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2025 Climate Solutions from Chinese Enterprises

应对气候变化的中国企业解决方案 (2025)

Painting a Green Blueprint for Jingning Guarding Its Growth and Harmony

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国家电网
STATE GRID

国网景宁县供电公司
STATE GRID JINGNING POWER SUPPLY COMPANY



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Challenges

Located in the mountainous and gorge-filled region of Lishui City, Zhejiang Province, Jingning She Autonomous County is home to 779 peaks over 1,000 meters high and boasting a forest coverage rate of 81.1%. The county's rich biodiversity is protected through seven nature reserves with strict controls on human activity. A key challenge was ensuring a stable power supply for these reserves under the stringent requirements of "zero disturbance" and "zero pollution." At the same time, 96 villages in Jingning sit at altitudes above 600 meters. The steep mountains, deep valleys, and dense forests have limited residents' means of increasing income, leading to relatively slow economic development. Ensuring secure and stable access to electricity for local households and industries—while pursuing zero-carbon growth and shared prosperity—thus became a central challenge.



Solution

State Grid Jingning Power Supply Company ("State Grid Jingning" for short) has fully leveraged the county's geographical strengths and natural endowments to accelerate the development and integration of distributed photovoltaic (PV) and small hydropower systems. Through these efforts, Jingning has become China's first county to maintain a self-balancing clean energy supply 365 days a year, setting the "Jingning Model" for building zero-carbon demonstration counties in China.

Energy supply: advancing clean energy development

Within the nature reserves, the company has built small-scale zero-carbon micro-energy grids powered by solar energy, and promoted portable solar power devices. These provide reliable, clean electricity for remote monitoring, species protection, and lightning prevention. In addition, through initiatives such as the Ethnic Village Collective PV Prosperity Project and rooftop PV projects, distributed PV systems have been extended into mountainous and rural areas, supporting the installation of more than 70 small-scale solar power stations.



Power company employees conduct a safety inspection at the Junyang Hydropower Station in Dajun Town to ensure safe and stable operations

More than 150 small hydropower stations built in the 1980s and 1990s once faced challenges such as non-standard construction and outdated management. In response, State Grid Jingning introduced integrated services combining "online + offline" centralized operations and maintenance, comprehensive equipment overhauls, and smart management solutions—maximizing the supply of green electricity across the region.

Energy accommodation: building a county-wide green power pan-microgrid

To ensure clean energy is visible, accessible, controllable, and efficiently utilized, State Grid Jingning developed a county-wide pan-microgrid project. By installing control terminals at hydropower and PV stations, the company built a hierarchical network architecture that coordinates the main grid, distribution network, and microgrids across four levels—county, balancing zone, line, and transformer. An integrated collaborative control system was established to enable centralized monitoring of wind, solar, hydro, and storage assets, coordinated optimization of the “source-grid-load-storage” framework, cluster-based hydropower dispatching, and demand-side interactive response.

The Jingning pan-microgrid officially came online in early 2023, adding 110 MW of new energy accommodation capacity. By 2024, grid losses had decreased by 1.79% compared with 2022, enabling the entire county to rely on clean electricity for an average of 15 hours per day.

Energy substitution: launching the “Electrified Jingning” initiative

State Grid Jingning continues to promote electricity substitution across all sectors, supporting the local government in building 70 new-era electrified villages and achieving a cumulative electricity substitution of about 12.82 GWh.

Industrial development: The company assisted Jingning’s pillar industry, Huiming Tea, in adopting electric-powered production equipment, enhancing efficiency and product quality. This upgrade increased the tea’s premium by over 35%.

Zero-carbon scenic areas: Three all-electric scenic areas were established. The company expanded the network of EV charging stations in tourist sites and rural areas, forming a 2-km EV charging circle to promote the shift from fuel to electric transport.

Rural livelihoods: Clean energy appliances such as induction cookers and electric heating were promoted, while policy incentives encouraged villagers to adopt electric-powered agricultural processing equipment and household tools.



Multiple Benefits

Environmental:

Jingning’s PV facilities generate approximately 6.56 GWh of electricity annually, equivalent to reducing 3,805 tons of carbon emissions each year. In 2024, the company accommodate 427.47 GWh of clean electricity, achieving 426,180 tons of carbon reduction. By increasing hydropower accommodation by 110.86 MWh, the county’s green electricity supply rate rose to 64.79%, further cutting carbon emissions by about 180,900 tons—equivalent to planting 361 square kilometers of forest.

Economic:

In 2024, Jingning’s power supply reliability reached 99.9920%, and voltage eligibility rate was 99.87%. These improvements supported a regional GDP of about US\$1.69 billion, up 8.1% year on year, and a per capita disposable income of about US\$5,894, up 7.7% year on year. The county ranked among the top ten in economic competitiveness among China’s 120 autonomous counties and banners.

Social:

By the end of 2024, Jingning had 718 distributed PV projects covering all 136 administrative villages, with a total grid-connected capacity of 75.2 MW and a stable annual income of about US\$2.53 million for village collectives. The county’s hydropower stations generated over 1 TWh annually, worth more than US\$70 million. Reliable electricity has become the driving force of rural vitalization, creating local jobs, increasing income for the Jingning ethnic community, and helping address rural labor migration and village hollowing.



A mobile prefabricated energy storage cabin in Dajun Town



Application Scenarios

Mountainous and valley regions, areas with rich new energy resources, like those rich in small hydropower and distributed solar resources, as well as nature reserves and other areas requiring minimal human interference



绘就绿色“景” 守护千山“宁”



问题与挑战

浙江省丽水市景宁畲族自治县地处高山峡谷地带，拥有779座千米高峰，森林覆盖率高达81.1%，物种资源丰富。县内设有7处自然保护区，区域内活动管控严格，如何在“零干扰”“无污染”要求下保障自然保护区基本电力供应，成为一道难题。同时，景宁县有96个村庄位于海拔600米以上，受山高、谷深、林密的地理条件限制，村民致富途径狭窄，经济发展相对缓慢。如何在这样的环境中，安全稳定地满足当地百姓日常生活与生产用能需求，实现零碳共富，亦是关键挑战。



解决方案

国网景宁县供电公司充分发挥景宁地理优势和自然禀赋，大力发展和消纳分布式光伏和小水电等清洁能源，打造出365天全天候不间断清洁能源自平衡第一县，为全国推进零碳示范县建设树立“景宁标杆”。

1. 能源供给：积极发展清洁能源

国网景宁县供电公司在自然保护区建设小光伏零碳微能源网，推广便携式太阳能供电装置，为保护区提供日常远程观测、物种保护和防雷工作所需的可靠清洁电能。同时，以民族村集体光伏小康工程、屋顶光伏工程为抓手，推动分布式光伏项目进山区、进农村，帮扶地方投入小光伏新能源项目70多座。



电力员工对大均乡均垟水电站开展安全隐患排查，保障水电站健康运行

景宁县于上世纪八九十年代建设的150余座小水电站普遍存在建设和管理不规范等问题，国网景宁县供电公司推出小水电“线上+线下”集中代运维、水电综合检修、智慧托管等业务，实现绿电最大化供给。

2. 能源消纳：打造县域绿电泛微网

为了让清洁能源“看得清、接得进、控得住、用得好”，国网景宁县供电公司建设县域泛微电网工程，通过在水电站、光伏电站等部署控制终端，构建主网、配电网、微电网协同的“县域-平衡区-线路-台区”泛微网架构，建设一体化协同管控系统，涵盖风光水储集中监控、“源-网-荷-储”协同优化、水电集群调度、负荷侧互动响应等功能。

2023年初，景宁县域泛微网工程正式投运，新增新能源消纳能力11万千瓦。2024年电网损耗较2022年降低1.79%，实现全县日均15个小时使用清洁电。

3. 能源替代：开展“电气化畲乡”行动

国网景宁县供电公司持续推进各领域电能替代，助力当地政府建成新时代电气化村70个，累计替代电量1281.58万千瓦时。

产业发展方面：推动景宁支柱产业惠明茶采用电驱动生产设备，提高生产效率，保证茶叶品质的稳定性和高端化，实现产品溢价率提升35%以上。

零碳景区方面：打造3个全电景区，推进电动汽车充电桩在景区和乡村的布局，打造2公里电动汽车充电圈，引导旅游交通工具“油改电”。

村民生活方面：推广电磁炉、电采暖等清洁能源设备，并通过政策措施，引导村民自觉采用电力驱动的农业加工设备和生活用具。



多重价值

环境效益

景宁光伏设施年发电量可达约656万千瓦时，相当于每年减少碳排放量约3805吨；2024年，国网景宁县供电公司消纳清洁能源电量4.2747亿千瓦时，消纳清洁能源碳减排量42.618万吨；增加水电消纳110.86兆瓦时，绿电供应率提高至64.79%，折算减少碳排放量约18.09万吨，约等于植树面积361平方公里。

经济效益

2024年景宁供电可靠率达99.9920%，电压合格率达99.87%，助力同年地区生产总值达119.7亿元，同比增长8.1%；全县常住居民人均可支配收入41980元，同比增长7.7%；县域经济基本竞争力位列全国120个自治县（旗）前十位。

社会效益

截至2024年底，景宁分布式光伏项目达718个，覆盖全县全部136个行政村，全域光伏并网容量达7.52万千瓦，每年为村集体经济带来1800万元的稳定收入。景宁县水电年均发电量超10亿千瓦时，年产值达5亿余元。可靠的电力成为推动乡村振兴、改善民生福祉的“源头活水”，为景宁畲族群众就近就业提供岗位和资金，有效解决农村劳动力转移和空心化问题。



景宁畲族自治县大均乡移动式储能预制舱



应用场景

高山深谷较多的区域，小水电和分布式光伏项目等新能源丰富的地区，自然保护区等对人类活动和扰动有要求的地区。

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
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“金钥匙——面向SDG的中国行动”



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