

Toward Net Zero How BOE Created the World's First "Net-ZeroCarbon Factory" in the Display Industry

迈向净零：
京东方如何打造显示行业全球首家“零碳工厂”

BOE





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Challenges

Amid the global drive to achieve the carbon peaking and neutrality goals, the low-carbon development of the display industry has become a critical direction for its transformation and upgrading. As China holds a leading position in global display panel production capacity, the manufacturing process involves intensive consumption of electricity and water, resulting in substantial overall energy use that translates directly into high operating costs and significant decarbonization pressure.

Stringent carbon emission standards and environmental regulations have increased approval barriers and operational costs for energy-intensive panel manufacturers seeking to expand or establish new production lines. Technological innovation must strike a balance between enhancing performance and reducing energy consumption, which heightens R&D complexity and costs in the short term. Meanwhile, under the trend of global economic integration and a fragmented market demand, display companies must design customized screens for a wide range of end devices—such as glasses, automotive displays, and wearables, requiring greater foresight and flexibility in innovation and significantly increasing R&D risks. Choosing between a “sharper screen” and a “more energy efficient screen” has become an increasingly challenging strategic decision.

The display industry is highly internationalized, and its level of green supply chain management directly affects the global competitiveness of Chinese products. Meanwhile, international brands are cascading decarbonization requirements down their supply chains, demanding transparent and reliable product carbon footprint data to calculate Scope 3 emissions. Regulatory frameworks such as the EU's Ecodesign for Sustainable Products Regulation (ESPR) set strict requirements for the energy efficiency, recyclability, and carbon footprint of display products, creating new “green trade barriers”.



Solution

In response to these challenges, leading panel manufacturers are pioneering new pathways through technological and managerial innovation. As a leading global innovator in the Internet of Things (IoT), BOE has formulated its sustainability strategy under the guidance of its “Screen of Things” strategy. It is supported by a three-tier sustainability governance structure—comprising the governance, management, and execution levels—to ensure the deep integration of BOE’s six strategic pillars into the company’s operation: Open Innovation, Env.Sustainability, Genesis Field, Humanity, Responsible Co., and Society.

BOE has also launched “ONE” (Open Next Earth), the first sustainability brand in China’s display industry. With a brand ethos of “Open, Next, and Earth,” BOE is dedicated to advancing open and innovative technologies that safeguard the future of humanity. Through green technological innovation and the principles of circular economy, BOE is defining a new paradigm of symbiosis between industry and nature. Guided by six core pathways—green management, green products, green manufacturing, green recycling, green investment, and green action—the company has established a low-carbon system spanning its entire value chain. In the realm of green manufacturing, BOE continues to invest in sustainable operations—from achieving 100% renewable energy coverage and end-to-end carbon footprint management, to driving emission reductions through technological innovation and promoting industry-wide replication of low-carbon models. These efforts have culminated in the creation of the world’s first “net-zero carbon factory” in the display industry—the BOE Mianyang Gen 6 flexible AMOLED production line. This facility has achieved green, low-carbon, and circular operations throughout its production process, setting a new benchmark for green development in the high-end manufacturing sector.

Defining the “net-zero carbon factory”: integrating technology and eco-friendliness

The creation of the “net-zero carbon factory” reflects BOE’s unwavering pursuit of integrating technological innovation with sustainable development. As the first carbon-neutral factory in the global display industry, the BOE Mianyang Gen 6 flexible AMOLED production line achieved its net-zero goal through three core pathways:

1. 100% green electricity coverage: In 2023, the factory achieved 100% renewable energy use by investing in rooftop PV and procuring green electricity from wind and solar sources. This large-scale adoption of clean energy not only reduced carbon emissions but also ensured a stable and reliable power supply.

2. Full-process carbon management: From raw material procurement to production, BOE conducts carbon footprint monitoring and optimization analysis to identify key areas for carbon reduction. This approach minimizes the carbon impact of product iterations and ensures transparent emissions management. BOE’s product carbon footprint now ranks at an industry-leading level.

3. Technology-driven emission reduction: BOE leverages technological innovation to drive energy conservation and carbon reduction. By optimizing production processes—such as extending NF_3 gas cleaning cycles, retrofitting air compressors for energy efficiency, and implementing smart lighting controls in cleanrooms—the factory reduced direct carbon emissions by 3,255 tons and indirect emissions by 3,677 tons in 2023. This “technology + green” model not only enhances energy performance but also boosts production efficiency.



Rooftop PV system at BOE Mianyang Gen 6 flexible AMOLED production line



The Energy Management System of BOE Mianyang Gen 6 flexible AMOLED production line

Core technology: from decarbonization to empowerment

The BOE Mianyang Gen 6 flexible AMOLED production line has not only significantly reduced energy consumption through a series of technological innovations but also leveraged its “green efficiency” to enhance productivity. This has created a win-win situation for both environmental and economic performance, driving collaborative upgrades across the entire industry.

1. Rooftop PV system: A 31.7MW distributed PV project, constructed by BOE Energy, utilizes the 230,000-m² rooftop of BOE Mianyang Gen 6 flexible AMOLED production line—an area equivalent to 32 standard football fields. Through a “self-generation for self-consumption” model, all green electricity generated by the rooftop PV system is accommodated on the production line’s 20kV side. Statistics shows that the project generates an average of 24 GWh of electricity annually, reducing CO₂ emissions by 12,800 tons each year. This further reduces reliance on traditional energy sources and strengthens BOE’s green competitiveness.

2. Energy management system: Powered by an industrial data center (IDC) with robust data integration and analytics capabilities, the factory’s energy management system provides real-time tracking of energy consumption across all production stages—from manufacturing to equipment operation. By systematically analyzing this data, the system identified over 60 energy-saving measures in 2024, resulting in cumulative electricity savings of 32.63 GWh and a carbon reduction of 17,500 tons.

3. Technology-enabled industry-wide upgrades: Innovative models pioneered at BOE Mianyang Gen 6 flexible AMOLED production line—such as “self-built PV system” and the “Free Cooling Project”—are being rapidly replicated across other BOE facilities. The Free Cooling Project alone saves 5.8 GWh of electricity and reduces CO₂ emissions by 3,112 tons annually, providing a scalable, low-cost decarbonization solution for energy-intensive clean production sectors. This showcases both the technological innovation and the industry-wide inclusiveness of BOE’s approach.

BOE’s success in its “net-zero carbon factory” demonstrates that energy-intensive industries and sustainable development are not mutually exclusive, but can thrive in synergy. This transformation represents more than a single factory’s evolution—it is BOE’s firm commitment to global climate governance. The company is turning the global vision of the Paris Agreement into tangible actions—embedding precise carbon

management in workshops and driving green innovation on production lines, integrating climate goals deeply into its innovation DNA and operational practices. As of October 2025, 18 of BOE’s factories have been recognized as “National Green Factories.” The company also operates the display industry’s only “National Zero Waste Enterprise,” one “Lighthouse Factory,” two “Net-Zero Carbon Factories,” and four “National Green Supply Chain Management Demonstration Enterprises.” Furthermore, one product has obtained UL 2809 certification, two have achieved UL 3600 certification, and seven factories have earned the highest Platinum certification for UL 2799 Zero Waste to Landfill. BOE also actively supports international initiatives such as the Science Based Targets initiative (SBTi) and CDP—nine factories have joined SBTi, and one has received an EcoVadis Platinum rating.

In the new global landscape of supply chain remodeling and green trade barriers, the development path grounded in “technology + green” model is no longer optional—it has become an imperative for sustaining future international competitiveness. BOE’s experience provides a replicable and scalable blueprint for the global high-end manufacturing sector. Through continuous technological innovation and open ecosystem collaboration, BOE is not only achieving outstanding carbon reduction results but also enabling green transition across diverse industries.



Multiple Benefits

Economic

The rooftop PV project at BOE Mianyang Gen 6 flexible AMOLED production line generates an average of 24 GWh of electricity annually, reducing reliance on traditional energy sources and enhancing green competitiveness. Through its energy management system, BOE identified over 60 energy-saving measures in 2024, achieving cumulative electricity savings of 32.63 GWh. Innovative models such as “self-built PV system” and the “Free Cooling Project” are rapidly being replicated across other BOE facilities, providing scalable, low-cost decarbonization solutions for energy-intensive clean production sectors.





BOE Mianyang Gen 6 flexible AMOLED production line

Social

The “carbon management” practices at BOE Mianyang Gen 6 flexible AMOLED production line have generated tangible benefits for the local community and environment. By improving resource efficiency, it reduces overall consumption, helping to deliver cleaner air and a better quality of life. During periods of drought or extreme heat, BOE prioritizes access to electricity and water for local residents. Indirectly, effective carbon management strengthens the company's overall competitiveness, boosts the local economy, and delivers tangible benefits to the public.

Environmental

Through its innovative model of “green electricity coverage + carbon footprint management + technology-driven carbon reduction,” BOE has pioneered carbon neutrality in its production processes. As the world's first “net-zero carbon factory” in the display industry, BOE Mianyang Gen 6 flexible AMOLED production line achieves an annual emission reduction of over 500,000 tons, setting a replicable and scalable example of green transition for the global high-end manufacturing industry.



Free Cooling Project of BOE Mianyang Gen 6 flexible AMOLED production line

Application Scenarios

Energy-intensive clean production sector



迈向净零：

京东方如何打造显示行业全球首家“零碳工厂”

问题与挑战

在全球积极践行“双碳”目标的大背景下，显示产业的绿色低碳发展已成为行业转型升级的关键方向。中国在全球显示面板的产能方面已占据领先地位，在面板生产过程中应用大量的电、水，总体能耗较大，这直接转化为巨大的运营成本和减碳压力。

严格的碳排放指标和环保法规，使得高耗能的面板企业在扩产或新建产线时面临更大的审批压力和运营成本。技术创新必须在提升性能和降低能耗之间找到平衡，短期内增加了研发复杂性和成本。与此同时，在全球经济一体化的大趋势下，市场需求碎片化。显示企业需要为不同形态的终端（例如，眼镜、汽车、可穿戴设备）开发定制化屏幕，这要求技术创新更具前瞻性和灵活性，研发风险显著增加。是选择“更清晰的屏幕”还是“更低功耗的屏幕”，决策难度加大。

显示产业是高度国际化的产业，其供应链的绿色化管理程度影响着中国产品在国际市场的竞争力。同时，全球化的品牌商开始将减碳压力向供应链传递，他们要求面板企业提供透明、可靠的产品碳足迹数据，以核算其“范畴三”碳排放。像欧盟的《可持续产品生态设计法案》等法规，对显示产品的能效、可回收性、碳足迹都提出了硬性指标，形成了新的“绿色贸易壁垒”。

解决方案

面对上述挑战，领先的面板企业正在通过技术和管理创新，积极探索破局之道。作为全球领先的物联网创新企业，京东方正以“屏之物联”战略为指引，制定可持续发展战略，依托“治理层—管理层—执行层”的可持续发展三层架构，确保“开放创新、环境永续、共赢生态、以人为本、正道经营、创益未来”六大可持续发展战略支柱与公司运营深度融合。

同时，京东方发布中国显示行业首个可持续发展品牌“ONE”（Open Next Earth），以“开放包容（Open）、创新引领（Next）、永续生态（Earth）”为品牌内涵，以开放创新科技之力守护人类未来。京东方通过绿色技术创新和循环经济发展，定义产业与自然共生新范式，通过“绿色管理、绿色产品、绿色制造、绿色循环、绿色投资、绿色行动”六大路径，构建了覆盖全价值链的低碳体系。在绿色制造领域，从100%可再生能源覆盖到全流程碳足迹管理，从技术创新驱动减排到低碳模式行业复制，京东方持续投入，打造全球显示行业首家“零碳工厂”——京东方绵阳第6代柔性AMOLED生产线，实现生产全过程绿色化、低碳化、循环化，为高精尖制造业领域树立了一个崭新的绿色发展典范。

定义“零碳工厂”：科技与绿色的深度融合

“零碳工厂”的诞生，源于京东方对技术创新与可持续发展融合的极致追求。作为全球显示行业首家实现“碳中和”的工厂，京东方绵阳第6代柔性AMOLED生产线通过三大核心路径达成“零碳”目标：

1.100%绿电覆盖：2023年，工厂通过投建屋顶光伏并采购风电、光伏等绿电，实现生产用电100%采用可再生能源化。大规模的绿电使用，不仅减少了碳排放，还为工厂提供了稳定、清洁的能源支持。

2.全流程碳管理：从原材料采购到生产环节，通过碳足迹监测与优化分析减碳重点方向，减少产品迭代升级带来的碳排放影响，实现碳排放透明化管控，目前，京东方的产品碳足迹已处于行业领先水平。

3.技术减排降碳：以技术创新驱动节能减排，通过优化生产工艺持续发力，例如，延长 NF_3 气体清洗周期、空压机节能改造、洁净室智能照明调控等技术，推动2023年直接碳排放减少3255吨，间接减排3677吨。这种“技术+绿色”的创新模式，不仅降低了能耗，还提升了生产效率。



京东方绵阳第6代AMOLED柔性生产线屋顶光伏



京东方绵阳第6代柔性AMOLED生产线能源看板

硬核科技：从减碳到赋能的升级

京东方绵阳第6代柔性AMOLED生产线不仅通过一系列技术革新显著降低能耗，更以“绿色效能”反哺生产效率，实现环境效益与经济效益双赢，推动全行业协同升级。

1.屋顶光伏：由能源科技投建的31.7MW分布式光伏项目，利用了京东方绵阳第6代柔性AMOLED生产线23万平方米的屋顶面积，总面积可达32个标准足球场大小。京东方通过“自发自用”模式，将屋顶光伏所发绿电在生产线20kV侧全部消纳。数据显示，绵阳京东方屋面光伏项目年均发电量可达2400万kWh，每年可减少二氧化碳排放1.28万吨，进一步减少对传统能源的依赖，提升绿色竞争力。

2.能源管理体系：能源管理体系采用IDC工业数据中心，拥有强大的数据整合和数据分析能力，通过对全公司各个生产环节的能源消耗进行实时追踪，包括生产制造、设备运转等各方面，系统分析并改善节能措施，2024年提出60余项节能措施，累计节电3263万kWh，减碳1.75万吨。

3.技术普惠赋能行业升级：京东方绵阳第6代柔性AMOLED生产线的“光伏自建”“自由冷却项目”等创新模式正快速复制至京东方其他产线。以“自由冷却项目”为例，其年节电量580万kWh、减少二氧化碳排放3112吨，为高耗能洁净生产领域提供了可推广的低成本减碳方案，彰显了技术创新性与行业普惠性。

京东方“零碳工厂”的成功实践证明，高耗能产业与可持续发展并非取舍，而是可以相辅相成的统一体。这不仅仅是一家工厂的转型，更是京东方对全球气候治理的坚定回应——以实际行动，将《巴黎协定》的全球愿景转化为车间里的精

准碳管理和生产线上的绿色革新。将气候目标深度融入企业创新基因与运营血脉。截至2025年10月，京东方旗下18家工厂获评“国家级绿色工厂”，并拥有显示行业唯一一家国家级“无废企业”，1家“灯塔工厂”，2家“零碳工厂”以及4家国家级“绿色供应链管理示范企业”。在1款产品获得UL 2809认证、2款获得UL 3600认证的同时，7家工厂获得UL 2799废弃物零填埋最高等级铂金级认证。此外，京东方还积极响应SBTi及CDP等相关国际倡议，旗下已有9家工厂加入科学碳目标倡议组织（SBTi），1家工厂荣获EcoVadis铂金等级认证。

面对全球供应链重塑与绿色贸易壁垒的新格局，这条以“科技+绿色”为底色的发展路径，已不再是可选项，而是关乎未来国际竞争力的必答题。京东方的案例为全球高精尖制造业提供了一个可复制、可推广的蓝图。通过持续的技术创新与开放的生态协作，京东方不仅能交出优异的碳减排答卷，更能赋能千行百业的绿色转型。



多重价值

1.经济效益

京东方绵阳第6代柔性AMOLED生产线屋面光伏项目年均发电量可达2400万kWh，进一步减少对传统能源的依赖，提升绿色竞争力。通过能源管理体系对全公司各个生产环节的能源消耗进行实时追踪，系统分析并改善节能措施，2024年提出60余项节能措施，累计节电3263万kWh。京东方绵阳第6代柔性AMOLED生产线的“光伏自建”“自由冷却项目”等创新模式正快速复制至京东方其他产线，为高耗能洁净生产领域提供了可推广的低成本减碳方案。





京东方绵阳第6代柔性AMOLED生产线

2. 社会效益

京东方绵阳第6代柔性AMOLED生产线的“碳管理”对绵阳的城市发展和环境带来了益处。从直接方面来看，通过碳管理提升了资源的利用效率，减少了对资源的消耗，让老百姓看到更多的蓝天，感受到鸟语花香，而且在特别干旱或者特别炎热等极端天气，让利于百姓、让电于百姓、让水于百姓。从间接方面来看，碳管理直接提升了企业的综合竞争能力，给地方经济作出更多的贡献，也让老百姓受到了实惠。

3. 环境效益

京东方通过“绿电覆盖+碳足迹管理+技术降碳”的创新模式，率先实现生产环节的“碳中和”。作为全球显示行业首家“零碳工厂”，京东方绵阳第6代柔性AMOLED生产线通过“科技+绿色”的深度融合，实现了年减排超50万吨的显著成效，率先实现生产环节的“碳中和”，为高精尖制造业探索出一条可复制、可推广的绿色路径。



京东方绵阳第6代柔性AMOLED生产线自由冷却项目



应用场景

高耗能洁净生产领域

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



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