

Greening the Pomegranate Industry Lighting Up the Low-Carbon Path for Rural Vitalization

“绿”动石榴产业，点亮低碳乡村路

国网山东省电力公司枣庄供电公司



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Challenges

Promoting low-carbon agricultural transition and building clean, efficient energy systems are key pathways to address global climate challenge. Zaozhuang, one of China's seven major pomegranate production areas, recorded a total industrial output value of US\$674 million in 2024. Facing new requirements under China's "dual carbon" (carbon peaking and neutrality) goals and the mission of rural vitalization, the pomegranate industry hits upon a pressing need to upgrade from traditional planting and processing to smart, low-carbon, and high-efficiency development. This calls for innovative models for low-carbon rural transformation.



Power Steward" services

Solution

State Grid Zaozhuang Power Supply Company ("State Grid Zaozhuang" for short) leverages the green energy transition as a strategic entry point. Within the Pomegranate Orchard covering over 6,667 hectares, it pioneers an integrated pattern featuring "Pomegranate Industry + Smart Energy", focusing on microgrid construction, digital services, efficiency improvement, and electricity substitution. A synergistic "Grid-Industry-Village" ecosystem is thus taken shape.



2025 Climate Solutions from Chinese Enterprises 应对气候变化的中国企业解决方案 (2025)



Green mobility for sightseeing



microgrid construction

Smart microgrid construction leads the industry toward green transition. In the orchard's core zone, a smart microgrid system integrating source, grid, load, storage, and charging has been completed and put into operation. By integrating solar and wind power, energy storage, and intelligent dispatching technologies, the project has improved power reliability and energy efficiency for the local pomegranate industry.

"Power Steward" services create a smart energy ecosystem for pomegranate industry. By integrating VR visualization, big-data analytics, and other advanced technologies, a real-time VR smart power platform for pomegranate cultivation is developed. Through high-precision modeling combined with real-time equipment load data, the platform enables grid facilities, line layouts, and their connections with orchards and processing plants to become visible, connected, and quantifiable. This allows for accurate decision-making and efficient execution, improves the quality of pomegranate products, and stimulates new momentum for coordinated growth along the industrial chain.

"Cloud Bill" analysis system empowers energy optimization and efficiency improvement. Designed to enhance performance across the entire pomegranate industrial chain, the "Cloud Bill" analysis system is developed to integrate multi-source electricity consumption data and identify inefficiencies, thus supporting refined management of corporate energy behavior. This endeavor helps companies effectively reduce electricity costs while improving energy efficiency.

Electricity substitution drives comprehensive carbon reduction in scenic areas. State Grid Zaozhuang helps replace coal-fired boilers and bottled gas with electric heating and cooking equipment, significantly cutting carbon emissions. Over the next five years, an "Invisible Power Infrastructure" initiative will bury poles to preserve the area's natural and cultural landscape, ensure a reliable power supply, and advance the efforts toward beautiful, low-carbon villages.



Multiple Benefits

Remarkable emission and energy reduction outcomes. State Grid Zaozhuang has supported 78 pomegranate companies and 1,505 farming households in connecting distributed PV systems to the grid, helping local businesses complete the electricity substitution. So far, the project has achieved 9.08 GWh of substituted electricity use, saving around US\$970,000 in energy costs. After nine months of operation, the Jiaquan Village solar-storage-charging integrated station has served over 400 vehicles, generating 35 MWh of electricity from solar and wind power and forming a virtuous cycle of "green vehicles charged by green power." The project also facilitated the construction and commissioning of two 25MW biomass power generation units, which consume about 600,000 tons of pomegranate-related agricultural waste each year.

Big increase in local economic returns. The quality of electricity for pomegranate cultivation has improved markedly, driving the industry's growth, entrepreneurship and employment, and farmers' income. By the end of 2024, 192,000 new pomegranate trees had been planted, adding about US\$30 million to the total industrial output. The average income of farmers in the park now exceeds the city's rural average by about US\$1,124 per person.

Notable results in digital and intelligent transition. The project has supported the establishment of a Comprehensive Pomegranate Trading Center, which maintains an inventory of 40 tons of fresh pomegranates and reaches an annual transaction volume of 150,000 tons. In terms of the intelligent park upgrading, a 5G smart factory is built, further strengthening the local pomegranate industry's clustered growth.



Application scenarios

Rural-specific agricultural park, scenic areas

“绿”动石榴产业， 点亮低碳乡村路

问题与挑战

推动农业绿色低碳转型、构建清洁高效的能源体系，是全球应对气候变化挑战的重要路径。山东省枣庄市是中国七大石榴主产区之一，2024年全产业链产值达48亿元。面对“双碳”目标新要求和乡村振兴新使命，石榴产业面临从传统种植加工向智慧、低碳、高效方向转型升级的现实难题，亟需探索乡村低碳发展的新模式。



“电管家”服务

解决方案

国网枣庄供电公司以能源绿色转型为突破口，在万亩榴园景区，积极探索“石榴产业+智慧能源”融合发展模式，以微电网建设、数字服务、能效提升和电能替代为抓手，构建“电网—产业—乡村”的联动生态。





“旅游观光绿色出行



微电网”建设

“微电网”建设，示范引领传统产业向绿而行。在万亩榴园核心区域，建成并投运了集“源、网、荷、储、充”于一体的智慧微电网系统，通过集成光伏、风电、储能和智能调度技术，提升当地石榴产业的供电可靠性和能源利用效率。

“电管家”服务，打造石榴产业智慧用能新生态。融合VR、大数据等前沿技术，构建“石榴用电实景平台”，通过高精度实景建模并融合设备负荷等实时数据，让电网设备、线路走向与石榴种植基地、加工厂商等“看得见、联得上、算得清”，驱动精准决策与高效执行，提升石榴产品品质，激活产业链协同发展动能。

“云账单”分析，赋能用电优化与能效提升。为提升石榴全产业链和深加工企业能效水平，开发企业用电“云账单”分析平台，系统融合企业用电多源数据，精准识别用能问题，帮助企业实现用电行为的精细化管理，有效降低用电成本，提升能源使用效率。

“电能替代”，推动景区全面降碳减排。协助景区淘汰传统燃煤锅炉与瓶装煤气，推广电采暖、电厨具等设备，有效降低碳排放。未来五年，将在景区实施“电力设施隐型化”工程，推进景区电杆全部下地，在保障供电的同时，维护景区自然与文化风貌，助力美丽乡村建设。

多重价值

减排降耗成效明显。助力当地78家石榴企业、1505家种植户的分布式光伏并网服务，帮助区域众多企业完成电能替代，累计替代电量907.86万千瓦时，节约企业用电成本约690万元。贾泉村光储充一体化充电站运行9个月累计服务车辆400余次，利用光伏与风电发电3.5万千瓦时，形成“绿车充绿电”良性循环。服务2台25兆瓦生物质发电机组建设投产，年消耗石榴相关废弃物约60万吨。

当地收益提升可观。石榴种植用电质量显著提升，推动了石榴产业的发展，促进创业就业、增加农民收入。截至2024年底，助力枣庄市新种植石榴19.2万株，全产业链总产值增加2.2亿元，园区榴农人均收入高出全市农村居民0.8万元。

数智赋能效益显著。助力建成石榴综合交易中心，以保鲜石榴8万斤的库存，实现年鲜果交易量达到15万吨。助力产业园智能升级，建设5G智慧工厂，进一步壮大当地石榴产业的集群发展。

 应用场景 乡村特色农业园区、景区

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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