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Responsible Product



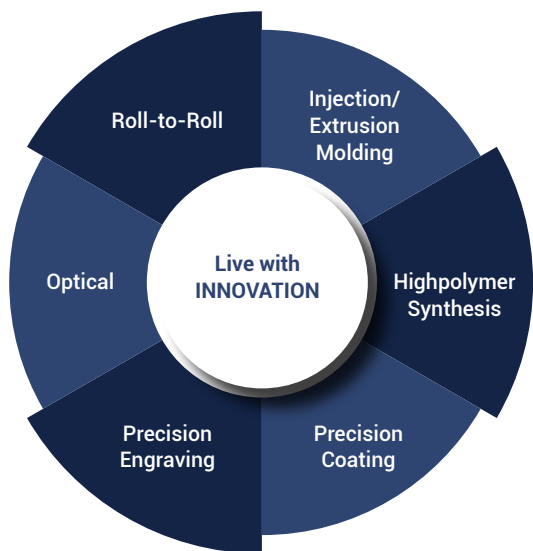
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Core Technology and Intellectual Property Management

Six Main Core Technologies

BenQ Materials has developed from optical design and material R&D to process optimization. Through years of development and experience accumulation, the company currently possesses two major material technologies: optical multilayer film design and polymer synthesis, as well as four major process technologies: roll-to-roll processing, precision engraving, precision coating, injection molding, and extrusion.



Product Manufacturing Process

BenQ Materials products are divided into display materials, battery materials, medical and care products, and fabric series. After being produced in the five major operating sites, display materials and battery materials are shipped to B to B customers, while medical and care products and functional fabrics are shipped to B to B customers, distributors, medical institutions, or e-commerce platforms depending on the nature of the product. The corresponding operating sites and production processes of each product line can be found on the [BenQ Materials ESG website](#).

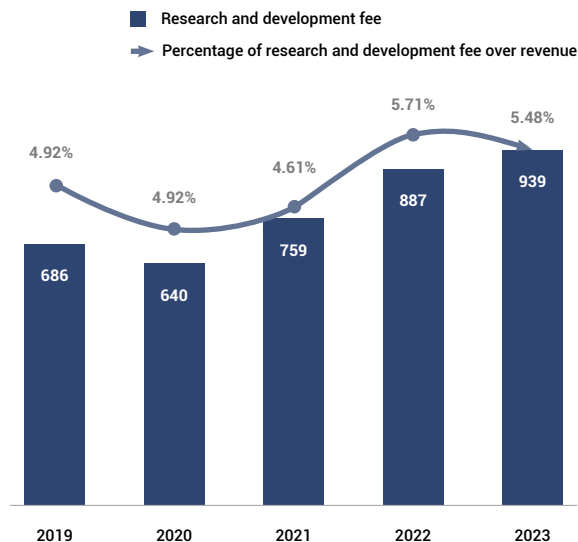
Intellectual Property Management

Intellectual property is a key capability for sustainable profitability. To protect research and development results and technological competitiveness, BenQ Materials actively encourages innovation and independent R&D. The intellectual property strategy focuses on core technologies, combining the company's technological and product development layout as the primary goal. The company continuously promotes patent deployment, providing timely patent protection and effective management for high-potential technologies and innovations produced during production and operations.

In 2023, BenQ Materials passed the Taiwan Intellectual Property Management System (TIPS) A-level certification re-inspection, systematically protecting R&D achievements and maintaining professional technical competitiveness.



Historical Research and Development Investment Amount and Percentage



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Intellectual Property Management Goals

- 1 Develop intellectual property management plans linked to operational goals and continuously promote the TIPS intellectual property management system, regularly reporting the implementation status of intellectual property management plans to the Board of Directors and disclosing them on the official website.
- 2 Implement intellectual property management, integrating various intellectual property management regulations, and clearly establishing the relevance of various intellectual property-related operating procedure documents.
- 3 Strengthen the R&D document management system, fully digitizing R&D records.
- 4 Establish a patent information monitoring system.
- 5 Regularly conduct internal audits and hold management review meetings, as well as organize education and training courses for working groups.
- 6 To enhance employees' intellectual property awareness, organize educational training courses, including:
 - Intellectual property courses for new employees.
 - Advanced intellectual property courses for R&D personnel.
 - Advanced training courses for intellectual property specialists.

Intellectual Property Management Achievements

Since 2000, BenQ Materials has filed over 1,200 global patent applications and obtained over 800 patents as of December 2023, with coverage in major markets and countries including Taiwan, the United States, the European Union, Japan, mainland China, and India. The execution results of BenQ Materials' intellectual property management were reported to the fourth Board meeting on November 2, 2023.

Patent Outcome	2019	2020	2021	2022	2023
Number of Applications	46	63	44	39	78
Number of Certificates Granted	30	30	37	38	33

Collaborative Innovation with Academia and Industry

To continuously enhance innovation and R&D capabilities and product competitiveness, BenQ Materials has actively engaged in cooperation and exchanges with domestic academic research institutions in recent years. Collaboration partners include the Industrial Technology Research Institute, National Tsing Hua University, National Cheng Kung University, National Taiwan University of Science and Technology, Chang Gung University, National Yunlin University of Science and Technology, Far East University, and other academic institutions with abundant research capabilities. Collaborative projects cover areas such as smart medical care, solid-state battery material R&D, new material development, and biomedical technologies. In 2023, 12 industry-academia cooperation projects were implemented, with an R&D investment of over NT\$14 million. The project outcomes include 3 Taiwan invention patents (1 granted: TWI759106), 2 Chinese patents, and 2 US patents. For more details on intellectual property management, please visit [the BenQ Materials website](#).





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Sustainable Design and Innovation of Products

In 2023, BenQ Materials incorporated the requirement that new product development must be 100% compliant with sustainability definitions into the product development procedure. Using a life cycle perspective, from design, manufacturing, logistics, to end use, maintenance, and disposal stages, and integrating the concept of a circular economy, the main principles for product design and innovation include "structure optimization," "environmentally friendly raw materials," "recyclable materials," "low impact components," "reduction of product packaging," and "product safety." The goal is to reduce the overall environmental impact of products and create sustainable value.

Display Materials

Aspect	Design Principle	Current Status
Design	Structure optimization	In terms of structure, the goal is to achieve the same functional specifications by reducing the material thickness. The actual product thickness will be determined based on customer requirements.
		<p>Polarizer :</p> <ul style="list-style-type: none"> The total thickness of each layer of the finished product is reduced by 30%, which can reduce material usage. The thickness of OLED products is reduced from 130um to 98um, effectively reducing the total thickness by 25%. <p>PDLC Smart Optical Film :</p> <ul style="list-style-type: none"> The adhesive layer thickness is the thinnest in the industry, only 8-10 um (industry average is 15-20 um). The conductive layer thickness is the thinnest in the industry, only 125 um (industry average is 188 um). <p>Optical Films :</p> <ul style="list-style-type: none"> A single-layer structure is planned to be introduced in 2024, which can reduce the overall thickness by at least 80um.

Aspect	Design Principle	Current Status
Design	Better Materials	<p>Polarizers :</p> <ul style="list-style-type: none"> Solvent-free Pressure-sensitive Adhesive: Significant design adjustments have been made to the formulation and process from the source, expected to reduce overall carbon emissions by 18%. Pressure-sensitive Adhesive Compliant with PFAS-free Requirements: New product development is underway, expected to be completed by the end of 2025. <p>PDLC Smart Optical Film :</p> <ul style="list-style-type: none"> The currently used transparent conductive film has the best appearance quality and optical coefficients in the industry. The 97/95 series is the highest transparency product in the industry, and its haze when electrically transparent is also the lowest in the industry.
		<p>Recyclable Materials</p> <p>Polarizer :</p> <ul style="list-style-type: none"> Recycle process chemicals and packaging materials for reuse, reducing the total amount of waste. (For details, refer to section 5-6 Circular Economy) <p>Optical Adhesives :</p> <ul style="list-style-type: none"> Plan to conduct raw material PET (Polyethylene Terephthalate) recycling tests in 2024. <p>Optical Film :</p> <ul style="list-style-type: none"> Utilizing solvent-free pressure-sensitive adhesives can reduce oven time during the process and lower the emission of volatile organic compounds into the atmosphere. Plan to simplify the production process in 2024, reducing the scrapping of release films.
	Low-impact elements	<p>Optical Adhesive :</p> <ul style="list-style-type: none"> Adopting a solvent-free process, which eliminates the need for ovens during manufacturing, thereby reducing electricity usage and carbon emissions. The absence of added acids enhances user safety and reduces the release of harmful substances into the environment during the process. Initiated the evaluation of the feasibility of self-manufacturing chemical raw materials used in pressure-sensitive adhesives.
		<p>Product safety</p> <p>Polarizer :</p> <ul style="list-style-type: none"> All raw materials used comply with the EU RoHS regulations. <p>Optical Adhesive :</p> <ul style="list-style-type: none"> The Yunke plant has passed ISO 9001, ISO 14001, and automotive certification IATF 16949. <p>PDLC Smart Optical Film :</p> <ul style="list-style-type: none"> Compliant with REACH/RoHS regulations and GP standards.
Manufacture	High-Performance Manufacture	<p>Process Switching Time Reduction Project: Increased production capacity by 3% compared to 2022.</p> <p>Coating Line Glue Machine Speed Increase: Increased machine speed from 35 meters to 38 meters, resulting in a 3% increase in monthly production capacity. (Taoyuan Plant)</p> <p>Introduction of Robotic Process Automation (RPA): Reduced working hours by 675 hours per quarter compared to 2022.</p>
		<p>Polarizer :</p> <ul style="list-style-type: none"> Low-carbon packaging reduced CO₂e emissions by approximately 172 tons.
Logistics	Green Packaging	<ul style="list-style-type: none"> The average recycling rate for low-carbon recycling cycles is 93%, achieving the set target. (For detailed information, please refer to section 4-3 Green Logistics)
	High-Performance Delivery	<ul style="list-style-type: none"> Low-carbon transportation cumulatively reduced CO₂e emissions by 3,205 tons. (For detailed information, please refer to section 4-3 Green Logistics)



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Aspect	Design Principle	Current Status
Use Maintenance and Repair Scrap	High-Performance Products	<p>Polarizer:</p> <ul style="list-style-type: none"> Continuously enhancing the transmittance of polarizers by 2% through low-reflection surface treatments, which reduces the number of backlight LEDs required for the same product brightness, thereby lowering energy consumption. By adjusting iodine concentration, stretching ratio, and optimizing the alignment of iodine complexes, the amount of non-aligned iodine compounds is reduced, improving transmittance by 2% while maintaining polarization capability. <p>Optical Adhesive:</p> <ul style="list-style-type: none"> Increased panel transmittance reduces light loss, roughly estimated to improve by about 20%, resulting in energy savings. <p>PDLC Smart Optical Film:</p> <ul style="list-style-type: none"> The product has obtained the Green Building Material Label (the first in the industry in Taiwan): it features high heat insulation efficiency with UV blockage rate >99% and IR blockage rate >87%. In applications such as floor-to-ceiling windows and curtain walls, it can reduce the harm of outdoor UV light to humans and furniture and minimize heat entering indoors. Verified by Cheng Kung University Laboratory, it can effectively reduce power consumption by 19% compared to regular glass, equivalent to reducing 96.38 kg of CO₂e, making it a green building material. Compared to insulation films, it is transparent when powered: saving 10~13% energy; and in a shaded state when unpowered: saving 13~18% energy.
	Product Life	<p>Polarizer:</p> <ul style="list-style-type: none"> Developing high-durability polarizers to enhance specifications (resistance to high temperatures from 500 hours to 1,000 hours). By adjusting process chemicals and parameters, the long-wavelength optical changes after durability (RA) are minimized. This project is being continuously adjusted to meet customer specifications and product requirements, with development expected to be completed by the end of 2024. <p>PDLC Smart Film:</p> <ul style="list-style-type: none"> Passed self-verification tests for 2,500 to 3,000 hours of durability (RA) reliability testing, and confirmed by Cheng Kung University testing laboratory for QUV 1,500 hours, all exceeding industry demands and standards. Consequently, a 5-year warranty, the longest in the industry, is offered, with an estimated lifespan of over 10 years (the industry standard is only one year).
Environmental Impact	Environmental Impact	<p>Polarizer:</p> <ul style="list-style-type: none"> High-transmittance polarizers can reduce energy consumption by 2%. By increasing the transmittance of polarizers and conducting practical tests with customer panels, high-transmittance polarizers, compared to current mass-produced products, can increase panel transmittance by more than 2% in actual tests. <p>PDLC Smart Film:</p> <ul style="list-style-type: none"> These films have indoor insulation functions that can reduce indoor electricity consumption and decrease carbon emissions.
		<p>Polarizer:</p> <ul style="list-style-type: none"> The reflectance of low-reflection polarizers has been reduced from 5% to below 2%, thereby minimizing the impact of ambient light on the human eye. This effectively reduces eye fatigue during prolonged use of displays. <p>Optical Adhesives:</p> <ul style="list-style-type: none"> Enhances panel light output efficiency with almost no emission of harmful substances during the process, thereby minimizing the display's potential harm to the body. <p>PDLC Smart Film:</p> <ul style="list-style-type: none"> These films have the function of blocking indoor infrared and ultraviolet rays, reducing the harm of outdoor UV light to humans and furniture.
Social Contribution	Social Impact	

Advanced Battery Materials

Aspect	Design Principle	Current Status	
Design	Structure optimization	<ul style="list-style-type: none"> 2023 product thickness: 12 um; 2024 target: 10 um 2023 coating thickness: 1.5 um; 2024 target: 1 um Uses polyolefin materials, which are relatively environmentally friendly. 	
	Low-impact elements	<ul style="list-style-type: none"> The production of separator films is environmentally friendly, using a solvent-free process (dry process). The next generation of high-power separator films (Armarator) aims for ceramic coating, water-based processes, and environmentally friendly development. 	
	Product safety	<ul style="list-style-type: none"> Independent Quality Control Mechanism: Strictly adhere to customer requirements and ISO, IQC, IPQC, FQC, OQC, IATF 16949 certification standards to ensure products are in optimal condition, providing customers with confidence in integrating them into battery and cell manufacturing processes. Battery Test Line Self-Verification: Establish a cell verification model to compare and verify with competitors' products and different models during the separator film development stage. This ensures comprehensive understanding of the separator film's performance in batteries and simulates its performance at the customer's end, thereby accelerating development success rates. Added ergonomic arm equipment to enhance loading/unloading efficiency, increasing operating rate by 5%. 	
Manufacture	High-Performance Manufacture	<ul style="list-style-type: none"> Speed Enhancement Engineering Changes: Speed increased by 14%, production capacity increased by 12%. Adopted automated operations to improve material supply and inspection, resulting in a 40% increase in operational efficiency compared to 2022. Increased roll length by 87.5%, yield improved by 0.1%, and slitting operating rate increased by 16%. 	
	Green Packaging	<ul style="list-style-type: none"> Reduced packaging materials consumption, increased container utilization rate, and lowered transportation costs. Continued to reduce waste by recycling and reusing cores, resulting in a 59.2-ton reduction in waste; recycled 53,267 cores with a reuse rate of approximately 98%. Introduced new support core and pallet recycling, expected to reduce packaging material expenses by 22%. In 2024, plan to increase the shipping length of products, expected to reduce packaging material consumption by 12%, increase container transport volume by 58%, and lower overall transportation costs. 	
Logistics	Product Life	<ul style="list-style-type: none"> Low internal resistance process can enhance battery cycle life; special pore size control technology can improve battery degradation after cycling. Developed a new generation of high-power separator film (Armarator) with increased durability: melting point above 300° C and high-temperature brittle fracture at 250° C, surpassing industry standards. 	
		Environmental	<ul style="list-style-type: none"> Through improvements in process efficiency and yield, waste reduction, and related enhancements, the carbon emissions of separator films have decreased by 46% compared to the baseline year 2020. Obtained ISO 14067:2018 certification.
Use Maintenance and Repair Scrap	Social Contribution	Social	<ul style="list-style-type: none"> Driven by the boom in the electric vehicle industry, the lithium battery production index is increasing, which will eventually lead to the generation of related waste. BenQ Materials is continually advancing towards extending material lifespan and recycling materials, which will help reduce the demand for raw materials needed for lithium battery production and minimize waste generation.





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Healthcare and Nursing Products

Aspect	Design Principle	Current Status
Design	Structure optimization	<p>Skin Care:</p> <ul style="list-style-type: none"> The number of acne patches produced per unit length increased from 333 patches per meter to 500 patches per meter, with mass production expected in 2024. Mass production of shaped patches, which compared to acne patches, can improve film material utilization by approximately 20% and release paper utilization by 10.6%. <p>Vision Care:</p> <ul style="list-style-type: none"> The process uses low-polypropylene caps, reducing polypropylene usage by 60%. <p>Medical packaging:</p> <ul style="list-style-type: none"> In 2023, membrane material formulations were adjusted and improved; in 2024, efforts to reduce membrane materials will continue. <p>Wound Care:</p> <ul style="list-style-type: none"> The new hemostatic device product, by switching the contact layer material, achieves a direct and process material carbon reduction benefit of up to 50%.
	Better Materials	<p>Medical packaging:</p> <ul style="list-style-type: none"> Self-manufactured membranes combined with solvent-free lamination technology reduce the impact of the process on human health and the environment. Lamination: More than 40% of bag-making medical membranes have been introduced; Printing: Expected to be introduced in 2024; Estimated to reduce carbon emissions during the process by 9.12%. <p>Skin Care:</p> <ul style="list-style-type: none"> Skincare products are formulated to be "alcohol-free," "fragrance-free," and "colorant-free." Sunscreen products use ocean-friendly formulations, avoiding ingredients banned in Palau. <p>Vision Care:</p> <ul style="list-style-type: none"> The next generation of green lens materials has completed mass production development and is expected to obtain certification in Taiwan by 2024.
	Recyclable Materials	<p>Skin Care:</p> <ul style="list-style-type: none"> PET release paper is now made from recycled materials, reducing carbon emissions by 47.8% compared to the original product. Stability verification has been completed, and it is expected to be introduced into products in Q4 2024. <p>Vision Care:</p> <ul style="list-style-type: none"> 100% recycled polypropylene is used at the production end; consumer-end cup recycling in China. In Taiwan, the concept is being promoted through health education, with plans to advocate through activities in 2024.
Design	Low-impact elements	<p>Skin Care:</p> <ul style="list-style-type: none"> Utilizes solvent-free raw materials and processes, effectively reducing the harm and impact of organic solvents on human health and the environment. <p>Vision Care:</p> <ul style="list-style-type: none"> The globally unique "EautraSil® Plus Hydrophilic Silicone Technology®" avoids solvent residues by not requiring solvent use, thereby reducing the risk of solvent-related harm to the human body, making it non-irritating and non-allergenic to the eyes. <p>Wound Care:</p> <ul style="list-style-type: none"> When planning advanced antibacterial versions of existing products, even though the raw materials previously used are still within the allowable limits on the REACH list of substances of concern, alternative substances will be sought to achieve antibacterial effects and enhance product properties from an environmental sustainability perspective.

Aspect	Design Principle	Current Status
Design	Product safety	<p>Medical packaging:</p> <ul style="list-style-type: none"> Passed the certification of the EU Medical Device Regulation (MDR) and also completed the FDA recertification in the United States. <p>Skin Care:</p> <ul style="list-style-type: none"> Acne patch products have all passed biological cytotoxicity tests, sensitivity tests, and aging safety tests. Skincare products have also passed high-standard stability, skin-friendliness, and functionality tests. <p>Vision Care:</p> <ul style="list-style-type: none"> All contact lens products comply with Green Product (GP) regulations. <p>Wound Care:</p> <ul style="list-style-type: none"> All products comply with ISO 13485 (Medical Devices Quality Management) and ISO 10993 (Medical Devices Biocompatibility).
		<p>Wound Care:</p> <ul style="list-style-type: none"> Manufacturing Improvement: Gauze yield increased by 0.6%, per capita revenue contribution increased by 50%. Introduction of Gauze Alcohol Recovery Machine: Scheduled for mass production in 2024, expected to reduce alcohol usage by 15 tons. <p>Skin Care:</p> <ul style="list-style-type: none"> Introduction of Automatic Feedback System: Estimated to reduce misaligned acne patches by 3,700 patches, with efficiency simultaneously improving by nearly 2%. Collaboration with Automatic Recognition System: Improved image recognition capabilities, reducing manual inspection workload, with manual inspection share decreasing by 28.1%. Introduction of Automated Folding Machine: Reduced manual folding operations, improving production efficiency by 80%. Introduction of Automated Packaging Machine: Reduced manual packaging operations, improving production efficiency by 50%.
Manufacture	High-Performance Manufacture	<p>Vision Care:</p> <ul style="list-style-type: none"> 100% Surface Automatic Optical Inspection: Introduced in Q3 2022 with an operating rate of 51%; in 2023, the operating rate increased to 78%. 100% recovery of contact lens printing plates (achieved 100% recycling from Q2 to Q4 2023). 100% recycling of PP materials used in pre-process molds, for reuse by downstream manufacturers. Increased lifespan of process alcohol, reducing usage by 1.4 tons compared to 2021. Reduced load on high-energy-consuming equipment: Reduced CO₂e emissions by 135 tons compared to 2021, a 22% reduction in carbon emissions. No production scheduling on holidays, reduced load on equipment (nitrogen machines, sterilizers, clean rooms), reducing electricity consumption.
		<p>Medical packaging:</p> <ul style="list-style-type: none"> Optimization of machine speed and automation introduction: Automation introduction was unsuccessful due to the inability of product structure to maintain the current operation mode stably; in 2024, plans to continue machine speed optimization, expected to increase production capacity by 10%, and average operating rate by 7%. Long paper rolls have been introduced, reducing the number of joints by about 25%. Through improvements in membrane manufacturing processes, waste rate reduced by 10%; electricity consumption reduced by 15%.



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Logistics	Green Packaging	<p>Wound Care:</p> <ul style="list-style-type: none"> 100% FSC-certified product packaging: Achieved 43% in 2022 and 52% in 2023. The remaining portion is due to inventory and EU certification factors for hemostatic products that prevent immediate implementation. Medical product transportation packaging requires transportation tests, and certification changes currently hinder initiation. <p>Skin Care:</p> <ul style="list-style-type: none"> Product packaging has achieved 100% FSC certification. Introduced recycled paper cards to replace aluminum foil packaging (implementation rate 4%), reducing aluminum foil usage and lowering carbon emissions (62% reduction in material carbon emissions, 16% reduction in production costs). QR codes replaced product instruction manuals, reducing carbon emissions by 43% compared to the previous year; sales point stickers were replaced by direct printing on packaging, reducing carbon emissions by 70% compared to the previous year. Introduced the removal of inner box packaging for Taiwanese e-commerce, reducing inner box usage by 8%. <p>Vision Care:</p> <ul style="list-style-type: none"> Introduced FSC-certified packaging for 4 items, accounting for 20% of annual new products; in 2024, all self-produced new products will use FSC-certified packaging, covering 39% of the current total product range. <p>Medical packaging:</p> <ul style="list-style-type: none"> Reduced the use of outer box strapping, decreasing annual waste by over 400 kilograms. Introduced recycled paper for shipping cartons, with a 60% implementation rate. No customer logos printed on outer cartons for domestic orders. Adjusted the shipping method for large rolls of film by removing the carton and using kraft paper bags for shipping.
		<p>Wound Care:</p> <ul style="list-style-type: none"> Conducted centralized sterilization treatment by third-party units, reducing the number of transport trips within the production and sales plan period, effectively centralizing control of sterilization time and trips. Compared to 2022, integrated sterilization reduced transportation by 4,800 kilometers and fuel consumption by 600 liters. In 2024, plan to maximize packaging box configuration and shipping quantities for foreign customers based on product size to reduce shipping costs. <p>Skin Care:</p> <ul style="list-style-type: none"> Domestic channels switched to pallet shipping, which can increase the number of boxes shipped by approximately 310% compared to single-box shipping. For container shipments to Indonesia, implemented pallet stacking, reducing the original 3 large containers to 2 large containers, saving NT\$15,000 in costs. <p>Medical packaging:</p> <ul style="list-style-type: none"> Adopted a domestic multi-point delivery model in a single trip, reducing shipping costs by 25%.
		<p>Wound Care:</p> <ul style="list-style-type: none"> Quick Ning gauze product has an average liquid absorption rate of more than 14 times its weight, demonstrating excellent exudate absorption capacity. In clinical trials for bleeding management, the bleeding management score is twice that of regular gauze. <p>Skin Care:</p> <ul style="list-style-type: none"> Angel Care acne patches absorb 3 to 5 times better than the market-leading brand. The material surface uses a special matte process treatment to reduce the reflectivity of the acne patch, increasing its concealment.
	High-Performance Delivery	
	Use Maintenance and Repair Scrap	High-Performance Products

Aspect	Design Principle	Current Status
Use Maintenance and Repair Scrap	High-Performance Products	<p>Vision Care:</p> <ul style="list-style-type: none"> The product has an oxygen permeability of Dk/t 193, which is 6 times that of traditional hydrogel, the highest in the market, allowing eyes to breathe smoothly. The full-color technology's three-layer coating technique locks the color material in the middle layer, ensuring it does not fade. The solvent-free formula significantly enhances the hydrophilicity of the lens, providing a highly smooth and watery feel to the eyes. The non-indentation optical design effectively replaces tear fluid and metabolizes eye secretions, preventing lipid and protein deposits. Enhanced moisturizing function of the material increases wearing time and comfort: <ol style="list-style-type: none"> Lens moisture evaporation rate decreased by 10%; moisturizing time increased by 71%. Clinical dryness satisfaction increased by 8%; overall satisfaction increased by 9%. Adjusted product shape through optical design to improve product comfort. Optical design correction based on the physiological structure of the eye, using a multi-arc design for the lens to fit closely to the eye, controlling lens displacement, and improving wearing comfort while reducing the sensation of foreign objects. Clinical overall satisfaction with wearing increased by 9%.
		<p>Product Life</p> <p>Wound Care:</p> <ul style="list-style-type: none"> Through special process technology, ChitoClot Gauze has a storage period of up to 5 years, higher than the 3-year life of ordinary gauze. <p>Vision Care:</p> <ul style="list-style-type: none"> In response to the waste of disposable cups generated by contact lens use, since March 2022, Miacare has launched the Green Movement initiative in China, and as of December 2023, over 130,000 cups have been recycled. <p>Medical packaging:</p> <ul style="list-style-type: none"> Actively trialing the introduction of self-made membranes using reusable cores, with expected benefits in 2024. The reuse rate of wastewater from the printing process is maintained at 90%.
		<p>Skin Care:</p> <ul style="list-style-type: none"> Acne patches are manufactured using a solvent-free process, while also striving to reduce packaging material usage and adopt environmentally friendly packaging materials. Without compromising the quality of raw materials and warehouse operations, individual product packaging is improved to expand the types of packaging material reductions. Working on "lightweight" packaging, evaluating materials and specifications with suppliers, and refining packaging methods not only reduce the weight and volume of products but also reduce carbon emissions generated during transportation, contributing to environmental protection. <p>Vision Care:</p> <ul style="list-style-type: none"> Conducting recycling of cup materials to not only reuse but also reduce the environmental impact of waste. Emphasizing the importance of eye care from a young age, Miacare has collaborated with the Taiwan Fund for Children and Families and Kobayashi Optical since 2014 on the "Optical Hope Project," providing free glasses to economically disadvantaged children in need of vision correction. For details, refer to section 8-2 Public Welfare Care.
	Product Life	
	Circular Economy	
	Environmental Impact	
	Social Contribution	
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Waterproof and breathable textiles

Aspect	Design Principle	Current Status
Design	Structure optimization	<ul style="list-style-type: none"> Optimization of film microstructure design and composite adhesive application to enhance product strength and reliability. Mon-material (single material) development focuses on combining polyester fiber fabrics with polyester breathable membranes to develop composite materials for waterproof and breathable fabrics that facilitate recycling processes. Polyester composite fabric is expected to be mass-produced and introduced in Q3 2024.
	Recyclable Materials	<ul style="list-style-type: none"> To reduce the use of petrochemical raw materials and support the removal and purification of marine waste, the company has introduced pioneering domestic technology for recycling nylon marine waste yarn. This technology is combined with BenQ Materials' eco-friendly micro-porous breathable membrane, producing functional fabrics in a plant planned to use fully renewable energy, providing products with a stronger environmental concept. In 2023, the waterproof and breathable functional fabric made from recycled marine waste yarn won the highest honor, the Gold Award, at the 32nd Taiwan Excellence Awards. Developed recycled polyester fabric from discarded polarizer release films. Based on the goals of the circular economy and sustainable development, this project exemplifies the cross-industry collaboration of recycling electronic waste into textile applications, setting a precedent for converting electronic factory waste into textile uses.
	Low-impact elements	<ul style="list-style-type: none"> Solvent-free film production technology: Ensures that the process does not produce volatile organic compounds (VOCs).
	Product safety	<ul style="list-style-type: none"> Materials certified by Intertex are free of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), aligning with the future trends of sustainable applications in various countries. Micro-nano level pore design, which passes the wet bacterial penetration test (TTRIENISO 22610), meets the functional needs for bacterial blockage in the post-pandemic era.
Manufacture	High-Performance Manufacture	<ul style="list-style-type: none"> Online fabric handling machine, increasing fabric joining production capacity by 50%. Introduction of automatic packaging machines, increasing packaging production capacity by 50%. Introduction of conveyor belts to replace manual handling, reducing daily round-trip handling by 120 trips, with a benefit of approximately 1.5 hours.
Logistics	Green Packaging	<ul style="list-style-type: none"> Reduced the core paper thickness of some product shipments from 3 inches to 2 inches, increasing the fabric winding length and improving container volume utilization, thereby reducing the number of transportation trips.
	High-Performance Delivery	<ul style="list-style-type: none"> To meet shipment deadlines, we communicated and coordinated with customers to consolidate shipments. We requested customers to retain or return shipments, allowing the pallet recycling system to remain operational. In 2023, the recycling usage rate was approximately 60%.
Use Maintenance and Repair Scrap	High-Performance Products	<ul style="list-style-type: none"> Through BenQ Materials' core composite technology, a longer and more reliable product lifecycle is established.
	Product Life	<ul style="list-style-type: none"> It is a hydrophobic and breathable material, unlike common polyurethane materials that easily hydrolyze and age, providing better assurance for waterproof characteristics.
Social Contribution	Environmental Impact	<ul style="list-style-type: none"> Xpore products are 100% fluorine-free, solvent-free, non-toxic, and safe, protecting consumer safety.
		<ul style="list-style-type: none"> All Xpore manufacturing processes strictly adhere to environmental regulations, causing no air or water pollution.





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Green Logistics

Green logistics policy

Net-zero is a global concern for enterprises. In addition to continuous process optimization and improved water efficiency, BenQ Materials is implementing low-carbon circular management to reduce carbon emissions from transportation as a primary logistics policy. Through product carbon footprint inventory and verification, BenQ Materials is gradually establishing a database for product carbon emissions to support the development of low-carbon, low-energy products. The goal is to achieve low-carbon product production through circular management.

Low-carbon Transportation

Planning for transportation optimization, implementation of combined type of transportation route, in order to reduce air freight weight, thereby achieving the goal of sustainable logistics and reduction of carbon emission.

Product packaging material reduction

Change the disposable cartons to recyclable packaging boxes for the shipping method, and increase the times of use of use of packaging material, in order to reduce generation of waste.

Packaging Material/Pallet Recycle

Use recyclable and reusable pallets for shipping, in order to prevent the use of disposable pallets, that may cause unnecessary wastes.



Low-carbon Transportation

BenQ Materials has adopted a hybrid transportation strategy and adjusted production plans, gradually returning to regular sea transport and reducing air transport since 2023. From 2017 to 2023, the cumulative carbon reduction was 19,349 tons CO₂e. In 2024, the low-carbon transportation policy will continue to be implemented, further reducing carbon emissions through circular management.

Note: Carbon reduction formula: Number of transports × [Carbon emissions per trip before implementation - Carbon emissions per trip after implementation]

Low-carbon packaging

BenQ Materials continues to promote policies such as "recycled packaging box certification," "reducing the number of finished product shipments and air transport usage," and "recyclable packaging boxes" to encourage and guide customers to adopt these practices.

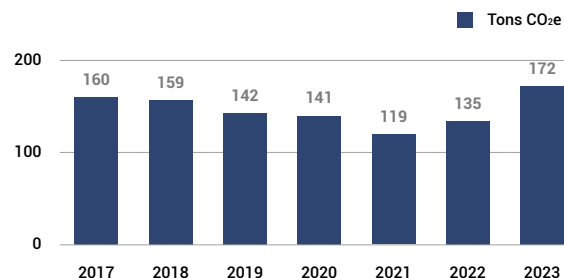
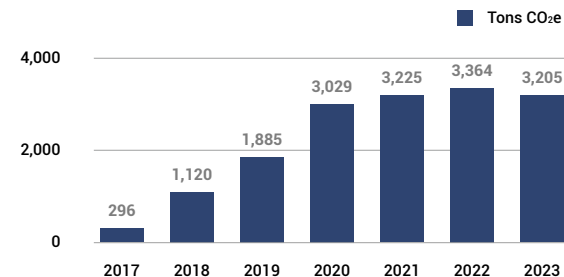
BenQ Materials' product packaging has transitioned from single-use cardboard boxes to "low-carbon packaging," reducing packaging materials through design guidelines. By using single materials and reusing them, the environmental impact is minimized. In 2023, the polarizer plant's shipment volume statistics showed that the use of recyclable packaging boxes reduced single-use packaging materials, resulting in approximately 172 tons CO₂e carbon reduction.

Low-carbon recycling and circularity

The display materials business uses recyclable packaging materials and pallets, along with low-carbon circular management to track packaging material recovery volume, recovery rates, and achievement rates. Through the packaging material recovery management mechanism, recovery quality is ensured, the usage cycle of packaging materials is extended, usage amounts and costs are reduced, and waste generation is minimized.

In 2023, the recovery items included a 94% recovery rate for recyclable packaging boxes, a 93% recovery rate for pallets, and a 94% recovery rate for product placement trays. The overall recovery rate increased by about 1% compared to 2022, achieving the 93% target.

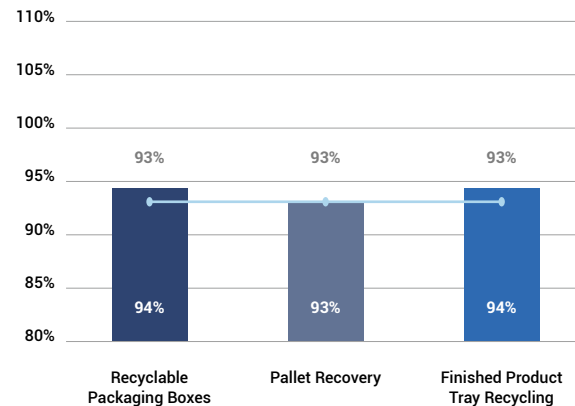
BenQ Materials continues to monitor customers' recovery status and promptly return recovered items for reuse to reduce the use of single-use packaging. The recovery rate target for 2024 is 94%.



Note : 1.Packaging material recycling rate: Calculation method refers to Each packaging material recycling volume per month of the polarizer plant site ÷ Each packaging material shipping volume per month.

2.The packaging box carbon reduction coefficient data source refers to the statistics of Longchen Paper & Packaging that for 1kg of recycled carton during the recycled waste paper process, the carbon emission is approximately 0.8 kg-CO₂e

Polarizer Packaging Recovery Rate





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Chemical Management

Hazardous Substance Management

BenQ Materials established the GP Core Team in 2010 to promote hazardous substance-free (HSF) management. Each year, based on international regulations, customer requirements, and environmental trends, they review the current status of hazardous substance management and update the "Environmental Quality Assurance Management System Operating Standards." All products must comply with the EU RoHS, EU REACH, Packaging Directive, and WEEE, as well as customer requirements. A material hazardous substance-free management system has been established to ensure that the produced functional films and battery materials comply with international regulations and customer requirements related to hazardous substances. In 2023, there were 1,614 non-use hazardous substance applications, with a compliance rate of 100%.

Number of HSF Product Applications

Product	Number of Applications	Compliance Rate
Display Materials	838	100%
Advanced Battery Material	11	100%
Waterproof and breathable textiles	2	100%
Vision Care	102	100%
Skincare Products	547	100%
Professional Healthcare	114	100%
Total	1,614	100%



Product Chemical Substance Management Achievements

- 1 Fully compliant with EU RoHS: BenQ Materials' products comply with EU RoHS concentration requirements for lead, cadmium, mercury, hexavalent chromium, PBB, and PBDE. Since 2016, BenQ Materials has responded to RoHS 2.0 regulations by including phthalates (DEHP, BBP, DBP, DIBP) in their testing, with results consistently showing "not detected."
- 2 Halogen-Free Requirements for Electronic Products: General customer requirements for halogen-free products are <900 ppm for bromine and chlorine individually, and <1500 ppm in total. BenQ Materials imposes stricter requirements, with bromine and chlorine individually <800 ppm, and their products meet these stricter requirements.
- 3 Disclosure of Hazardous Substance Lists in Products: EU REACH regulation lists hazardous substances and periodically announces substances of very high concern (SVHC). After EU REACH announces SVHCs, BenQ Materials conducts investigations with suppliers and honestly discloses the results to customers.

In 2023, EU REACH announced the 28th and 29th batches of SVHCs, totaling 11 substances. BenQ Materials completed investigations for 53 display materials customers, 14 specialty products customers, and 4 battery materials customers, with 2,256 customer demand surveys conducted and results honestly disclosed.

To comply with EU regulations (e.g., RoHS and REACH) or customer specifications (e.g., green products, processes, and procurement) related to hazardous substance characteristics, BenQ Materials effectively ensures compliance through process management and system perspectives based on ISO 9001. This enhances the quality assurance of hazardous substance management and increases customer confidence in BenQ Materials' hazardous substance management. On October 11, 2023, BenQ Materials obtained the QC080000 certification for BMC & BML.

- 22/12~23/02
 - Plan
 - Internal Auditor Training
- 23/03~05
 - QC080000 Standard (Clause) Education and Training
 - System Integration and Implementation
- 23/05~07
 - Internal Audit
 - Management Review
- 23/07~08
 - Stage 1 Document Review
 - Stage 2 Formal Audit
- 2023/10
 - Certification Acquisition



Supply Chain Chemical Management

Connecting raw material suppliers, process material suppliers, downstream cutting plants, and packaging material suppliers, BenQ Materials forms an effective green product industry chain with upstream suppliers. This ensures effective control from the source to meet green product standards and reduce environmental impacts during the product manufacturing process.

Supplier management process: BenQ Materials manages reporting information through the 'Supplier Portal' → internal approval → documents can be queried in the system, and supplier test reports need to be updated and uploaded annually.



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Appendix

Product Safety and Marketing Labels

Medical Device Product Regulations and Certifications

All medical device products sold by BenQ Materials must obtain national regulations and certifications in each sales region before being exported and sold. Currently, the certifications obtained include Taiwan TFDA, EU CE, US FDA, and China CFDA. For detailed product certifications, please refer to [BenQ Materials ESG website](#).

During clinical trials, products must also comply with EN ISO 14971:2012 medical device risk management standards and ISO 14155:2011 guidelines for clinical evaluation of medical devices. These standards ensure that risk management, design, conduct, recording, and reporting of clinical trials are in compliance to guarantee scientifically conducted and reliable results. Sterilization packaging series products must pass ISO 10993:2018 biocompatibility testing before shipment.

Medical Device Product Manufacturing and Sales Permits

BenQ Materials is a medical device manufacturer, and after obtaining approval and registration, it has received the necessary permits to manufacture related medical device products. These products must meet the safety regulations and manufacturing licenses of each country. Product sales also require obtaining a pharmaceutical sales permit and product registration before selling. Additionally, contact lenses, as medical devices, must be sold through channels with pharmaceutical permits to reach end consumers.



Medical Device Labeling and Marketing Regulations

Medical Device Packaging Labeling Regulations

1. Transport packaging should be clearly and permanently marked with the product catalog number, quantity, manufacturer or supplier name/trademark, production date in ISO 8601 format, batch number, standard weight per square meter (in grams), roll width (in cm) and length (in meters), and recommended storage conditions.
2. Inner packaging or roll labels should be clearly and firmly marked with the quantity, manufacturer or supplier name/trademark, batch number, and standard weight per square meter (in grams).

Medical Device Labeling Regulations

All medical device product labels must comply with relevant regulations of the sales region and conform to EN 1041:2008 standards for information provided by medical device manufacturers, as well as ISO 15223-1:2016 standards for symbols used in medical device labels and information. Product information is disclosed according to the symbols in the standards.

Skin care products regulated by the Medical Device Management Act must include necessary information on labels, instructions, or packaging, such as product name, permit or registration number, efficacy/purpose or indications, manufacturing date/expiration date or shelf life, model/specifications or main ingredients, warnings/precautions/usage restrictions or foreseeable side effects, name and address of the permit holder or registrant, manufacturer's name and address, batch number or serial number, and other items announced by the central competent authority.



Medical Device Product Marketing Regulations

Medical device-related products must comply with advertising and marketing laws in each country. For example, in Taiwan, before advertising and marketing medical devices, all text, pictures, or verbal information in the advertisement must be submitted to the competent authority for approval. The promotion methods are also subject to restrictions and must not use other people's names, books/documents, interviews, or other improper methods for promotion.

For example, contact lenses, as regulated by the Medical Device Management Act, must follow the advertising review regulations of the Ministry of Health and Welfare for both print and media advertisements. The Taiwan Food and Drug Administration will notify relevant departments about medical device advertising laws and review principles, ensuring immediate communication and implementation. Brand collaborations with influencers for product trial articles must be reviewed by the legal department to ensure compliance with advertising laws.