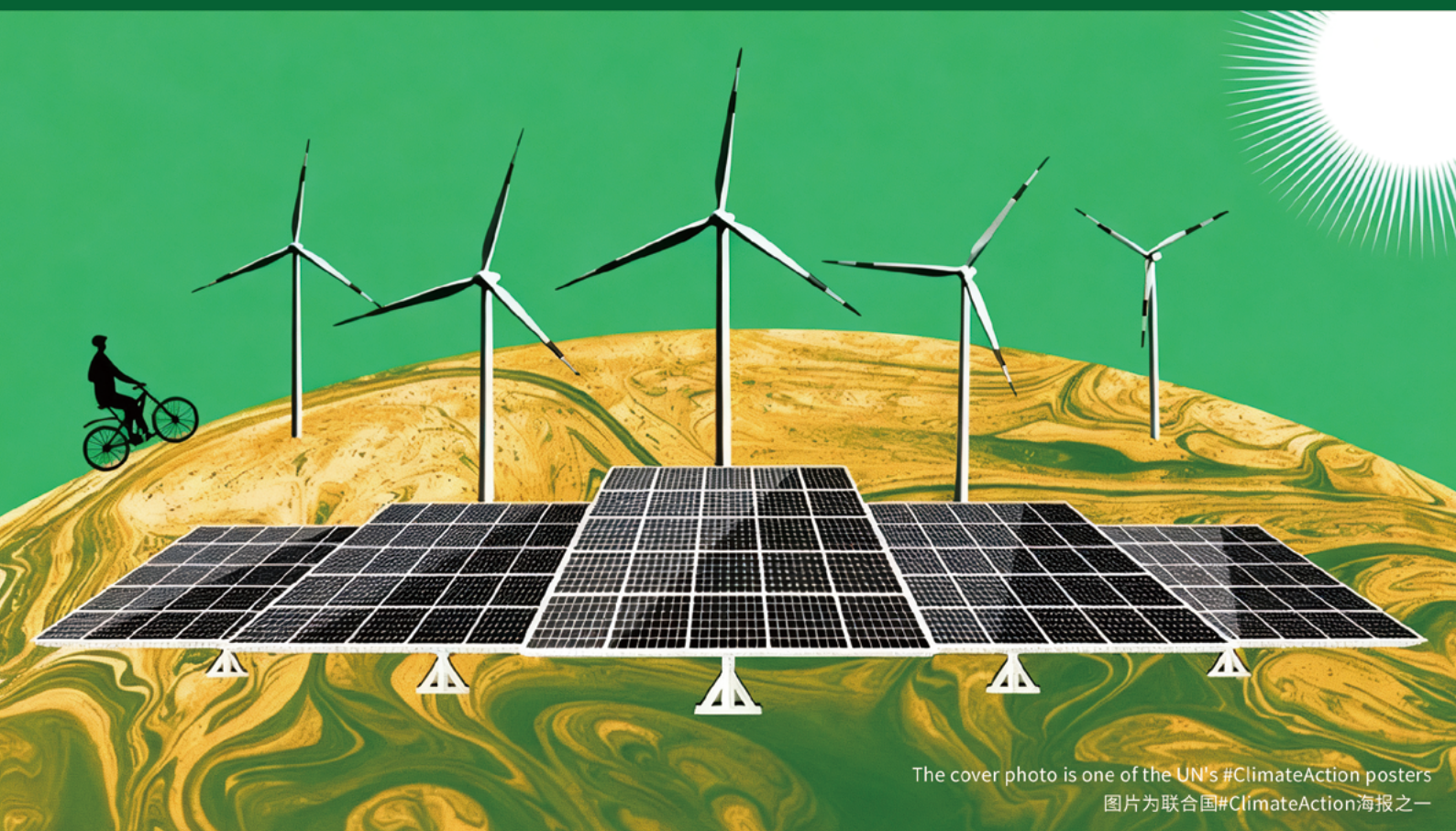


GoldenKey COP30 Special
金钥匙COP30特辑

Accelerating the Low-Carbon Transition Fostering New Drivers for Global Growth

全面推进低碳转型 培育全球增长新动能

Present the landscape and actions of Chinese enterprises in advancing their low-carbon transition, and demonstrate how they convert challenges into opportunities and contribute "China's solutions" to global green growth
呈现企业推进低碳转型的现状与行动，见证企业如何将压力转化为机遇，为全球绿色增长贡献“中国方案”。



About This Report

As 2025 marks the 10th anniversary of the signing of the Paris Agreement and the fifth anniversary of China's dual carbon goals (carbon dioxide emissions peaking before 2030 and carbon neutrality before 2060), global climate action and China's green and low-carbon transition are entering a more critical phase. As the fundamental units for implementing national climate strategies, enterprises have undergone profound changes, with low-carbon transition advancing comprehensively and deeply. Based on six years of accumulated observations of corporate low-carbon practices through the GoldenKey - SDG Solutions, this report presents the landscape and actions of Chinese enterprises in advancing their low-carbon transition, and demonstrates how they convert challenges into opportunities and contribute "Chinese solutions" to global green growth.



From Paris to Belém:

A Decade of Observations on Chinese Enterprises' Climate Action (2015–2025)

Over the past decade, Chinese enterprises have undergone a profound evolution in their green and low-carbon transition, progressing from its nascent stages to deepening maturity and from isolated initiatives to systemic integration. This journey has witnessed a shift from "a single spark" of low-carbon practice among pioneering enterprises to "a raging prairie fire" of widespread participation across industries, a change from policy-driven compliance ("I have to do it") to strategic initiative ("I choose to do it"), and an upgrade from central state-owned enterprises (SOEs) setting benchmarks to an ecosystem-based acceleration across the industrial chain. More significantly, Chinese enterprises have achieved a leap from focusing on their own "self-renovation" to offering "Chinese solutions" to the world, introducing advanced technologies, products, and standards to the world, thereby contributing Chinese wisdom and strength to global climate governance.

2015–2020: The First Sparks of Action

The Paris Agreement reached in 2015 was a pivotal milestone in global climate governance. China not only contributed significantly to the agreement's adoption but also actively implemented its Nationally Determined Contributions (NDCs) domestically, vigorously developing the green economy and new energy industries. Against this backdrop, a group of pioneering enterprises began exploring low-carbon pathways. Wind power companies like Goldwind and Mingyang Smart Energy, and photovoltaic enterprises such as Longi Green Energy Technology Co., Ltd. and Tongwei Co., Ltd., achieved rapid development and significantly reduced costs through innovation. CATL and BYD made breakthroughs in power batteries and electric vehicles, while property developers like Vanke accelerated their green building initiatives. These pioneers validated the commercial viability of low-carbon development, acting as the first "sparks" of transition.

However, at that time, these actions still had limited reach. Most enterprises underestimated the connection between climate change and their own operations. Moreover, due to technical-economic constraints and immature market mechanisms, energy conservation and carbon reduction were widely viewed as passive social responsibilities rather than growth opportunities. Overall, this period saw most enterprises lagging behind the requirements of low-carbon transition era in terms of awareness, technical capabilities, and practical actions.



The Paris Agreement is a landmark treaty for global climate governance (image source: COP21)

2020: The Inflection Point

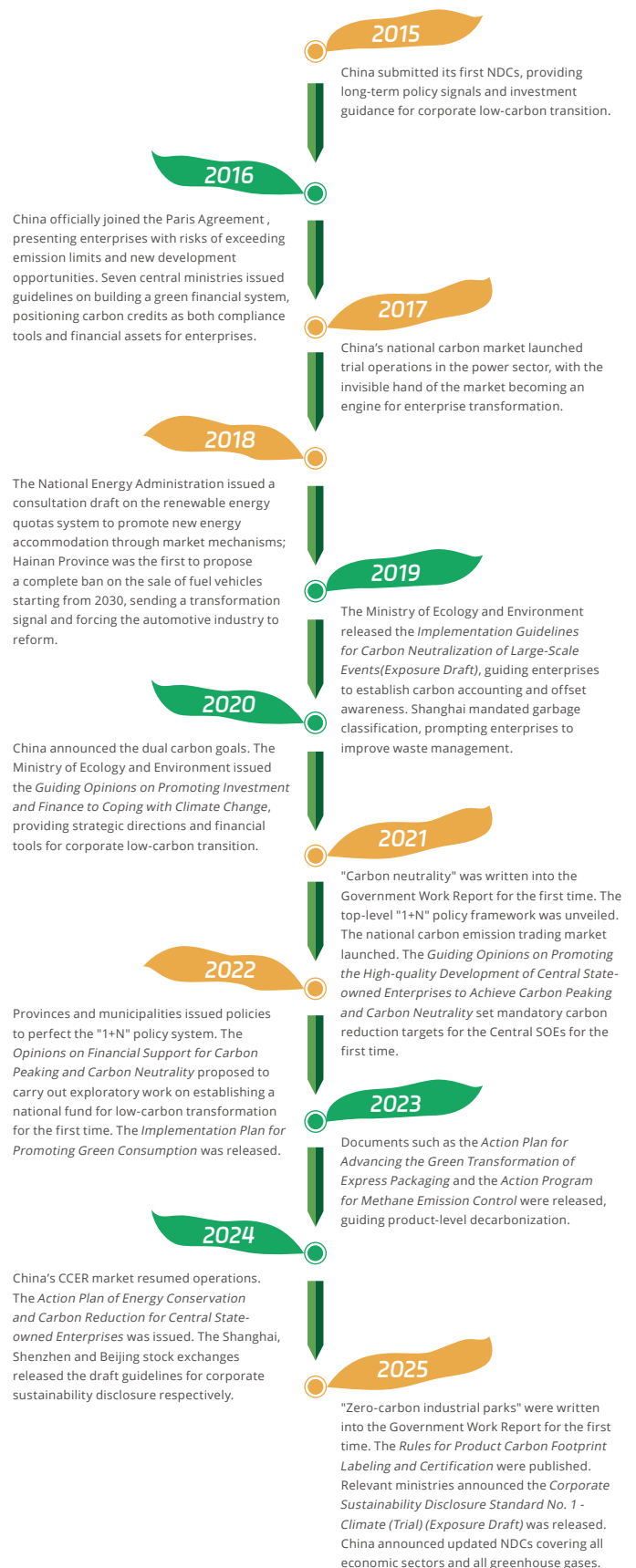
In September 2020, China's announcement of its dual carbon goals (carbon dioxide emissions peaking before 2030 and carbon neutrality before 2060) marked a fundamental turning point for domestic enterprises' climate actions. The issue of carbon neutrality transcended the realm of environmental protection, becoming a strategic priority for the entire business community. Reducing carbon emissions shifted from an "optional task" for fulfilling social responsibility to a "mandatory requirement" for low-carbon transition and development.

Faced with clear policy signals and market expectations, leading enterprises took the initiative to respond. Central SOEs in the energy sector like the three major oil companies (CNPC, Sinopec, CNOOC), State Power Investment Corporation, and China Datang Corporation, along with industrial leaders such as China Baowu Steel Group, launched carbon neutrality road-mapping and announced their carbon peaking timelines.

In March 2021, State Grid Corporation of China released the first carbon peaking and neutrality action plan among central SOEs, providing a detailed "implementation blueprint". Financial and investment institutions also quickly followed suit: in February 2021, China's first batch of six "carbon neutrality bonds" were successfully issued, and Hillhouse Capital and Sequoia China, among others, established dedicated green funds. Internet and technology companies were not left behind: Tencent launched its carbon neutrality plan in January 2021, and Ant Group committed to achieving net-zero emissions by 2030. Collectively, these actions signaled the entry of Chinese enterprises' low-carbon transition into a new phase characterized by cross-industry, multi-stakeholder collaboration.

2021–2022: From Ambiguity to Clarity

Although the dual carbon goals were included in the Chinese government work report for the first time in 2021, accompanied by intensive policy introductions and active market responses, many enterprises found themselves confused or engaging in misguided practices when faced with transition requirements—some prioritized slogans over action; some set unscientific targets while others over-relied on carbon-offset, with even misinterpretations like treating



Key Milestones in Corporate Low-Carbon Transition (2015–2025)

"carbon peaking" as a "carbon surge" (a last-minute rush to increase emissions). In response to such "campaign-style" carbon reduction, the central government explicitly called for the principle of "building the new before discarding the old" and adhered to a nationally coordinated approach in July 2021, providing clear direction for corporate transition.

Guided by policies and practical reflections, corporate actions gradually returned to rationality: China Baowu Steel Group and Ansteel successively released industry-leading carbon neutrality roadmaps, setting benchmarks for the industrial sector. The "1+N" policy framework for carbon peaking and carbon neutrality was gradually refined, with various key industries formulating their peaking plans and research institutions releasing numerous pathway guidelines, collectively building a top-down implementation framework. Socially, extreme weather events such as the 2021 Zhengzhou flood heightened public awareness of the urgency of climate action, while controversial measures like load shedding in Northeast China sparked in-depth discussions on how to balance a green energy transition with ensuring energy security.

Overall, during these two years, Chinese enterprises increasingly recognized carbon neutrality as a long-term endeavor requiring strategic determination and systematic planning. Driven by both policy and enhanced capacities, corporate climate actions gradually moved beyond the initial chaos towards a more rational and pragmatic new stage.

2023–2025: Full-Scale Transformation with Green Momentum

By 2023, the logic behind corporate carbon reduction had undergone a fundamental shift—carbon neutrality was no longer seen as a compliance cost but as a new growth engine. Leading enterprises fully integrated low-carbon transition into their core development through strategic restructuring and management innovation. Chinese enterprises began to promote their innovative achievements globally. Represented by companies like LONGI, CATL, and Goldwind, they offered "Chinese solutions" for global green transitions via advanced technologies including efficient photovoltaics, new-generation energy storage, and smart wind power. The exports of these technologies and products, epitomized by the "new three products" (electric vehicles, lithium-ion batteries and solar cells), not only enhanced the

international competitiveness of Chinese enterprises but also contributed to lower global clean energy cost and their widespread adoption.

Enterprises advanced low-carbon transition comprehensively. Strategically, ESG principles were deeply integrated into corporate governance. In operations, smart manufacturing and zero-carbon factories became priorities. At the industrial chain level, green supply chain management became increasingly prevalent. In terms of innovation, investment in frontier technologies like CCUS (Carbon Capture, Utilization, and Storage) and hydrogen energy surged. Meanwhile, consumer recognition of low-carbon products also rose, making zero-carbon products and low-carbon lifestyles critical elements of brand competition.

In 2024, China's green development entered a new phase driven by both policies and markets. Top-level policies such as the *Guidelines on Accelerating the Comprehensive Green Transformation of Economic and Social Development* propelled the green economy from concept to accelerated implementation with industries like energy conservation, environmental protection, clean energy expanding rapidly. Consequently, their eco-friendly attributes continued to rise, and their role as green growth poles became increasingly prominent. In 2025, with the new round of NDCs covering all economic sectors, China is accelerating into a new stage of systemic, economy-wide low-carbon transition. Seizing green opportunities and embracing the carbon neutrality era have become a widespread consensus within the business community and key driver for business expansion.



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GoldenKey:

Showcasing Chinese Corporate Wisdom and Solutions in Global Climate Governance

GoldenKey × Corporate Climate Action

In driving the transition from awareness to practice in climate action, the China Sustainability Tribune (CST) launched the GoldenKey—SDG Solutions. Through knowledge building, on-site empowerment, benchmark promotion, international engagement, and ecosystem collaboration, GoldenKey enhances Chinese enterprises willingness and capacity to address climate change in a systematic, scenarized, and globally connected manner.

Shaping Benchmarks: Providing Replicable Transition Pathways

As a platform for aggregating, evaluating, and promoting corporate climate actions, GoldenKey has, over the past six years, identified nearly 1,000 outstanding solutions in energy transition, low-carbon production and operations, and green supply chains. Through mechanisms such as case selection, competition evaluation, expert guidance, and international dissemination, the platform has established a closed-loop model of “discovery–evaluation–improvement–promotion”, offering replicable low-carbon transition methodologies for more enterprises.

On-Site Engagement: Building Capacity Through Field Research

GoldenKey emphasizes scenario-based empowerment, organizing a series of field studies such as “GoldenKey Delegation Tour to State Grid” and “GoldenKey Delegation Tour to China Shengmu”. These programs bring together corporate representatives, experts, and international organizations to observe first-hand—from grid dispatch centers to desert-based organic ranches—how low-carbon transition unfolds. By examining technology integration and operational models, participants gain an intuitive understanding of the systemic benefits and practical logic of low-carbon practices. Such activities not only facilitate cross-industry learning but also cultivate trust-based collaboration and localized innovation.

Ecosystem Building: Integrating Resources for Systemic Empowerment

GoldenKey collaborates with universities and enterprises to establish the Low-Carbon Action Center and the Corporate Low-Carbon Action Alliance, integrating resources from academia, industry, and finance. By offering full-chain services—from strategy development and carbon management capacity building to green finance matchmaking—these platforms promote a shift from isolated initiatives to system-wide transformation, continuously enhancing corporate capabilities for climate governance.

About GoldenKey – SDG Solutions

To implement the assertion that sustainable development is the “golden key” to solving current global problems proposed by Chinese President Xi Jinping and to respond to the Decade of Action, “GoldenKey – SDG Solutions” (“GoldenKey” for short) was launched by China Sustainability Tribune in October 2020. The initiative aims to identify, shape, and promote outstanding corporate SDG solutions in China, tackle humanity’s greatest challenges and drive sustainable development in China and beyond. In 2021, the GoldenKey was selected as the UN Good Practices (#33560). So far, GoldenKey has been held for six consecutive sessions. A total of 2,365 corporate SDG solutions have been collected, with 1,054 selected as outstanding SDG solutions, demonstrating the capability and innovation of Chinese enterprises in advancing the SDGs.

From 2022 to 2025, GoldenKey and State Grid Corporation of China (SGCC or State Grid) co-hosted the “GoldenKey · SGCC Special” for four consecutive years. The event collects innovative solutions on topics such as low-carbon transition and green grids and has identified and promoted numerous exemplary practices within the power sector. In 2025, GoldenKey launched the “GoldenKey · Power Sector Special” in partnership with the China Electricity Council (CEC) to further collect and showcase breakthroughs by power enterprises in climate change, China’s dual carbon goals, and low-carbon transition of clean energy.

International Exposure: Enabling Chinese Enterprises to Engage in Global Climate Governance

GoldenKey actively presents Chinese enterprises' exemplary climate actions on the global stage, releasing case collections and thematic reports at UN Climate Conferences (COP26, COP28, and COP29). These reports systematically summarize Chinese enterprises' experience and innovations in low-carbon transition. GoldenKey also collaborates with international organizations and institutions abroad to host side events at the China Pavilion and showcase corporate climate solutions, enhancing their global visibility, discourse power, and collaboration opportunities in climate governance.

Cognitive Deepening: Building the Foundation for Corporate Climate Action

GoldenKey focuses on overcoming corporate cognitive bottlenecks regarding China's dual carbon strategy, advancing policy interpretation and awareness-building in a systematic way. Through seminars, industry salons, and live online sessions, authoritative experts interpret low-carbon policy trends and implementation pathways, creating bridges for government-business and business-to-business dialogues, and helping businesses convert macro goals into a clear blueprint for action. Meanwhile, leveraging CST's media ecosystem, GoldenKey disseminates low-carbon concepts through columns, videos, and social media, and drives enterprises to embed climate awareness into corporate strategies and workplace culture, thereby strengthening the cognitive foundation for sustained corporate climate action.

GoldenKey Observation: Corporate Pathways to Low-Carbon Transition

Chinese enterprises are undergoing a fundamental shift in their decarbonization logic: from passively fulfilling external obligations to actively seizing development opportunities; from a marginal social responsibility to a core source of competitiveness.

Strategic Reconfiguration: From External Response to Internal Motivation

Chinese enterprises have achieved a cognitive leap in

their strategic approach to low-carbon transition. By embedding low-carbon principles into top-level design, enterprises not only align internal objectives and optimize resource allocation but also integrate emission reduction with the building of core competitiveness. Observations from the GoldenKey show that central SOEs have taken the lead in formulating carbon peaking and neutrality roadmaps, setting strong examples for others. An increasing number of enterprises now recognize that the drivers of decarbonization stem from supply chains, capital markets, and consumer demand. Leading enterprises are establishing internal low-carbon governance structures, embedding targets into business operations and performance evaluations, and thereby achieving synergistic growth of commercial and environmental value.

Six Dimensions of Action: Systematic Advancement of Low-Carbon Transition

Chinese enterprises are advancing decarbonization in a systematic and multi-dimensional manner, focusing on six key areas:

- **Energy structure transition:** Deploying solar, wind, and other renewables on a large scale to build a clean and efficient energy system.
- **Operational efficiency improvement:** Leveraging technological innovation and refined management to tap into deep emission-reduction potential throughout the production process.
- **Product and service innovation:** Developing low-carbon products and services to create new markets and guide green consumption.
- **Circular system development:** Embedding circular economy principles across design, production, and recycling to form closed-loop resource cycles.
- **Negative-carbon technology deployment:** Exploring frontier technologies such as CCUS to enhance carbon dioxide removal capacity and build future technological advantages.
- **Value chain collaboration:** Engaging upstream and downstream partners to build green ecosystems and drive emission reduction across the entire value chain.

Path with Chinese Characteristics: Synergy Between Climate Governance and High-Quality Development

Leading Chinese enterprises are integrating low-carbon transition into the nation's high-quality development strategy, generating comprehensive value beyond emission reduction. Through clean-energy projects, they create local employment and income growth, achieving synergy between livelihood improvement and ecological progress. Circular economy models promote resource efficiency while fostering a green consumption culture. Green technological innovation nurtures new quality productive forces that underpin high-quality economic growth. Meanwhile, corporate efforts to support and protect vulnerable groups ensure that the transition remains just and inclusive. This integrated approach, blending climate governance, economic growth, and social progress, not only accelerates carbon neutrality but also lays the foundation for a resilient and inclusive business civilization.

Digital Empowerment: Accelerating the Transition

The collaboration of digitalization and environmental protection has become a defining feature of corporate transformation. Technologies such as big data, AI, and the IoT have equipped enterprises with a "smart brain", and significantly improved efficiency and transparency in transition processes.

Smart energy management: Real-time monitoring and AI-driven optimization of energy dispatch and utilization.

Carbon footprint visualization: Accurate accounting and tracking of corporate and product-level carbon footprints.

Green supply chain transparency: Enhanced traceability and collaboration across the value chain to achieve coordinated emission reduction.

Digital tools themselves have also spawned new business models, such as carbon management software and certification services, opening new avenues for corporate growth.

While pursuing mitigation, forward-looking enterprises are also prioritizing adaptation, strengthening the climate resilience of their operations and value chains.

Risk forecasting and emergency response: Enterprises in key sectors such as finance, energy, and transportation are developing climate risk platforms and emergency response systems to better prepare for and respond to extreme weather events.

Systemic vulnerability assessment: Leading enterprises are identifying weaknesses in their assets, supply chains, and customer bases under climate risks and incorporating adaptation measures into long-term strategies to build resilience in advance.

Observations from the GoldenKey indicate that China's corporate low-carbon transition has evolved from isolated actions to systemic transformation, forming a comprehensive framework of strategic leadership, multi-dimensional implementation, technological empowerment, and ecosystem collaboration. Guided by the China's dual carbon goals, Chinese enterprises are charting a distinctively Chinese yet globally relevant pathway toward low-carbon development, contributing valuable Chinese solutions to the world's sustainable future.



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Directory of Outstanding Corporate Climate Solutions

Empowering Industrial Parks/ Factories in Low-Carbon Transition

Case 1: Lead with Green Electricity: Building a New Engine for the Ningdong Base's Net-Zero Transition

State Grid Ningdong Power Supply Company

Case 2: Creating a Flagship Zero-Carbon Industrial Park to Accelerate Action on Carbon Peaking and Neutrality Goals

State Grid Wuxi Electric Power Supply Company

Case 3: A Full-Chain Decarbonization Model Powers Hardware Factories Toward Zero Carbon

State Grid Yongkang Power Supply Company

Building Zero-Carbon and Livable Villages

Case 4: Painting a Green Blueprint for Jingning, Guarding Its Growth and Harmony

State Grid Jingning Power Supply Company

Case 5: Precision Adaptation & Multi-Energy Integration: Cracking the Code on Building Zero-Carbon Mountainous Villages

State Grid Wencheng Electric Power Supply Company

Case 6: Courtyard with Green Energy: Unlocking a New Model of Energy Consumption for Rural Households

State Grid Guyuan Power Supply Company

Driving Green Growth Across Industries

Case 7: Green Intelligence Engine Activates New Growth Drivers of the NEV Industry

State Grid Taizhou Luqiao Power Supply Company

Case 8: Greening the Pomegranate Industry, Lighting Up the Low-Carbon Path for Rural Vitalization

State Grid Zaozhuang Power Supply Company

Case 9: "Precise Dismantling and Rebirth" of Power Scrap: A Digital Solution for Carbon Neutrality in Power Equipment Recycling

State Grid Dezhou Power Supply Company

Case 10: Carbon Accounts: Empowering Low-Carbon Development and Boosting Export Trade

State Grid Quzhou Power Supply Company

Developing Safe and Resilient Cities

Case 11: AI for Flood Prevention: A Climate-Resilient Flood Prevention Model for Community-Based Underground Distribution Rooms

State Grid Taizhou Huangyan Power Supply Company- State Grid Zhejiang Information & Communication Company

Building New-Type Power Systems

Case 12: Pursuing Eco-friendliness and Embracing Innovation: World's First County-Level Demonstration Zone for New-Type Power Systems

State Grid Suizhou Power Supply Company

Case 13: Yangjiang Sanshanda Offshore Wind Power VSC-HVDC Transmission Project Opens the "Deep-Sea Expressway" for Green Electricity

Yangjiang Power Supply Bureau of Guangdong Power Grid Co., Ltd. under China Southern Power Grid Company Limited

Case 14: Toward Net Zero: How BOE Created the World's First "Net-Zero Carbon Factory" in the Display Industry

BOE Technology Group Co., Ltd.

Why State Grid Serves as a Representative Example—A Model of Multi-Scenario Low-Carbon Transition

Power enterprises are the main driving force of the energy transition, and among them, State Grid Corporation of China (State Grid) plays a vital role as the connector between energy supply and energy consumption. As a leading grid operator, State Grid has demonstrated advanced vision, typical representativeness, and strong innovation in supporting China's carbon peaking and neutrality process. Its efforts have received widespread recognition and honors under the GoldenKey initiative.

Across industrial parks, factories, villages, scenic areas, and households, State Grid's subsidiaries at all levels have built smart microgrids, promoted distributed PV system, and implemented energy-efficiency management projects, thereby forming flexible, efficient, low-carbon models. These practices showcase the unique advantages of China's grid enterprises in technology integration and system optimization, and highlight their critical role in driving society-wide low-carbon transition. For this reason, the majority of cases included in this report come from State Grid and related power enterprises, representing exemplary, replicable pathways for low-carbon transition.

About “GoldenKey – SDG Solutions”

To implement the assertion that sustainable development is the “golden key” to solving current global problems proposed by Chinese President Xi Jinping and to respond to the Decade of Action, “GoldenKey – SDG Solutions” (GoldenKey) was launched by China Sustainability Tribune in October 2020. The initiative aims to identify, shape, and promote outstanding corporate SDG solutions in China, tackle humanity's greatest challenges and drive sustainable development in China and beyond. In 2021, the GoldenKey was selected as the UN Good Practices (#33560).

As one of China's most influential platforms for sustainable development, GoldenKey has been held for six consecutive sessions. A total of 2,365 corporate SDG solutions have been collected, with 1,054 selected as outstanding SDG solutions. These solutions span areas such as climate action, well-being for all, rural vitalization, tech4SDG, quality education, action4nature, and zero waste. They stand out for their clear problem definition, outstanding innovation, strong replicability, and significant integrated value, demonstrating the capability and innovation of Chinese enterprises in advancing the SDGs.

With the growing emphasis on green and low-carbon transformation, the number of climate-related corporate solutions featured on the GoldenKey platform has increased each year. Participating enterprises range from central state-owned enterprises and foreign-invested companies to private enterprises of all sizes and sectors, contributing to China's carbon neutrality goal through efforts in energy transition, low-carbon production and operations, digital empowerment, financial support, as well as low-carbon consumption and living. GoldenKey has become one of China's most influential and internationally recognized platforms for corporate sustainability exchange and evaluation.

From 2022 to 2025, GoldenKey and State Grid Corporation of China (SGCC or State Grid) co-hosted the “GoldenKey · SGCC Special” for four consecutive years. The event collects innovative solutions on topics such as low-carbon transformation and green grids, and has identified and promoted numerous exemplary practices within the power sector. In 2025, GoldenKey launched the “GoldenKey · Power Sector Special” in partnership with the China Electricity Council (CEC) to further collect and showcase breakthroughs by power enterprises in climate change, China's 30·60 Decarbonization Goal, and low-carbon transition of clean energy.

GoldenKey continues to optimize and upgrade China's corporate SDG solutions. Through a series of initiatives, including publications, academic forums, field research, international launches, and demonstration projects, GoldenKey showcases and promotes these solutions on domestic and global platforms such as the China International Import Expo, China International Consumer Products Expo, UN Climate Change Conferences, and IUCN World Conservation Congress. This provides replicable models for more regions worldwide and supports the implementation of the SDGs.

Additionally, GoldenKey and the International School of Low-carbon Studies of Shandong University of Finance and Economics jointly established the GoldenKey Low-Carbon Action Center. Focusing on empowering enterprises in their green and low-carbon transformation, the center provides comprehensive knowledge empowerment and capacity building, covering low-carbon strategy development, carbon management capacity building, green project implementation, application of green financial instruments and climate risk control.



GoldenKey Annual Event

关于本报告

2025年，适逢《巴黎协定》签署十周年、中国“双碳”目标提出五周年，全球气候行动及中国绿色低碳转型迈入更加关键的阶段。作为落实国家气候战略的最小单元，企业的行动已发生深刻变化，低碳转型正在全面深入推进。本报告基于“金钥匙”活动开展六年来，对大批企业低碳实践的观察积累，旨在呈现中国企业推进低碳转型的现状与行动，见证他们如何将压力转化为机遇，为全球绿色增长贡献“中国方案”。



从巴黎到贝伦： 中国企业气候行动十年观察（2015-2025）

过去十年，中国企业绿色低碳转型走过了一段从萌芽到深化、从局部到全局的深刻演进之路——实现了从少数领先企业的“点点星光”到各行业普遍参与的“燎原之势”的跨越；完成了从政策驱动下的“我要做”到战略引领下的“我要做”的转变；经历了从央企“标杆领跑”到产业链“生态加速”的升级。更重要的是，中国企业实现了从聚焦自身的“自我革新”到面向全球的“输出方案”的巨大跨越，将先进的技术、产品与标准推向世界，为全球气候治理贡献了中国智慧与力量。



《巴黎协定》是全球气候治理的标志性条约（图片来源：COP21）

2015-2020年：点点星光

2015年达成的《巴黎协定》是全球气候治理的关键里程碑。中国不仅为协定达成作出重要贡献，更在国内积极落实国家自主减排目标，大力发展绿色经济与新能源产业。在此背景下，一批先锋企业率先探索低碳路径。以民营企业为例，金风科技、明阳智能等风电企业，隆基绿能、通威股份等光伏企业，通过创新大幅降低成本，实现飞速发展；宁德时代、比亚迪在动力电池与电动汽车领域取得突破；万科等房企也加速布局绿色建筑。他们以实践验证了低碳发展的商业可行性，成为转型中的“星星之火”。

然而，彼时这些行动覆盖面仍较小。多数企业对气候变化与自身经营的关联认知尚浅，加之技术经济性不足与市场机制不健全，普遍将节能降碳视为需被动履行的社会责任，而非发展机遇。总体来看，这一阶段绝大多数企业在认识深度、技术能力和实际行动方面，仍落后于低碳转型的时代要求。

2020年：迎来爆发点

2020年9月，中国宣布2030年前碳达峰、2060年前碳中和的“双碳”目标，这一事件成为企业气候行动的根本转折点。碳中和议题突破环保领域范畴，跃升为企业界共同聚焦的战略方向。减少碳排放放在企业界从履行社会责任的“附加题”，迅速升格为低碳转型发展的“必答题”。

面对明确的政策信号与市场预期，领先企业率先响应。以三大石油公司（中石油、中石化、中海油）、国家电投、大唐集团等为代表的能源央企，以及中国宝武等工业龙头企业，纷纷启动碳中和路径研究并公布碳达峰时间表。2021年3月，国家电网发布首个央企碳达峰碳中和行动方案，绘制出具体“施工图”。金融与投资机构也快速跟进。2021年2月，全国首批6只“碳中和债”成功发行；高瓴资本、红杉中国等设立专项绿色基金。互联网科技企业亦不落后。腾讯于2021年1月宣布启动碳中和规划，蚂蚁集团承诺在2030年实现净零排放。这些行动共同标志着中国企业低碳转型进入跨行业、多主体协同推进的新阶段。

2021-2022年：从含混走向清晰

尽管2021年“双碳”目标被首次写入政府工作报告，重要政策密集出台，市场积极响应，但许多企业面对转型要求却陷入迷茫与实践偏差：有的口号多于行动，有的目标缺乏科学依据，有的过度依赖碳补偿，甚至出现将“碳达峰”误读为“碳冲锋”的现象。针对此类“运动式”减碳，2021年7月中央明确提出“先立后破”、坚持全国一盘棋，为企业转型指明方向。

在政策引导与现实反思中，企业行动逐步回归理性：中国宝武与鞍钢集团相继发布行业领先的碳中和路线图，为工业领域提供了重要范本。碳达峰碳中和“1+N”政策体系逐渐完善，各重点行业陆续制定达峰方案，研究机构也发布多项路径指南，共同构建起自上而下的“双碳”实施框架。社会层面，郑州暴雨等极端天气让公众对气候变化紧迫性有了更深体会，而东北地区拉闸限电等争议措施也引发了对如何平衡能源绿色转型与保障能源安全的深入讨论。

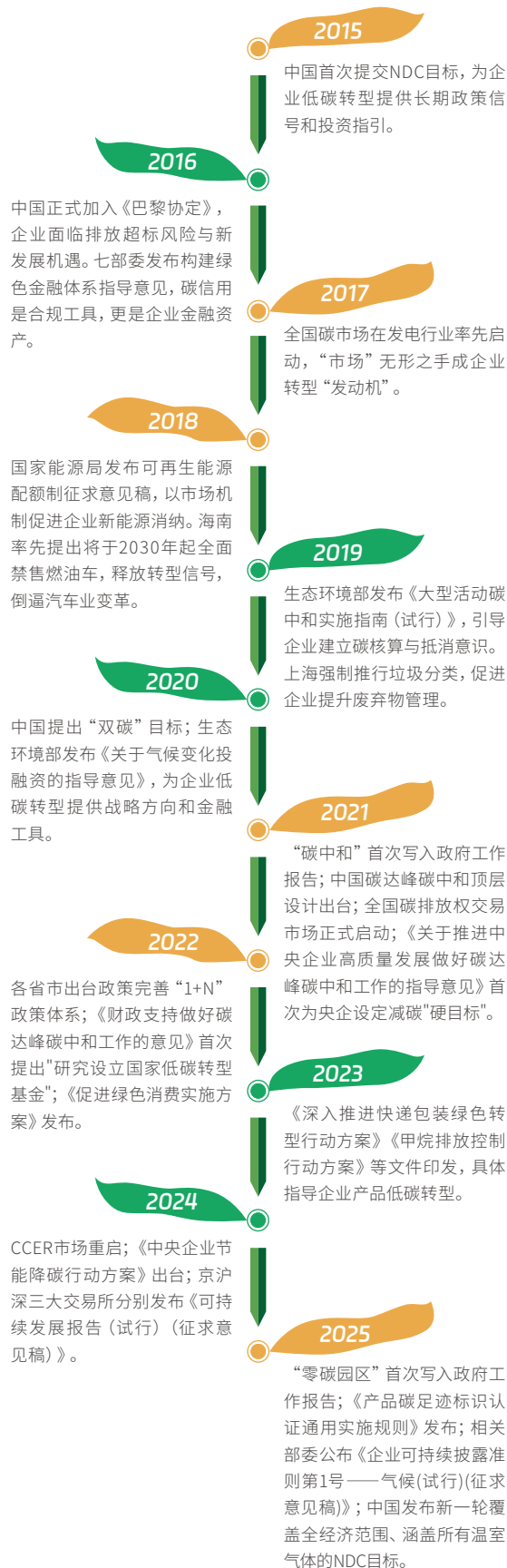
总体来看，这两年间中国企业逐渐认识到碳中和是一条需要战略定力与系统布局的长期赛道。在政策引导与能力提升的双重推动下，企业气候行动已逐步摆脱初期混乱，迈向更加理性、务实的新阶段。

2023-2025年：绿色动能，全面转型

时间迈入2023年，企业的减碳逻辑发生根本转变——碳中和不再仅是合规成本，更被视为驱动增长的新引擎。领先企业通过战略重构与管理创新，将低碳转型全面纳入核心发展。中国企业亦开始将创新成果推向全球。以大量能源央企以及隆基绿能、宁德时代、金风科技等民企为代表，凭借高效光伏、新一代储能与智能风电等先进技术，为全球绿色转型提供“中国方案”。“新三样”等技术与产品的输出，既增强了中国企业的国际竞争力，也推动了全球清洁能源成本的下降与普及。

企业低碳转型呈现全方位推进态势。战略上，ESG理念深度融入公司治理；运营中，智能制造与零碳工厂成为重点；产业链层面，绿色供应链管理不断普及；创新方面，对CCUS、氢能等前沿技术的投入持续加大。同时，消费端对低碳产品的认可度提升，零碳产品与低碳生活方式正成为品牌竞争的关键要素。

2024年，中国绿色发展进入政策与市场双轮驱动的新阶段。《关于加快经济社会发展全面绿色转型的意见》等顶层政策出台，推动绿色经济从理念加速落地，节能环保、清洁能源等产业快速扩张，“含绿量”不断提升，绿色增长极作用日益凸显。2025年，随着新一轮国家自主贡献目标覆盖全经济领域，中国正加速进入系统性、全行业低碳转型新阶段。抓住绿色机遇、主动融入碳中和时代，已成为企业界的普遍共识与拓展商业空间的重要动能。



▲ 促进中国企业低碳转型大事件（2015-2025）

金钥匙：

见证全球气候治理的中国企业智慧与方案

“金钥匙”X 企业气候变化

在推动气候行动从认知迈向实践的过程中，可持续发展经济导刊发起的“金钥匙——面向SDG的中国行动”通过认知建构、实地赋能、标杆推广、国际链接与生态协作，以系统性、场景化、国际化的方式，全方位提升中国企业应对气候变化的意愿与能力。

☑ 塑造标杆，提供可复制的转型路径

作为企业气候行动的汇集、评选与推广平台，六年来“金钥匙”持续发掘在能源转型、低碳生产与运营、绿色供应链等领域的优秀实践，累计近千项。通过案例遴选、赛事评选、专家赋能、国际化推广等机制，“金钥匙”平台构建了“发现—评价—提升—推广”的闭环，为企业提供更多可借鉴、可复制的低碳转型方法论。

☑ 走进现场，以实地调研推动能力共建

“金钥匙”重视场景化赋能，策划“走进国家电网”“走进中国圣牧”等系列调研活动，组织企业代表、专家与国际机构深入一线场景——从电网调度中心到荒漠有机牧场。通过实地考察转型路径、剖析技术集成与运营模式，参与者得以直观理解低碳实践的系统效益与落地逻辑。此类活动不仅促进经验跨行业流动，也催生了基于信任的协作与本土化创新。

☑ 构建生态，整合资源实现系统赋能

“金钥匙”联合高校、企业发起成立“低碳行动中心”与“企业低碳行动联盟”等，整合学界、产业与金融资源，探索为企业提供从战略制定、碳管理能力建设到绿色金融对接的全链条服务，通过搭建跨领域协作网络，推动企业从单点实践走向系统转型，持续强化整体气候治理能力。

☑ 对接国际，赋能企业参与全球气候治理

“金钥匙”积极将中国企业优秀气候行动推向国际舞台，连续在联合国气候大会COP26、COP28、COP29发布相关案例集及专题报告等，系统总结中国企业低碳转型的经验与创新。平台还联合国际组织与驻外机构在“中国角”举办边会、展示企业解决方案，有效提升中国企业在全球气候治理中的能见度与话语权，为企业创造国际合作机会。

☑ 深化认知，构建企业行动基础

“金钥匙”着力破解企业对“双碳”政策的认知瓶颈，系统开展政策解读与理念传播。通过组织研讨会、行业沙龙与线上直播等活动，邀请权威专家深入解析低碳政策趋势与实施路径，搭建起政企、企企对话的桥梁，助力企业将宏观目标转化为清晰可行的行动框架。同时，“金钥匙”依托可持续发展经济导刊的专栏建设与社交媒体矩阵，以视频、图文等轻量化形式，推动低碳理念融入企业战略文化与员工日常行为，持续夯实企业参与气候行动的认知基础。

关于“金钥匙——面向SDG的中国行动”

为落实中国国家主席习近平关于“可持续发展是破解当前全球性问题的‘金钥匙’”论断，响应联合国可持续发展目标“行动十年”计划，可持续发展经济导刊于2020年发起“金钥匙——面向SDG的中国行动”（简称“金钥匙”），旨在寻找、塑造、推广来自中国企业贡献SDG的优秀解决方案，应对人类所面临的重大挑战，为推动中国和全球可持续发展贡献力量。2021年，“金钥匙”获评联合国SDG优秀实践（编号：SDG Action#33560）。目前“金钥匙”已成功举办六届，共征集了2365项行动，其中1054项行动脱颖而出，展现出中国企业贡献SDG的行动力和破解难题的创新力。

2022-2025年，金钥匙与国家电网连续四年合作举办“金钥匙·国家电网主题赛”，围绕低碳转型、绿色电网等议题征集创新方案，发掘推广了一批行业示范实践；2025年，金钥匙与中国电力企业联合会启动“金钥匙·电力行业主题赛”，旨在广泛征集推广电力行业在应对气候变化、服务“双碳”目标、促进能源清洁低碳转型等方面的突破性行动。



金钥匙年度盛典

金钥匙企业低碳转型路径观察

中国企业减碳的逻辑正发生根本性转变：从被动履行外部责任，转向主动把握发展机遇；从边缘化的社会责任，升级为核心竞争力来源。

1. 战略重构：从外部响应到内生驱动

中国企业低碳转型实现战略层面的认知跃迁。通过将低碳理念纳入顶层设计，企业不仅统一内部目标、优化资源配置，更将减排与核心竞争力构建紧密结合。“金钥匙”平台观察显示：中央企业率先制定碳达峰碳中和方案，发挥示范作用；越来越多企业认识到，减碳动力来自供应链、资本市场与消费者的多重市场驱动；领先企业建立内部低碳治理架构，将目标融入业务体系与绩效考核，实现商业与环境价值协同增长。

2. 六大行动维度：系统化推进低碳转型

中国企业的减碳实践呈现出系统化、多维度的特征，主要聚焦以下六大关键领域：

- **能源结构转型**：大规模布局光伏、风电等可再生能源，构建清洁、高效能源体系。
- **运营效能提升**：通过技术革新与精细化管理，挖掘生产全流程的深度减排潜力。
- **产品服务创新**：开发低碳产品与解决方案，以绿色供给创造新市场、引领新需求。
- **循环体系构建**：将循环经济理念贯穿设计、生产、回收全过程，打造资源闭环。
- **负碳技术布局**：探索CCUS等前沿技术，增强碳移除能力，储备未来技术优势。
- **价值链协同**：联动上下游伙伴，共建绿色生态，推动全链条减排

3. 中国特色路径：气候治理与高质量发展协同共进

中国领先企业正将低碳转型融入国家高质量发展战略，创造出超越减排本身的综合价值：通过清洁能源项目带动当地就业和收入增长，实现民生和生态共赢；借助循环经济模式促进资源高效利用，同时培育社会绿色消费文化；依托绿色技术创新培育新质生产力，实现经济高质量发展；通过对脆弱群体的支持和保护，促进转型过程的公平与包容。这种将气候治理、经济增长与社会进步深度融合的模式，不仅加速了碳中和进程，更构建了一个更具韧性 with 包容性的商业文明。

4. 数字化赋能：加速转型进程

数字化与绿色化的“双化协同”已成为企业转型的核心特征。大数据、人工智能、物联网等技术为企业装上了“智慧大脑”，显著提升了转型的效率与透明度。智慧能源管理：通过实时监测与AI算法，优化能源调度与使用效率。碳足迹可视化：实现企业及产品碳足迹的精准核算与追踪。供应链绿色穿透：增强供应链透明度，推动全链条协同减排。此外，数字工具本身也催生了碳管理软件、认证服务等新业态，为企业开辟了新的增长点。

5. 适应能力建设：提升气候韧性

在积极“减缓”的同时，前瞻性企业已开始系统关注“适应”，将增强自身与价值链的气候韧性提上日程。风险预警与应急：金融、电力、交通等关键领域的企业正在开发气候风险平台与应急响应系统，以强化对极端天气事件的预警与处置能力。系统性脆弱性评估：部分领先企业开始识别自身资产、供应链及客户群体在气候风险下的脆弱点，并将适应措施纳入长期战略规划，未雨绸缪。

“金钥匙”平台的实践表明，中国企业低碳转型已从单点治理迈向系统重构，形成战略引领、多维推进、技术赋能、生态协同的完整体系。在“双碳”目标引领下，中国企业正在探索一条兼具中国特色与国际意义的低碳发展道路，正为全球的可持续发展提供宝贵的中国方案。



金钥匙年度盛典

企业应对气候变化优秀解决方案目录

赋能
园区
工厂
低碳
转型

- 案例1: “绿电”领航, 打造宁东基地“零碳”转型新引擎 (国网宁东供电公司)
- 案例2: 打造零碳园区优质样本, 为“双碳”目标实现提质加速 (国网无锡供电公司)
- 案例3: 全链路协同降碳模式 助力五金工厂迈向“零碳” (国网永康供电公司)

建设
幸福
零碳
乡村

- 案例4: 绘就绿色“景”, 守护千山“宁” (国网景宁县供电公司)
- 案例5: 精准适配, 多能共赴: 破解山区零碳乡村建设难题 (国网文成供电公司)
- 案例6: 绿能小院——解锁乡村家庭用能新模式 (国网固原供电公司)

驱动
绿色
产业
增长

- 案例7: 绿智引擎, 激活路桥新能源汽车产业新动能 (国网路桥供电公司)
- 案例8: “绿”动石榴产业, 点亮低碳乡村路 (国网枣庄供电公司)
- 案例9: 电力废旧物品的“精拆重生”: 以数智化绿色拆解助力碳中和 (国网德州供电公司)
- 案例10: “碳账户”助力企业低碳发展和出口贸易 (国网衢州供电公司)

建设
韧性
安全
城市

- 案例11: AI问汛, 防涝有道: 打造具有气候韧性的社区地下配电房防汛模式 (国网黄岩供电公司、国网浙江信息通信公司)

打造
电力
新系
统

- 案例12: 逐“绿”而行 向“新”而变——世界首个县域级新型电力系统示范区落地实践 (国网随州供电公司)
- 案例13: 阳江三山岛风电柔直输电工程打通电力“深海高速路” (南方电网广东阳江供电局)
- 案例14: 迈向净零: 京东方如何打造显示行业全球首家“零碳工厂”

为何以国家电网为典型范例? ——多场景低碳转型的典型示范说明

电力企业是推动能源转型的主力军。作为联结能源供给侧和消费侧的电网企业尤其是国家电网公司在助力中国双碳进程中体现了较强的先进性、典型性和创新性, 并在金钥匙活动中赢得众多认可与荣誉。

在园区、工厂、乡村、景区、家庭用能等场景, 国家电网各级公司通过建设智能微网、推广分布式光伏、实施能效管理等项目, 构建了灵活高效的低碳用能模式。这些实践不仅展现了中国电网企业在技术集成和系统优化方面的独特优势, 也代表了更广泛中国企业推动全社会低碳转型的关键角色与力量。正因如此, 本案例集收录的案例多数来自国家电网等电网企业, 以呈现具有代表性、可推广的转型路径。

关于“金钥匙——面向SDG 的中国行动”

为落实中国国家主席习近平关于“可持续发展是破解当前全球性问题的‘金钥匙’”论断，响应联合国可持续发展目标“行动十年”计划，《可持续发展经济导刊》于2020年发起“金钥匙——面向SDG 的中国行动”（简称“金钥匙”）。

“金钥匙”旨在寻找、塑造、推广来自中国企业贡献SDG 的优秀解决方案，应对人类所面临的重大挑战，为推动中国和全球可持续发展贡献力量。2021年，“金钥匙”获评联合国SDG 优秀实践（编号：SDG Action#33560）。

“金钥匙”是中国可持续发展领域具有重要影响力的平台型活动，目前已成功举办六届，共征集了2365项行动，其中1054项行动脱颖而出，在气候行动、人人惠享、乡村振兴、科技赋能、优质教育、礼遇自然、无废世界等领域涌现出一批问题定义精准、创新性突出、可复制性强、综合价值显著的SDG 解决方案，展现出中国企业贡献SDG 的行动力和破解难题的创新力。

随着企业对绿色低碳转型重视程度的增加，金钥匙平台上关注气候议题的企业行动数量逐年增加，涉及企业包括不同规模、不同行业的央企、在华外企以及民营企业等，这些行动分别从能源转型、低碳生产与运营、数字化赋能、金融支持、低碳消费与生活等方面积极参与全球气候治理，贡献中国碳中和目标。“金钥匙”成为中国最具影响力和国际化的企业可持续发展交流与展示活动。

2022-2025年，金钥匙与国家电网连续四年合作举办“金钥匙·国家电网主题赛”，围绕低碳转型、绿色电网等议题征集创新方案，发掘推广了一批行业示范实践；2025年，金钥匙与中国电力企业联合会启动“金钥匙·电力行业主题赛”，旨在更广泛征集推广电力行业在应对气候变化、服务“双碳”目标、促进能源清洁低碳转型等方面的突破性行动。

“金钥匙”持续对中国企业SDG 解决方案进行优化升级，举办成果出版、学术研讨、走访调研、国际发布、推广示范等一系列活动，在中国国际进口博览会、中国国际消费品博览会、联合国气候变化缔约方大会、世界自然保护大会等国内外平台上展现和推广中国企业SDG 解决方案，为全球更多地区提供可复制的经验，助力联合国2030可持续发展目标落实。

此外，“金钥匙”还联合山东财经大学中国国际低碳学院成立“金钥匙低碳行动中心”，以推动企业绿色低碳转型为核心，提供涵盖低碳战略制定、碳管理能力提升、绿色项目实践、绿色金融工具应用及气候风险管控等全方位的知识赋能和能力建设。



金钥匙年度盛典



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