assemblage of resources. To make an enterprise out of resources it is not enough to put them together in a logical order and then to throw the switch of capital. What is needed is a transmutation of the resources. And this cannot come from an inanimate resource such as capital. The resources capable of enlargement can only be human resources. Man, alone of all the resources available to man, can grow and develop."¹² Therefore, personnel is an important factor of production and plays a decisive role in improving corporate performance. If companies fail to handle this factor properly, they will have trouble differentiating themselves from other competitors at the strategic level.

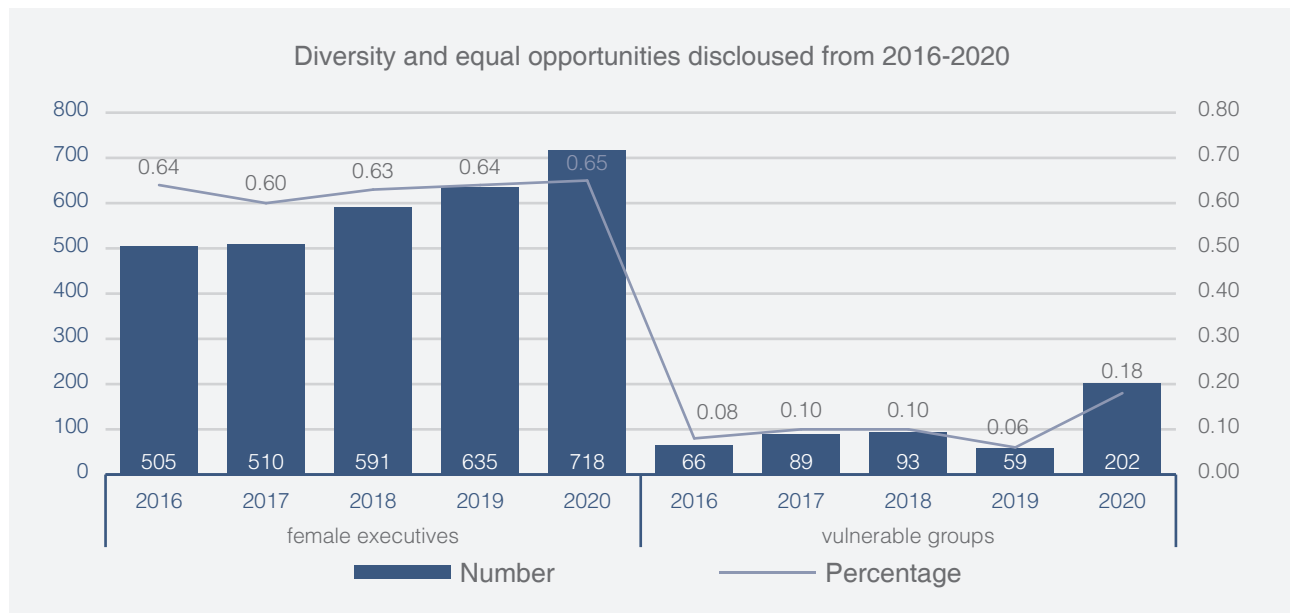
According to statistics, in 2020, reporting A-share listed companies significantly increased their investment in human resources compared to the previous year. More people-centered companies stepped up efforts to motivate, train, and develop their employees while paying more attention to communication and information exchange. For companies, improving employee wellness is a win-win strategy. By raising employees' motivation, enhancing their professional qualities and skills, and improving their sense of loyalty and wellbeing, companies can increase their operating efficiency,



while creating a positive and harmonious workplace. An efficient workforce, in return, can help companies establish a positive corporate image, facilitate strategic partnerships, and boost business sustainability. For countries, when companies take responsibility for employee wellness, they not only enable workers to exercise their employment rights and realize their potential, but can also help to reduce social conflict and improve people's life satisfaction, which in turn contribute to social harmony and stability.

Diversity and equal opportunities

This indicator comprises five sub-indicators, namely female executives, female directors, all-male directors, supervisors & executives, vulnerable groups, and equal opportunities. The most noteworthy aspects for this category in the 2020 CSR reports were a focus on women's status and enhanced inclusion of vulnerable groups.



Focus on women's status

Statistics showed that the representation of women in corporate governance continued to improve. Of the 1,106 CSR reports disclosed by A-share listed companies in 2020, 718 companies, or 64.9%, disclosed that they had at least one female executive, a slight increase over the previous year. From 2016 to 2020, the proportion of female executives trended upward. By sector, real estate, pharmaceuticals, and communications, software, and IT services recorded higher levels of disclosure, at 80%, 78.21%, and 77.27% respectively.

In terms of board diversity, a total of 97 companies, or 8.8%, disclosed that they had four female directors or more, 1.6% or 26 more than the previous year. By business type, private companies had the highest disclosure rate, at 53.61%, compared to 40.21% for SOEs.

Enhanced inclusion of vulnerable groups

Of all reporting companies in 2020, a total of 202 companies (18.3%) disclosed inclusive policies and a reputation for protecting the rights and interests of vulnerable groups (people with disabilities or those released from labor re-education), representing an increase of 143 companies or 12% from the previous year. The financial and pharmaceutical sectors were the most inclusive of vulnerable groups, with 35.71% and 26.92% of their respective companies disclosing inclusive policies.

In 2020, 310 companies, or 28% of reporting companies, emphasized having internal policies and practices that promote equal opportunities for people of different ethnic backgrounds, religion, and nationality, up 126 from the previous year. By municipality/province, 58 Guangdong-based companies made disclosures about equal opportunities, followed

by Beijing and Shanghai with 45 and 34 companies respectively.

Summary of diversity and equal opportunities

Over several decades of reform and opening-up, China has made substantial progress on gender equality, and women are enjoying increasing representation in corporate management. While men and women may vary in personality, risk appetite, and ethical awareness, in academia, it is widely agreed that women are able to bring a fresh perspective, style, and mindset to strategy formulation and corporate governance. This can help to correct information biases resulting from a lack of heterogeneity and improve governance efficiency.¹³

From an empirical standpoint, G.V. Krishnan and L. Parson concluded from a survey of Fortune 500 companies that earnings quality is positively associated with the percentage of women in senior management.¹⁴ In his study, R.D. Adler found that companies with more women in the top management had higher profitability and enterprise value than those that employed no or few female executives.¹⁵ In their research, R. A. Bernardi and D. F. Arnold found that female executives may place more value on workplace ethics than their male counterparts.¹⁶ Evidently, female executives play an active role in their companies' day-to-day operations and strategic decision-making.

The year 2020 was a year of milestone significance for China, as it marked the 100th anniversary of the founding of the Communist Party of China. In that year, China realized its first centenary goal of building a moderately prosperous society in all respects, brought the 13th Five-Year Plan to conclusion, and attained a decisive victory in the fight against poverty. Statistics show that due to the influence of important government policies, in 2020, more A-share listed companies paid close attention to the fundamental interests of vulnerable groups. Such corporate behavior will help promote social harmony, reduce social conflicts, and facilitate common prosperity.

Environmental responsibility

This indicator comprises nine sub-indicators: environmental benefits, energy conservation, reduction of three types of waste, circular economy, green office, environmental protection and public welfare, environmental certification, environmental commendations, and environmental penalties. The most noteworthy aspects for this category in the 2020 CSR reports were reduction of three types of waste, environmental certification, and the circular economy.

Reporting companies in 2020 largely performed better on these nine environmental sub-indicators than in 2019, further reducing three types of waste (waste gases, waste water, and industrial residue), and making progress on environmental certification and the circular economy.

Disclosures for environmental sub-indicators from 2019–2020						
Sector	Reduction of three types of waste		Circular economy		Environmental certification	
Transportation, warehousing, and postal services		12.0%		7.0%		9.0%
Communications, software, and IT services		3.2%		2.2%		6.8%
Manufacturing		12.1%		6.2%		14.5%
Pharmaceutical		3.9%		15.9%		13.3%
Real estate		14.0%		18.0%		16.0%
Wholesale and retail		8.4%		11.5%		15.9%
Culture, sports, and entertainment		6.6%		9.9%		9.1%
Environmental protection and public utilities		25.8%		29.0%		13.0%
Electricity, heat, gas, and water supply		0.8%		2.4%		8.2%
Finance		9.3%		3.2%		1.0%

Note: Figures in the table represent the percentage of growth in the highlighted sub-indicators from 2019 to 2020



Reduction of three types of waste

In 2020, 695 companies, or 62.84%, reported that they had measures or policies in place to reduce the generation of three types of waste (waste gases, waste water, and industrial residue). By sector, manufacturing was home to the most disclosing companies (373); the pharmaceutical sector had the highest disclosure rate, at 85.9%, while the energy production and supply sector placed second at 81.8%.

Circular economy

This sub-indicator assesses policies and measures taken by companies to use renewable energy or adopt circular economy models in their business operations. In 2020, 341 or 30.83% of companies disclosed their efforts to develop a circular economy. By sector, the energy production and supply sector, and the environmental protection and public utilities sector had relatively high disclosure rates, at 42.4% and 41% respectively.

Environmental certification

In 2020, a total of 423 companies disclosed that they had achieved the Environmental Management Systems (EMS) standard, (ISO14001). Of these, the manufacturing sector had the largest number of disclosing companies and highest disclosure rate, at 266 and 53.5% respectively, followed by the pharmaceutical sector at 51.3%.

Summary of environmental responsibility

Over the past 500 years, human society has undergone three industrial revolutions. These raised productivity, increased the efficiency of natural resource usage, and generated economic value, but at the same time, they seriously damaged the natural environment. As a result, our planet faces serious environmental challenges such as ozone depletion, nuclear pollution, water pollution, biodiversity loss, and global warming. The Union of Concerned Scientists, which was founded by faculty at the Massachusetts Institute of Technology (MIT), warns that: “Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about.”¹⁷

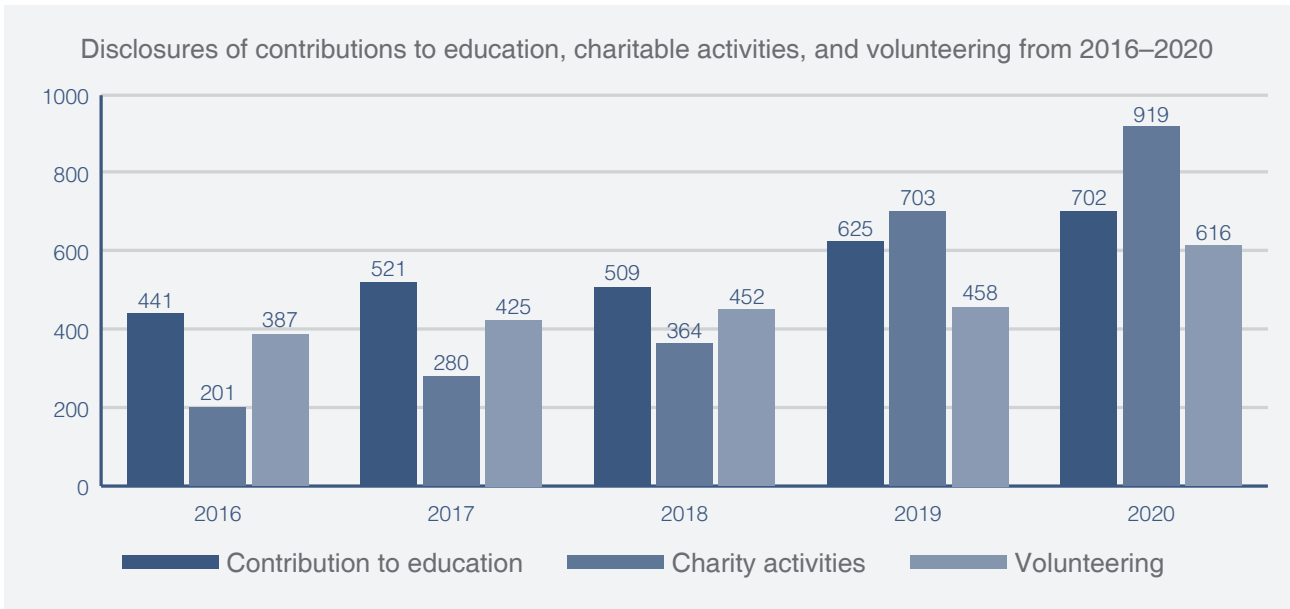
At the 75th session of the United Nations General Assembly held on September 22, 2020, China, a major contributor to CO₂ emissions, pledged to “scale up its Intended Nationally Determined Contributions by adopting more vigorous policies and measures, and strive to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060.”¹⁸ Against this policy background, A-share listed companies showed greater environmental awareness and stepped up their investment in environmental protection in 2020. The market values environmental performance. In a study, the researchers Shameek Konar and Mark A. Cohen found that poor environmental performance could cause a firm’s market capitalization to shrink while negatively impacting the firm’s tangible and intangible assets. They also suggested that companies pay attention to and take measures to protect the natural environment in which they operate. The improvement in the natural environment could give them a “bonus.”¹⁹

Social contributions and charity

This indicator comprises nine sub-indicators: donations, social contribution value per share, contribution to education, charitable activities, volunteering, international aid, job creation, contribution to economic growth, and layoffs. CSR reports for 2020 showed that reporting companies were extensively involved in social welfare activities in that year.

Extensive involvement in social welfare activities

In 2020, 958 companies disclosed their engagement in social welfare activities, 103 more than the previous year, representing 86.6% of the total and a similar level to 2019. Overall, the number of companies that made charitable dona-



tions rose from 2016–2020.

In 2020, 702 companies disclosed their efforts to support education, 77 more than the previous year. The proportion of A-share listed companies contributing to education grew at an average annual rate of 12.32% between 2016 and 2020. By sector, 300 companies from the manufacturing sector and 86 from the financial sector made disclosures, outnumbering other industries. In terms of the disclosure rate, the financial sector, and the culture, sports, and entertainment sector led the field with 87.8% and 73.5% respectively, in contrast to a lower rate of 49.2% in the environmental protection and public utilities sector.

Total donations in 2020 stood at RMB 12.13701 billion. 919 companies made charitable donations, a significant increase of 216 from the previous year. The number of A-share listed companies contributing to charitable activities grew at an average annual rate of 46.22% between 2016 and 2020. By sector, 405 companies in the manufacturing sector and 94 in the financial sector made disclosures, outnumbering other industries. In terms of the disclosure rate, the financial and pharmaceutical sectors took the lead with 95.9% and 94.9% respectively, while the rate in the electricity, heating, gas, and water supply sector was lower at 72.7%.

In terms of volunteering, in 2020, 616 companies disclosed their participation in volunteering activities, 158 more than the previous year. The number of A-share listed companies engaging in volunteering activities grew at an average annual rate of 12.32% between 2016 and 2020. By sector, manufacturing made the largest number of disclosures with 273 companies, followed by 66 companies from the financial sector. Transportation, warehousing, and postal services reported the highest disclosure rate at 78%, followed by electricity, heating, gas, and water supply at 69.7%, which was far higher than the average of 35.7% for other sectors (including mining, agriculture, forestry, animal husbandry, and fishery).

Reporting companies' charitable efforts have two main positive impacts on society: job creation and contribution to economic growth. In terms of job creation, in 2020, 690 (62.4%) companies disclosed their implementation of job creation measures, up by 127 or 22.56% from 2019. The number of disclosing companies maintained an annual growth rate of 26.91% from 2016–2020. In terms of contributions to economic growth, 406 (36.7%) companies disclosed that their business operations facilitated local economic growth and community development, and that they had implemented policies and measures to drive local economic development (e.g. localized sourcing and employment policies), 37 more than the previous year. In 2020, 21 of the 55 HCECL companies, or 38.2%, disclosed that their operations positively impacted local economic and social development.



Summary of social contributions and charity

The famous 18th-century English writer Samuel Johnson defined philanthropy as the unique love of humankind that derived from human goodness. In the early 20th century, the United States began to develop its philanthropic system as a social science discipline with humanistic characteristics, while defining philanthropy as private initiatives for the public good, focusing on quality of life. According to the Nobel Prize-winning US economist Gary Becker, philanthropy is about giving your time and goods to a person or organization in which you have no personal interest.

Scholars have summarized the following reasons for corporate involvement in charitable donations. 1) A strategic perspective: In 2002, Porter and Kramer coined the concept of “strategic philanthropy”, and they believed that companies could use their charitable efforts to improve their competitive context and strategic positioning, enhance their corporate image and reputation, and thus improve their long-term business prospects²⁰. 2) An altruistic perspective: Companies fulfill their social responsibilities through a selfless contribution to society by making charitable donations²¹. 3) Political and institutional perspectives: Through charitable donations, companies can seek material benefits from, or establish and maintain political relationships with the government, thereby realizing corporate earnings²². 4) A management perspective: Corporate managers can enhance their visibility and status within their industry through charitable donations.²³

Philanthropy has positive significance for social development. If used wisely, it can increase overall happiness, reduce social tensions, enhance social cohesion, narrow the gap between the rich and poor, improve the quality of life of vulnerable groups, and promote social harmony. Statistics show that in 2020, reporting A-share listed companies deepened their participation in charitable activities. While continuing to support the domestic fight against the COVID-19 pandemic, Chinese companies are also providing support to other cities worldwide, demonstrating a spirit of mutual help and assistance.

Overview of CSR disclosures by A-share listed HCECL companies

Carbon neutrality was a big buzzword in 2020. At the general debate of the 75th session of the United Nations General Assembly, China’s President Xi Jinping stated that “China will scale up its Intended Nationally Determined Contributions by adopting more vigorous policies and measures, and strive to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060.” In December 2020, the Central Economic Work Conference listed “carrying out carbon peaking and carbon neutrality work” as its key tasks for the coming decades.

Of the 1,106 companies that disclosed CSR reports in 2020, 55 were HCECL companies. These accounted for just 4.97% of the total, but their disclosure rates were higher than non-HCECL companies in the following areas.

External publicity of CSR practices

In 2020, 54 of the reporting HCECL companies, or 98%, published CSR columns on their websites, a higher disclosure rate than non-HCECL companies. By sector, manufacturing accounted for the highest share with 29 companies or 52.7%, followed by environmental protection and public utilities, at 14 companies or 25.5%. Of the remaining companies, five were in transportation, warehousing, and postal services, another five in electricity, heating, gas, and water supply, and one in communications, software, and IT services.

CSR leadership teams

By 2020, a total of 35 HCECL companies had established dedicated departments or teams for CSR management, accounting for 63.6% of all reporting HCECL companies. This was higher than the disclosure percentage for non-HCECL companies. By region, 80% of these companies were from east China, 5.7% from the northeast, and 14.3% from central China. By sector, 17 of the companies were in manufacturing, accounting for the largest share, followed by eight companies in environmental protection and public utilities, five in electricity, heating, gas, and water supply, four in transporta-

tion, warehousing, and postal services, and one in communications, software, and IT services.

Valuing customer opinions

In 2020, a total of 408 non-HCECL companies disclosed that they conducted customer satisfaction surveys, accounting for 36.9% of all CSR report disclosures. By contrast, 31 HCECL companies conducted customer satisfaction surveys in 2020, accounting for 56.4% of all reporting HCECL companies. By sector, manufacturing topped the list with 16 companies, accounting for 51.6% of the total, followed by 6 companies in environmental protection and public utilities (19.4%), 5 in transportation, warehousing, and postal services (16.1%), and a few in other industries.

Employee incentives

In 2020, a total of 32 HCECL companies disclosed their remuneration incentives, such as stock options to encourage employees to share ownership, earnings, and financial information of their companies and participate in management decision making. These 32 companies accounted for 58.2% of all reporting HCECL companies, which surpassed the 46.3% disclosure rate of non-HCECL companies. By sector, 20 companies (32.5%) were in manufacturing, 5 (15.6%) in environmental protection and public utilities, 3 in electricity, heating, gas, and water supply (9.4%), 3 in transportation, warehousing, and postal services (9.4%), and 1 in communications, software, and IT services.

Focus on employee benefits

In 2020, 48 of the 55 HCECL companies disclosed their supplementary benefits for employees, representing a disclosure rate of 87.3%, higher than the 78.6% disclosure rate of non-HCECL companies. By sector, manufacturing and environmental protection and public utilities dominated these disclosures, with 26 and 12 companies respectively.

Improving professional qualities and employee care

In 2020, 50 HCECL companies disclosed on-the-job training for employees, accounting for 91% of the 55 reporting HCECL companies. By region, east China had the most disclosing companies at 33, accounting for 66% of the total, followed by 9 companies (18%) from central China, and 6 companies (12%) from the northeast, with only 2 (4%) from west China.

With concern to employee care, 47 of the 55 reporting HCECL companies disclosed employee care policies or measures, including leadership visits, annual health inspections, childcare, and presentations on mental health in the workplace, representing a disclosure rate of 85.5%, which is above the 73.6% rate for non-HCECL companies. By business type, SOEs led the pack with a total of 44 disclosing companies, followed by 2 disclosing private companies and 1 joint venture.

Environmental responsibility

Owing to China's carbon neutrality policy, HCECL companies performed better and boasted higher disclosure rates for the environmental responsibility indicator than their non-HCECL counterparts in 2020. With respect to environmental benefits, 42 HCECL companies disclosed that they had developed or utilized environmentally beneficial products, equipment, or technologies, accounting for 76.4% of the 55 reporting HCECL companies. By region, east China had the largest number of disclosing companies at 29, or 69% of the total, followed by central China at 9 (21%), the northeast at 3 (7%), and west China with just one company (2%).

In terms of energy conservation, 43 HCECL companies disclosed that they had energy saving measures and technologies, accounting for 78.2% of the total. By sector, manufacturing contributed the most disclosing companies, at 23, or 53% of the total, while the environmental protection and public utilities sector placed second with 12 companies (28%). Companies from these two sectors collectively accounted for more than 80% of the total.

47 HCECL companies, or 85.5%, disclosed measures and technologies they used to reduce the generation of three types of waste (waste gases, waste water, and industrial residue). By region, east China was the most active in controlling emissions with 31 companies or 66% of the total, followed by central China with 9 companies (19.1%), west China with 3



companies (<10%), and northeast China with 4 (<10%).

33 HCECL companies disclosed their measures to develop a circular economy, accounting for 60% of the total. Of these, 31 were SOEs, accounting for 94% of the total, while there were only 2 private companies that disclosed such measures, or 6% of the total.

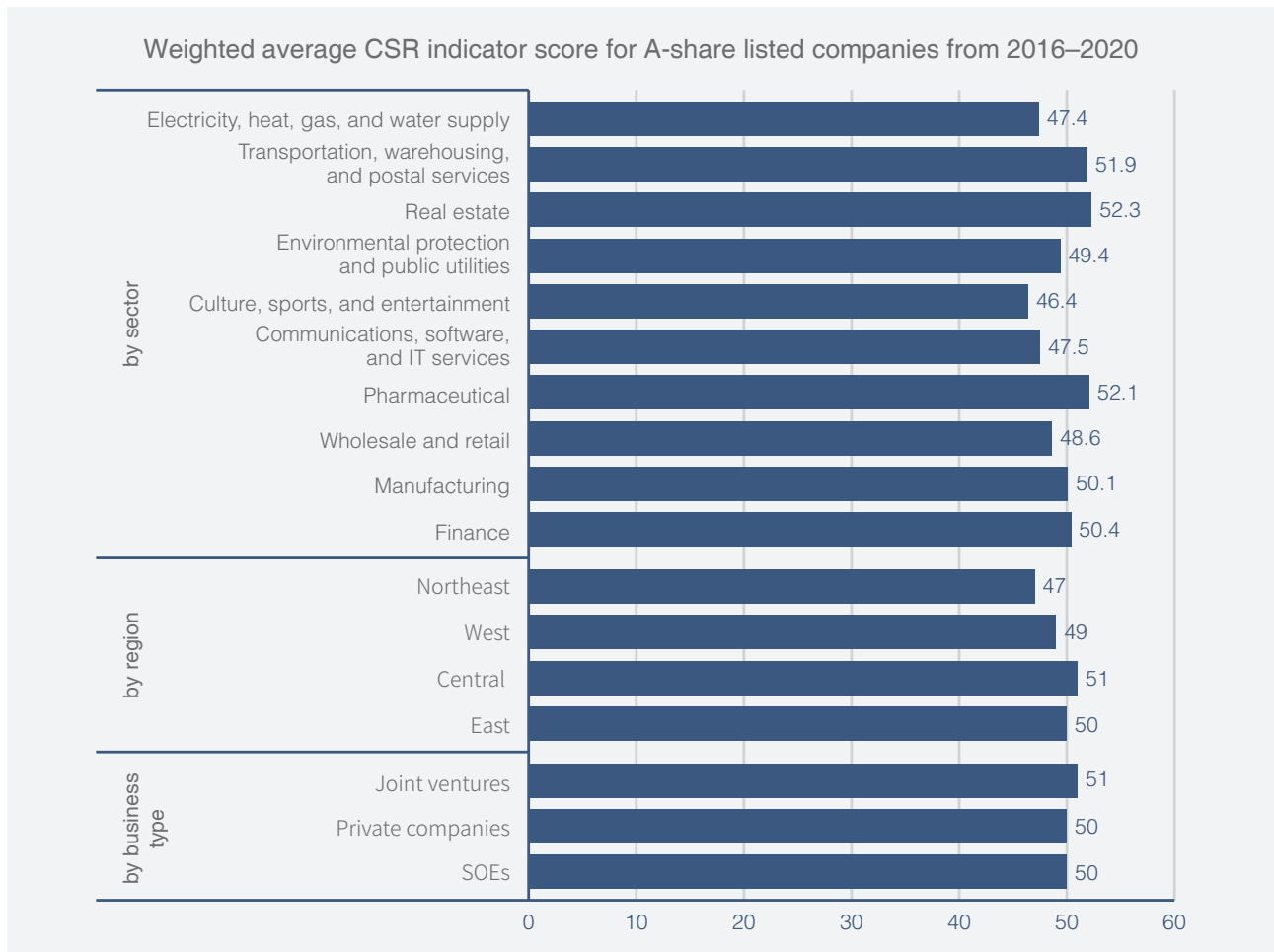
40 HCECL companies, or 72.3% of the total, disclosed their participation in environmental protection and public welfare activities. By municipality/province, Beijing, Guangdong, and Shanghai topped the list, with 14 companies from Beijing, 4 from Guangdong, and 4 from Shanghai, accounting for 35%, 10%, and 10% respectively. No other municipality or province had a share of more than 10%.

Social contributions and charity

In 2020, 72.3% or 40 of the 55 reporting HCECL companies disclosed charitable donations, with a combined total of RMB 874.0127 million. By sector, 29 manufacturing companies donated RMB 622.2 million in total, topping other industries; 15 environmental protection and public utilities companies donated a combined RMB 211.61 million; 5 transportation, warehousing, and postal services companies donated RMB 19.09 million; 5 electricity, heating, gas, and water supply companies donated RMB 14.88 million; and 1 communications, software, and IT services company donated RMB 6.24 million. For three other sub-indicators, namely contribution to education, charitable activities, and volunteering, reporting HCECL companies had disclosure rates of 63.6, 78.2, and 74.5% respectively.

Year-on-year comparison of CSR report indicators

Weighted average score for all indicators



In 2020, the 1,106 reporting A-share listed companies recorded a weighted average score of 49.69 (out of 100) and median of 49.11 for all CSR indicators, an increase of 1.1 points or 2.3% from the previous year. This score rose every year from 2016 to 2020, but is still far from the “pass mark” of 60.

The scores for all sectors improved in 2020. The real estate sector scored the highest at 52.3, up 6.5 points from the previous year; the pharmaceutical sector came in second at 52.1; then came transportation, warehousing, and postal services at 51.9, up 6.7 points from the previous year. Between 2017 and 2020, the culture, sports, and entertainment sector had the highest average annual growth at 13.39%, followed by communications, software, and IT services at 9.03%.

By business type, both SOEs and private companies scored 50 in 2020, up 2 points each from the previous year; joint ventures scored 51, slightly lower than the previous year but higher than the scores of SOEs and private companies. The CSR scores for these three types of companies all gained steadily from 2016 to 2020.

By region, excluding companies in west China, where scores were flat with the previous year, companies in other regions reported rising scores in 2020, with central China up by 4 points, west China by 2 points, and northeast China with the highest increase of 11.9%, up by 5 points.

Median score by indicator category: A-share listed companies vs. HCECL companies

In 2020, the medians of all seven indicator categories held steady or increased. Specifically, the medians of three indicator categories, namely CSR management, product quality and innovation, and social contributions and charity increased by 18.57, 1.25, and 2.55 points respectively from the previous year, indicating that they are receiving increasing attention from A-share listed companies. The medians of the other four indicator categories remained the same as in 2019.

Median score by indicator category: A-share listed companies vs. HCECL companies		
Indicator category	HCECL companies	A-share listed companies (excluding HCECL companies)
CSR management	50	61.42
Company operations and management	66.67	66.67
Product quality and innovation	50	38.75
Employee wellness	75	62.5
Diversity and equal opportunities	25	25
Environmental responsibility	62.5	37.5
Social contributions and charity	50	46.25

“Carbon neutrality” and “carbon peak” were big buzzwords in 2020. Spurred by government policies, Chinese companies began to engage in a series of energy-saving and emission reduction activities: pushing through reforms at companies with high energy consumption, pollution, and emissions; improving the efficiency of renewables; and using digital technology to drive innovation.

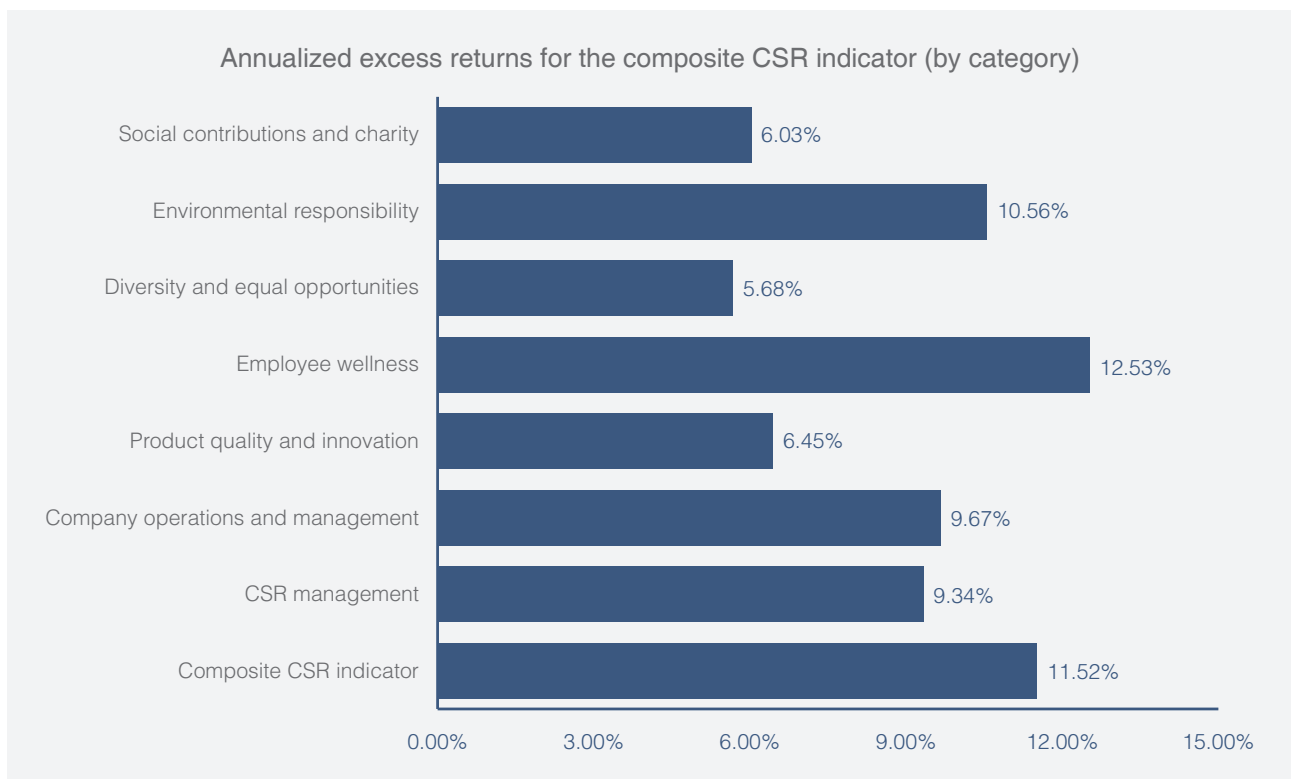
In 2020, the weighted score of the 55 reporting HCECL companies for the overall CSR indicator was 56.29 (out of 100), slightly higher than the weighted score of 49.64 for A-share listed companies (excluding HCECL companies). When comparing median scores for different indicators, HCECL companies outperformed A-share listed companies in four categories, namely product quality and innovation, employee wellness, environmental responsibility, and social contributions and charity. Both categories of company had the same median scores for company operations and management, and diversity and equal opportunity. It is worth noting that the median score of HCECL companies for environmental responsibility was 25 points higher than that of A-share listed companies, which was the largest gap across all categories.



This divergence can be explained by the enhanced regulation and mandatory disclosure requirements imposed by China's 30-60 targets.

Analysis of the economic value of CSR reports

The economic value of CSR reports is a major concern for investors in the capital markets. This study explored the issue of economic value by constructing an investment portfolio based on information in the reports and measuring its profitability. We chose companies with a CSR score of over 60 for both the weighted average of all indicators, and each individual indicator category. To measure the excess returns from this portfolio, we bought shares of these companies on January 1, 2021, and sold them on December 31, 2021.^① The result was an annualized return rate of 11.52% for the composite CSR indicator (comprising all seven categories, including CSR management, company operations and management, product quality and innovation, employee wellness, diversity and equal opportunities, environmental responsibility, and social contributions and charity). The following are the excess returns for each individual indicator category:



Grouping by CSR management

This indicator measures how much a company values social responsibility by looking into its performance in areas such as education and training, report assurance, and report inclusiveness. Sound CSR management is a prerequisite for a high quality CSR report. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 9.34%.

Grouping by company operations and management

This indicator comprises six sub-indicators: strategic cooperation and sharing, anti-bribery and anti-corruption,

^① The excess return was defined as the stock's return in excess of the corresponding market index. For instance, the excess return of an A-share stock in the Shanghai Stock Exchange is its monthly return minus the Shanghai Composite Index.

business integrity, recognition of governance efforts, accounting irregularities, and financing disputes. The comprehensive evaluation of corporate governance paves the way for a company's future development. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 9.67%.

Classification by product quality and innovation

This indicator includes, among others, sub-indicators for quality management, customer satisfaction, patents, and R&D expenditure. They have a significant bearing on the company's economic value because of their critical role in helping the company retain customers and acquire competitive advantages. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 6.45%.

Classification by employee wellness

This indicator represents a company's investment in its employees. Employees are the cornerstone of a company's development. Paying attention to the wellness of employees will contribute significantly to the company's development in the long run. After grouping companies by their score for this indicator, the study found the portfolio yielded an annualized excess return of 12.53%.

Classification by diversity and equal opportunities

This indicator emphasizes paying attention to women, the disabled, people released from labor re-education, and other vulnerable groups. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 5.68%.

Classification by environmental responsibility

This indicator includes, among others, sub-indicators for environmental benefits, energy conservation, reduction of three types of waste, circular economy, and green office. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 10.56%.

Classification by social contributions and charity

This part includes donations, charitable activities, and contributions to education. After grouping companies by their score for this indicator, the study found that the portfolio yielded an annualized excess return of 6.03%.

Based on the actual excess returns recorded in this study, we believe that the CSR performance of companies can serve as a reference for investors. We will continue to follow up and conduct in-depth research on the medium to long-term (three years and above) investment returns that these companies provide.

Conclusion

The available theoretical and empirical evidence demonstrates that CSR practices are of strategic importance to companies in a number of ways. On the theoretical side, Paul C. Godfrey proposes that engaging in CSR activities helps companies to increase intangible capital and enhance their reputation, market value, and market recognition²⁴; Daniel B. Turban found that a company's CSR reputation can motivate its employees to increase productivity, thus creating a harmonious working environment for the company²⁵; Homer H. Johnson found that being socially responsible can provide a unique way for companies to build their competitive advantage and improve financial performance²⁶; R. C. Mayer et al. argue that CSR practices can help a company deepen its relationship of trust with partners and further reduce the cost of cooperation²⁷; Shapiro Carl believes that good corporate social performance will positively influence consumer buying behavior, increasing consumer loyalty, satisfaction, and repeat purchases²⁸.

On the empirical side, a 2011–2015 study of 2,304 A-share listed companies made the following findings: (1) The fulfillment of social responsibility and the sustainable development of companies are significantly correlated, i.e. companies' socially responsible behavior will boost their sustainable development; (2) The fulfillment of social responsibility



helps extend a company's socioemotional wealth (SEW), a long-term strategic wealth that enhances social impact and corporate value, and ultimately contributes to healthy and sustainable corporate development.²⁹ Therefore, both theoretical and empirical evidence suggest that fulfilling social responsibility contributes to companies' future development.

The "2020 Study on the CSR Reports of A-share Listed Companies" gives a holistic account of the CSR performance and disclosures of A-share listed companies in China. It may help regulatory authorities better understand CSR disclosure in capital markets and enable individual investors, intermediaries, and securities analysts to improve their investment decisions. We will continue to follow up on the CSR performance of listed companies in China.

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Afterword

The economic consequences of the Covid-19 pandemic and pressing environmental issues such as climate change, resource shortages, and biodiversity loss have underscored the urgent need for sound global economic governance. In recent years, ESG has gained considerable traction around the world, and has never been so closely intertwined with real business practices.

The ESG movement was spearheaded by companies, which today face not only formidable challenges, but also rare historic opportunities. However, the business world still has a long way to go. Over the past 27 years, CEIBS has been committed to nurturing socially responsible, enterprising leaders that are versed in “China Depth, Global Breadth” and aligned with the School’s motto of “Conscientiousness, Innovation, and Excellence”. Throughout the years, CEIBS has consistently sought to sow the seeds of faith and virtue in the business community to promote business prosperity and social progress.

With its focus on carbon neutrality, the *China Europe International Business School ESG White Paper 2022* combines the forward-looking perspectives of CEIBS faculty and researchers on ESG and sustainability with the hands-on experience of CEIBS alumni companies. The white paper offers a glimpse into how the CEIBS community has explored the evolution of ESG and pursued social responsibility.

This year marks the fifth consecutive year that CEIBS, together with the Alumni Association, has released a white paper on corporate social responsibility, and more notably, this year’s white paper has been officially renamed an *ESG White Paper*. We are grateful to the leadership of the School for their staunch support and encouragement which made our work possible. Our thanks also go to the Case Center, Alumni Relations Office, Marcom Department, and Translation Department for their indispensable help during the compilation of this paper.

We are especially indebted to the CEIBS Alumni Association for ardently advocating CSR concepts and practices, and demonstrating the qualities of a responsible business leader. Our thanks also go to alumni companies and organizations, such as SEE, 37 Interactive Entertainment, INCOM Recycle, Landsea, and Saint-Gobain (China), for pursuing performing social responsibility across a spectrum of industries and fields, contributing a wealth of case materials, and showcasing best practices and results.

We would like to conclude this report with an old Chinese saying: “Long and difficult as the journey may be, sustained actions will take us to our destination; as long as we press ahead with perseverance, a bright future will beckon”. Guided and inspired by our “co-culture”, the CEIBS community will continue to work together to break new ground in the field of ESG.

Editorial Board
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CEIBS ESG White Paper

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