



2025 Climate Solutions from Chinese Enterprises

应对气候变化的中国企业解决方案 (2025)

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

“绿电”领航，打造宁东基地“零碳”转型新引擎



国家电网
STATE GRID

国网宁东供电公司

STATE GRID NINGDONG ELECTRIC POWER SUPPLY COMPANY





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



Challenges

As the only chemical industrial park in Northwest China with an output value exceeding US\$14 billion, the Ningdong Energy Chemical Industry Base (Ningdong Base) faces a long-standing challenge of high energy consumption and carbon emissions. The base consumes over 55 million tons of coal and emits more than 67 million tons of CO₂ annually. Its energy mix remains heavily reliant on fossil fuels, while the traditional power grid suffers from high energy losses and insufficient capacity to accommodate clean electricity. Against the backdrop of China's carbon peaking and neutrality goals and increasingly stringent environmental regulations, a green transition has become imperative for the Ningdong Base.



Power supply employees conduct on-site inspections at Ningxia Hening Chemical Co., Ltd. to inspect the electricity substitution.



Solution

State Grid Ningdong Power Supply Company ("State Grid Ningdong" for short) is leading a green electricity-driven initiative to systematically advance the clean energy transition. By building a new-type power system, the company promotes large-scale, high-efficiency accommodation of new energy. It has also introduced a "one enterprise, one policy" customized energy efficiency service model to enhance lean management and accelerate the park's progress toward its net-zero goal.

Dual-engine approach to clean energy supply

State Grid Ningdong is supporting Ningdong Base in developing a modern coal chemical demonstration park driven by a "Green Electricity + Green Hydrogen" dual-engine model. This initiative aims to drive the low-carbon transition of the local energy mix, establish a new paradigm for the net-zero industry, and provide strong momentum for the green upgrading of the modern coal chemical sector and the high-quality development of regional energy systems.

Green electricity: Under the “Green Electricity Park” initiative, the company replaces the traditional coal-fired power with green energy, and has completed the 1.64GW PV Project (Phase I), bringing the total installed capacity of green electricity in the Ningdong Base's to 18.31 GW—accounting for more than 50% of total capacity. Once operational, the project will generate 3 TWh of green electricity annually, reducing CO₂ emissions by over 2 million tons each year.

Green hydrogen: The company is advancing green hydrogen production to establish a closed-loop industrial chain across PV power generation, water electrolysis for hydrogen, chemical industry applications and hydrogen-powered transportation. Besides, it facilitates the “hydrogen-electricity coupling” project in the demonstration zone to realize a net-zero transition of hydrogen use in the chemical sector through the purification of industrial by-product hydrogen and green hydrogen production. These initiatives forms a model of annual carbon reductions of about 500,000 tons.

Smart power for high-efficient new energy accommodation

State Grid Ningdong is actively developing a “Virtual Power Plant+” intelligent control system to build a flexible regulation network that enables the source-grid-load-storage coordinated interaction. Utilizing advanced bidirectional control technologies, the platform has integrated 10.8 GW of new energy capacity, boosting on-grid new energy by 30% year on year and achieving a frequency regulation accuracy of 98%. This effectively mitigates the intermittency and volatility of wind and solar power generation. Meanwhile, the company is advancing a “PV-Storage-Charging” integrated microgrid demonstration project and has developed an innovative park-level energy router. This system deeply couples hub substations—such as the 750kV Xiling Substation—with distributed power sources, forming a dual-layer “macrogrid+microgrid” supply architecture that enables highly efficient new energy accommodation.

Energy decarbonization driven by customized services

State Grid Ningdong has established a “Power Supply + Energy Efficiency” demonstration and management platform to provide enterprises with comprehensive energy services and tailored conservation solutions, enabling optimized and efficient energy utilization. The company has pioneered a “one enterprise, one policy” precision service system targeting five energy-intensive enterprises, including coal-to-olefins producers. It has developed an intelligent energy efficiency diagnostic system to assess green electricity substitution potential and has generated 156 customized energy efficiency reports. A comprehensive client file system is built to provide over 100 enterprises with customized energy-saving plans, continuously helping them reduce costs and enhance efficiency.



Employees of State Grid Ningdong visit chemical enterprises in Ningdong Base to facilitate their energy conservation, cost reduction, and green transition.



Multiple Benefits

Environmental

By coordinating flexible resources and clean energy, power generation by new energy accommodation increased by 28% year on year, while the Ningdong Base's clean energy utilization rate rose to 98%. PV utilization improved from 85% to over 98%, cutting annual CO₂ emissions by 836,400 tons. The cumulative emission reduction in 2025 is expected to reach 20.91 million tons. Green hydrogen substitution has reduced the carbon intensity of coal chemical feedstocks by 76%. At Baofeng Energy's coal-to-olefins project, unit product energy consumption decreased by 15%, saving 180,000 tons of standard coal annually. These practices have been extended to other key sectors, such as coal-to-liquids, MTO coal-to-olefins, and cement, helping the three industries reach national energy efficiency benchmark levels.

Economic

The project has helped five energy-intensive enterprises lower their average electricity costs by 12%, saving more than US\$32 million in annual electricity expenses. Customer service timeliness and satisfaction rates both reached 100%, while electricity sales in 2024 increased by 19.62% year on year. Intelligent management systems also have improved equipment operational efficiency, reducing failure rates by 35% and saving around US\$3.9 million in annual O&M costs.

Social

The project has established a national demonstration model of “renewable energy-based hydrogen production + coal chemical,” promoting the region's development as a modern energy economy demonstration zone and offering a replicable example for net-zero transition. By increasing clean energy consumption and optimizing the regional energy mix, it supports green growth of local economy and strengthens the strategic importance of the Ningdong Base in China's energy landscape.



Application Scenarios

Large-scale energy and chemical bases and industrial parks across Northwest China and other regions nationwide.



“绿电”领航，打造宁东基地“零碳”转型新引擎



问题与挑战

作为西北唯一一个产值过千亿元的化工园区，宁东能源化工基地（简称宁东基地）年煤炭消费超5500万吨、二氧化碳排放超6700万吨，长期面临高能耗、高碳排困境。其中，能源结构中化石能源占比居高不下，且传统电网运行模式存在能源损耗较高、清洁电力消纳能力不足等问题尤其突出。在国家“双碳”目标刚性约束及环保政策收紧挑战背景下，宁东基地亟须实现绿色转型。



供电员工深入宁夏和宁化学有限公司现场查看电能替代情况



解决方案

国网宁东供电公司以绿色电力“领航”，系统推进能源供给清洁化转型，构建新型电力系统，促进新能源大规模高效消纳；创新实施“一企一策”定制化能效服务模式，提升能效管理精细化水平，助力园区向“零碳”目标迈进。

1. 双轮驱动，推动能源供给清洁化

国网宁东供电公司助力宁东基地打造“绿电+绿氢”双轮驱动的现代煤化工绿电示范园区，推动能源结构低碳转型，构建“零碳工业”新范式，为现代煤化工产业绿色升级与区域能源高质量发展提供关键动能。

► **绿电**：以建设“绿电园区”为抓手，通过绿电替代传统火电，建成164万千瓦光伏项目（一期），实现宁东电网绿电装机总量达1831万千瓦，绿电占比超50%。项目投产后，年发绿电30亿千瓦时，每年减排二氧化碳200万吨以上。

► **绿氢**：开展绿电制氢，助力园区建立“光伏发电-电解制氢-化工用氢-氢能交通”的闭环产业链，推动示范区内的“氢电耦合”项目通过工业副产氢提纯与绿氢互补，实现化工用氢“零碳化”转型，形成年减排50万吨碳的标杆效应。

2.智慧电力，促进新能源高效消纳

国网宁东供电公司积极推进“虚拟电厂+”智能调控体系构建，助力“源-网-荷-储”协同互动的柔性调节网络形成。该平台采用先进的双向调控技术，已接入1080万千瓦新能源装机，新能源上网电量同比提升30%，调频精度达98%，有效解决风光发电的随机性与波动性问题。同时，重点推进“光储充”一体化微电网示范工程，创新开发园区级能源路由器，将750千伏西岭变等枢纽变电站与分布式电源深度耦合，形成“大电网+微电网”双层级供电格局，实现新能源高效消纳。

3.定制服务，驱动企业用能低碳化

国网宁东供电公司打造“供电+能效”服务示范管控基地平台，为企业提供全方位用能服务和节能建议，实现能源的优化配置和高效利用。公司创新构建“一厂一策”精准服务体系，重点针对煤制烯烃等5家高载能企业，开发智能能效诊断系统，进行绿电替代测算，累计生成定制化能效账单156份。此外，建立完善的客户档案系统，为100多家企业提供“一企一策”定制化节能方案，持续推动企业降本增效。



国网宁东供电公司员工走访宁东基地化工企业助力节能降本与绿色转型

多重价值

环境效益

通过灵活资源与清洁能源协调互补，消纳新能源电量同比增长28%，园区清洁能源利用率提升至98%，光伏利用率从85%升至98%以上，年减少二氧化碳排放83.64万吨，2025年运营期内累计减排量达2091万吨。通过绿氢替代，煤化工原料碳强度下降76%，宝丰能源煤制烯烃项目单位产品能耗降低15%，年节约标煤18万吨，该经验已推广至煤制油、MTO煤制烯烃、水泥等重点领域，推动三大行业全部达到国家能效标杆水平。

经济效益

帮助5家高载能企业平均降低用电成本12%，年节约电费支出超2.3亿元。客户业务办理时限达标率、客户服务满意度均达100%，2024年售电量累计同比增长19.62%。此外，通过智能化管理平台提升设备运行效率，故障率降低35%，年节约运维成本2800万元。

社会效益

打造“可再生能源制氢+煤化工”全国示范样板，带动区域建设国家现代能源经济示范区，形成可复制的零碳转型经验。同时，通过提升清洁能源消费比重，优化区域能源结构，带动地方经济绿色增长，提升宁东基地在全国能源领域的战略地位。

应用场景

西北乃至全国同类型大型能源化工基地、工业园区。

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“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



Read the full version of 2025 Climate Solutions from
Chinese Enterprises
获取《中国企业应对气候变化解决方案》完整案例集



Learn more about GoldenKey SDG Solutions
了解更多关于
“金钥匙——面向SDG的中国行动”



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Authors: Guo Chenchen, Jiang Ying, Li Jiazhou
Editor: Li Sichu
Designer: Guo Zhiyu
Translator: Yang Mingming

作者: 郭辰晨、姜瑛、李嘉洲
编辑: 李思楚
设计: 郭志宇
翻译: 杨明明