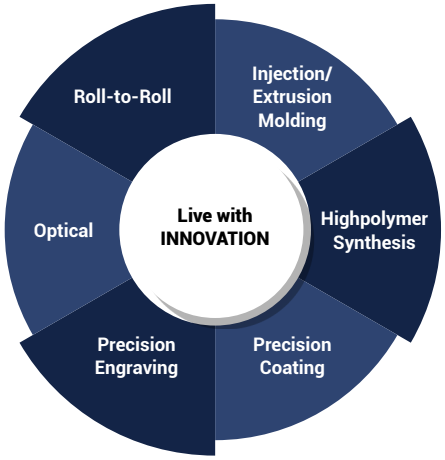
Responsible Product

04

Core Technology and Intellectual Property Management

Six Core Technologies

BenQ Materials has established six core competencies through years of advancement in optical design, material development, and process optimization. These include two material technologies—optical multilayer film design and polymer synthesis—along with four process technologies: roll-to-roll processing, precision embossing, precision coating, and injection and extrusion molding.



Production Processes

BenQ Materials categorizes its products into Display Materials, Battery Materials, Medical and Healthcare Products, and Functional Textiles. Manufacturing is conducted in-house across five major operational sites, each aligned with specific product lines and production processes.

- Display Materials and Battery Materials are distributed directly to B2B clients.
- Medical and Healthcare Products and Functional Textiles are delivered through various channels, including B2B clients, distributors, healthcare institutions, and e-commerce platforms, depending on product characteristics.

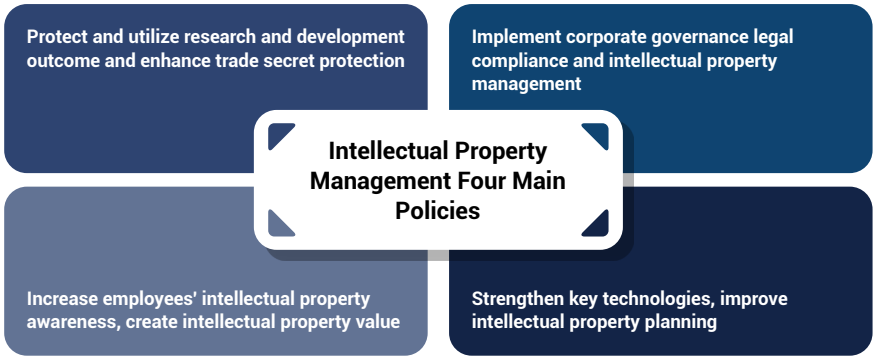
Each production line is integrated with its respective operational site and manufacturing technology, ensuring process efficiency, quality assurance, and traceability across the value chain, in alignment with sustainable operations and product responsibility principles.. The corresponding operating sites and production processes of each product line can be found on the BenQ Materials ESG website.

Intellectual Property (IP) Management

Intellectual property (IP) plays a key role in safeguarding R&D outcomes and maintaining technological competitiveness. BenQ Materials is committed to continuously developing core technologies by integrating R&D with product innovation. Through the reinforcement of IP strategies and regular performance reviews, the company aims to enhance IP robustness, ensure freedom to operate, and strengthen its competitive edge.

BenQ Materials has formulated an intellectual property management plan that is closely aligned with its business strategy. The plan is implemented through a comprehensive management system to ensure the timely protection, effective management, and optimal utilization of high-potential technologies and innovations derived from R&D, manufacturing, and operations.

As a diversified brand operator, the company also focuses on enhancing and protecting brand value to ensure a strong professional image and sustained market competitiveness. In 2024, BenQ Materials' IP policies and goals are centered on strengthening IP portfolio deployment, steadily accumulating IP assets, increasing employee awareness of IP, and reinforcing the protection of R&D outcomes and confidential information — thereby maximizing the value of intellectual property.



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: (a) Intellectual property courses for new employees. (b) Advanced intellectual property courses for R&D personnel. (c) Advanced training courses for intellectual property specialists.

Intellectual Property Management System

BenQ Materials actively promotes the implementation of its intellectual property (IP) management system by strengthening the scope of IP governance and embedding operational procedures into daily practices. In 2021, the company obtained certification under the Taiwan Intellectual Property Management System (TIPS), receiving an A-grade (TIPS-2021-cert.-052). This certification was successfully renewed in both 2022 and 2024, with A-grade certifications (TIPS-2022-cert.-015 and TIPS-2024-cert.-044), valid through December 31, 2026.

Intellectual Property Management Measures and Objectives

1 Optimization of the TIPS Management System

In accordance with the Taiwan Intellectual Property Management System (TIPS) standards, BenQ Materials has established an IP management manual to serve as the operational basis for implementing its IP management system, ensuring the effectiveness of IP governance and execution.

2 Patent Management

Patent management encompasses R&D recordkeeping, patent application and maintenance assessments, incentive mechanisms, and portfolio strategies aimed at strengthening the company's overall patent quality and competitive edge. Additionally, a review mechanism is in place to evaluate R&D outcomes before public disclosure, thereby safeguarding trade secrets and mitigating the risk of information leakage.

3 Trademark Management

BenQ Materials enforces a structured process for trademark application and usage oversight. The company regularly updates its trademark inventory and monitors usage to prevent infringement risks, while actively planning and deploying brand-related trademark strategies.

4 Brand Management

In alignment with internal brand management policies, brand assets are systematically managed. Awareness sessions on brand usage standards are held within the organization to reinforce compliance.

5 IP-Related Education and Awareness

Internal Training: Annual online training on general IP concepts and trade secret protection is mandatory for all employees, with dedicated courses for R&D staff. In 2024, TIPS and trade secret protection e-learning courses were conducted company-wide, with a 94% completion rate. Additionally, advanced patent courses were delivered to senior R&D staff, with a 100% pass rate.

External Training: IP officers completed the 2024 TIPS Tiered IP Management Training for A-level and AA-level certification (2 attendees) and participated in other specialized external courses, accumulating 71.5 hours of professional training over the year.

Intellectual Property Management Achievements

Patents

As of December 2024, BenQ Materials has filed over 1,290 patent applications globally and has been granted more than 830 patents. The company's patent portfolio spans key markets and countries, including Taiwan, the United States, the European Union, Japan, Mainland China, South Korea, India, and Southeast Asia.

In 2024 alone, BenQ Materials filed more than 64 new patent applications and received 40 granted patents. The core technological fields include battery separator films, functional optical film technologies, and biomedical dressings.

Aligned with the company's commitment to circular economy and sustainable development, a portion of the 2024 patent filings focused on innovations utilizing recycled materials—specifically, the application of regenerated polyester derived from recycled polyester waste in functional textiles and optical films. For further details, please refer to the BenQ Materials official website.

Patent Outcome	2020	2021	2022	2023	2024
Number of Applications	63	44	39	78	64
Number of Certificates Granted	30	37	38	33	40

Trademarks

BenQ Materials has filed over 500 trademark applications globally and has been granted 484 trademark registrations. In 2024, the company filed 30 new trademark applications and successfully obtained 30 trademark rights. The trademark portfolio covers major markets including Taiwan, the United States, the European Union, Japan, Mainland China (including Hong Kong), Southeast Asia, and Oceania (Australia and New Zealand).

Region	Taiwan	United States	China	European Union	Southeast Asia	Others	Total
Registered Trademarks	161	7	181	19	81	35	484

Collaborative Innovation with Academia

To continuously enhance its innovation capabilities and product competitiveness, BenQ Materials has actively engaged in academic-industry collaborations with leading research institutions in Taiwan in recent years. Strategic partners include:

- Industrial Technology Research Institute (ITRI)
- 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

These partnerships span diverse technology domains such as smart healthcare, solid-state battery materials, advanced material development, and biomedical engineering.

In 2024, BenQ Materials executed five collaborative R&D projects, with a total investment of over NTD 6 million in joint research and development efforts.

Sustainable Product Design and Lifecycle Integration

To realize sustainable product value creation, BenQ Materials has formally incorporated the requirement that "100% of new product developments must comply with internal sustainability criteria" into its official Product Development Procedures. The company has adopted a Lifecycle Thinking approach that encompasses all stages—from design, manufacturing, and logistics, to usage, maintenance, and end-of-life disposal.

Product design principles are aligned with circular economy concepts and are assessed through an internal sustainability evaluation checklist across six key dimensions:

- Structural Optimization
- Use of Environmentally Friendly Raw Materials
- Incorporation of Recyclable Materials
- Low Environmental Impact Components
- Reduction in Product Packaging
- User Safety and Health Considerations

Several products have already obtained third-party carbon footprint certifications (refer to Section 5-2-3: Greenhouse Gas Management for details).

GHG Reduction Targets for Major Products	2025	2027	2030
Baseline year:2020	-30%	-45%	-55%
Low-Carbon Strategies for Existing Products	Low-Carbon Materials	• Material down-gauging and weight reduction design • Adoption of bio-based and recycled materials • Improved material utilization to minimize waste	
	Low-Carbon Processes	• Streamlining of manufacturing processes • Enhanced output efficiency • Energy-efficient equipment upgrades	
100% Sustainability Compliance for New Products Incorporated into the Product Development Procedures across all major product lines: ☑ Display Materials ☑ Advanced Battery Materials ☑ Medical and Healthcare Products ☑ Waterproof and Breathable Textiles	Planning Phase	• Material selection must meet low-carbon and environmentally responsible sourcing criteria • Application of DOE (Design of Experiments) methodology for dosage optimization • Product structure must enable recyclability • Process design emphasizes low energy consumption	
	Design Verification Phase	• Packaging and logistics methods reviewed and optimized to reduce GHG emissions • Product carbon footprint testing and inventory assessment conducted	
	Mass Production Verification Phase	• Carbon reduction improvement plans established, targeting >20% emission reduction within five years	

Display Materials

Aspect	Design Principle	Environmental Benefits
Design	**Structure optimization**	**The goal of structural optimization is to reduce material thickness while maintaining functional specifications, with actual product thickness determined by customer requirements.** Polarizer: • OLED products reduced from 130 μm to 98 μm, achieving a 25% total thickness reduction. • Overall layer thickness reduced by 30%, decreasing material consumption. • Automotive products reduced from 133 μm to 118–122 μm, lowering total thickness by 8–11%. • For thinner TV polarizers, base film reduced from 80 μm to 40 μm (22% reduction). Based on 150K 85-inch TVs per month, this saves 32.2 tons of plastic—equivalent to 1.48 million PET bottles. PDLC Smart Optical Film: • Adhesive layer is the thinnest in the industry at 8–10 μm (industry average 15–20 μm). • Conductive layer is the thinnest in the industry at 125 μm (industry average 188 μm).
	Eco-Friendly Raw Materials	Polarizer: • Solvent-free pressure-sensitive adhesive: formulation and process redesigned to reduce carbon emissions by 18%. • PFAS-free pressure-sensitive adhesive: in development, targeted for completion by end of 2025. • PFAS-free protective film: under validation for automotive applications, targeted for completion by end of 2025. PDLC Smart Optical Film: • Transparent conductive films deliver industry-best visual quality and optical performance. Series 97/95 offers the highest transparency and lowest haze. Optical Adhesives: • Biomaterial introduction targeted for 2025, projected to reduce emissions by 6% vs baseline. • New product development goal for 2025: 25% carbon reduction vs baseline.
	Recyclable Materials	Polarizer: • Recovery of process chemicals and reuse of packaging materials reduces total waste (see 5-6 Circular Economy). Optical Adhesives: • In 2024, passed PET recycling validation; full implementation expected in 2025.
	Low-Impact Components	Optical Adhesive • Solvent-free production eliminates oven baking, reducing electricity consumption and GHG emissions. Acid-free formulation enhances safety and reduces environmental harm. • In 2024, EAC (ethyl acetate) usage reduced by 6% through resin reformulation. PDLC Smart Optical Film: • Waste mainly consists of glass, which has lower environmental impact during treatment and recycling.
	Product safety	Polarizer: • All raw materials comply with EU RoHS regulations. Optical Adhesives: • YUNTECH facility certified to ISO 9001, ISO 14001, and IATF 16949. • PFAS alternatives are under evaluation. PDLC Smart Optical Film: • Complies with REACH, RoHS, and Green Product (GP) standards.

Aspect	Design Principle	Environmental Benefits
Manufacture	High-Efficiency Production	• Process speed-up from 10m to 15m/min through bottleneck upgrades, increasing monthly output by 10km². • Introduced 21 RPA (robotic process automation) improvements in 2024, saving 369 hours per quarter.
Logistics	Green Packaging	Polarizer: • Low-carbon packaging reduced 3 tons CO_2e compare to 2023 (For detailed information, please refer to section 4-3-3) • Average recycling rate of circular packaging: 93% (For detailed information, please refer to section 4-3-4)
	High-Performance Delivery	• Low-carbon transportation saved 3,208 tons CO_2e (For detailed information, please refer to section 4-3-2)
Use, Maintenance, End-of-Life	High-Performance Products	Polarizer: • Low-reflective coating increased transmittance by 2%, reducing required LED backlights and energy use. • Adjusted iodine concentration, stretching ratio, and molecular alignment to increase transmittance by 2% without sacrificing polarization. Optical Adhesive: • Improved panel transmittance by ~20%, reducing power consumption. PDLC Smart Optical Film: • Certified as Taiwan's first green building smart film: blocks >99% UV and >87% IR, reducing indoor heat. Compared to regular glass, tested to cut electricity use by 19%, or ~96.38 kg CO_2e. • Energy saving compared to thermal film: 10–13% in transparent mode, 13–18% in opaque mode.
	Product Lifetime	Polarizer: • Ongoing development of high-durability versions (thermal resistance from 500h to 1,000h), adjusting process chemicals and parameters. Completion expected mid-2025. PDLC Smart Film: • Passed 2,500–3,000h internal weather resistance tests and verified by NCKU Lab (QUV 1,500h), exceeding industry standards. Now offered with 5-year warranty, lifespan estimated at 10+ years (vs. 1-year industry norm).
Social Contribution	Environmental Impact	Polarizer: • High-transmittance versions reduce energy consumption by 2%, confirmed by customer testing. PDLC Smart Film: • Indoor heat insulation reduces energy use by 19%, equating to 96.38 kg CO_2e reduction.
	Social Impact	Polarizer: • 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. Optical Adhesives: • Boost panel light output; near-zero hazardous emissions during production minimize user health risks. PDLC Smart Film: • Filters indoor UV radiation, protecting occupants and furniture.

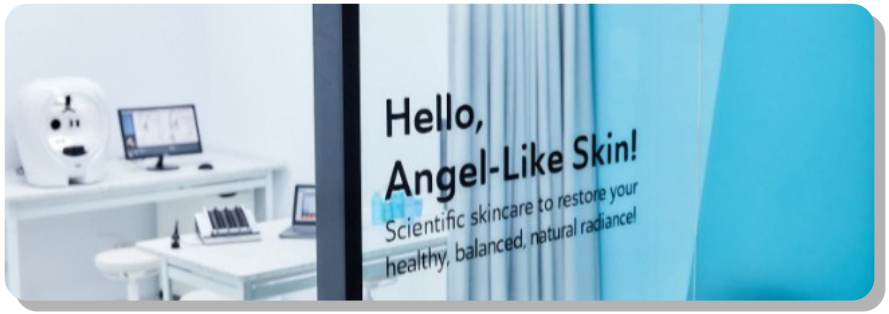
Advanced Battery Materials

Aspect	Design Principle	Environmental Benefits
Design	Structure optimization	• Product thickness in 2024: 10 μm; 2025 target: 9 μm. • Coating thickness in 2024: 1 μm; 2025 target: 0.8 μm.
	Low-Impact Components	• Utilization of polyolefin materials, which are relatively environmentally friendly. • Separator production adopts an organic solvent-free (dry) process, minimizing environmental impact. • Next-generation high-power separator (Armarator) is under development, emphasizing ceramic coating, water-based processing, and environmentally friendly design.
	Product safety	• Established independent quality verification mechanisms aligned with ISO, IQC, IPQC, FQC, OQC, and IATF 16949 standards to ensure optimal product quality and safety during customer integration into battery/cell production processes. • In-house battery testing line: Development-stage separators are benchmarked against competitor products and diverse models to validate performance and simulate downstream application scenarios, increasing product development success rate.
Manufacture	High-Efficiency Production	• Automation has improved material supply and inspection efficiency by 40% compared to 2022. • Roll length per unit increased by 87.5%, with a 0.1% yield improvement and a 16% increase in slitting equipment utilization. • Process optimization in 2024 reduced material waste by 1% and energy consumption by 22% (vs. 2023). • Equipment self-maintenance rate reached 83% in 2024.
Logistics	Green Packaging	• Optimized packaging reduced material use and improved container utilization, resulting in cost savings. Core reuse lowered waste by 59.2 metric tons; 53,267 cores were recycled with a reuse rate of ~98%. • Additional recovery systems for supporting cores and pallets introduced, reducing packaging material expenditure by an estimated 22%. • Discontinued certain cushioning foams in 2024, reducing packaging waste by 75%. • Switched from wooden pallets to reusable plastic pallets in 2024, projected to reduce 90 tCO_2e.
Use, Maintenance, End-of-Life	Product Lifetime	• Low internal resistance process improves battery cycle life; precision pore control technology helps mitigate performance degradation post-cycling. • Next-gen high-power separator (Armarator) features improved durability: melt-down temperature exceeds 300˚C and brittle point reaches 250˚C—higher than industry average. • Developed lithium-replenishment technology in 2024 to significantly extend battery cycle life.
Social Contribution	Environmental Impact	• Process efficiency and yield improvements have led to a 64% reduction in carbon emissions compared to the 2020 baseline. • In 2023, obtained ISO 14067:2018 Product Carbon Footprint certification for one separator product.

Healthcare and Nursing Products

Aspect	Design Principle	Environmental Benefits
Design	**Structure optimization**	Skin Care: • Mass production of crescent-shaped patches improves film material utilization by ~19.8% and release liner utilization by ~10.6% compared to acne patches. • Square-shaped patches improve film material utilization by ~20.2%. • At the Yunlin plant, producing 12mm acne patches achieves ~5.0% higher film utilization and ~15.0% higher liner utilization than at the original Taoyuan plant. Vision Care: • Manufacturing process adopts low-polypropylene plastic lids, reducing polypropylene usage by 60%. Wound Care: • New hemostatic product under development is expected to reduce carbon emissions from materials and processes by ~50%.
	Eco-Friendly Raw Materials	Medical packaging: • In-house film production integrated with solvent-free lamination reduces impact on human health and the environment. • Over 40% of bag-making medical films now use this method. • EVA water-based adhesive to be introduced in 2025. Skin Care: • Skincare products formulated without alcohol, fragrance, or color additives. • Sunscreen uses ocean-friendly formulations and excludes ingredients banned by Palau. Vision Care: • Future plans to adopt more comfortable materials for end-user wear. Wound Care: • Developing antimicrobial hydrogels using natural polymers with low toxicity, derived from renewable resources (in progress).
	Recyclable Materials	Skin Care: • Switching to recycled plastic for release liners is expected to cut carbon emissions by 47.8% compared to originals, reducing ~14.8% carbon per acne patch. Full implementation targeted for 2025 Q3. Vision Care: • Since 2022, consumer campaigns in Taiwan and China promote recycling of polypropylene lens cups.
	Low-Impact Components	Skin Care: • Uses solvent-free materials and manufacturing, minimizing health and environmental risks from volatile organic compounds (VOCs). Vision Care: • Proprietary EautraSil®Plus hydrophilic silicone technology eliminates solvent use, avoiding solvent residues and minimizing eye irritation and allergy risks. Wound Care: • In developing next-gen antimicrobial products, current substances on the REACH Substances of Very High Concern (SVHC) list are being replaced with alternatives to reduce environmental impact while enhancing product performance.
	Product safety	Medical packaging: • Certified under EU MDR and US FDA compliance. Skin Care: • Acne patches pass cytotoxicity, sensitization, and aging tests; skincare products pass high-standard stability, dermal compatibility, and functionality tests. Vision Care: • All contact lens products comply with GP standards and medical device regulations in respective countries. Wound Care: • Certified under ISO 13485 (Medical Device QMS) and ISO 10993 (Biocompatibility).
Manufacture	**High-Efficiency Manufacturing**	Wound Care: • Process improvement in 2024 increased gauze yield by 0.9%. • Alcohol recovery system for gauze production introduced in 2024, reducing alcohol use by ~80 metric tons. Skin Care: • Introduction of magnetic soft blades in 2024 enhanced efficiency by 80% and reduced blade cost by 90%. Vision Care: • 100% automated surface optical inspection; 2024 utilization rate reached 82%, a 4% increase from previous year. • 100% recovery of printing steel plates used in contact lens manufacturing. • 100% recovery of polypropylene molds from preform stages for downstream reuse. • Process optimization extended alcohol usability, saving 4 tons in 2024. • Replacement of high-energy equipment in 2024 led to a 59% carbon emission reduction compared to 2021 baseline. • Tray system introduced for product storage, replacing zipper bags. • Nitrogen-saving system implemented in 2024, reducing consumption by 28% per unit. Medical packaging: • Production scheduling optimization in Q4 2024 estimated to reduce material waste by 5 metric tons/month. • Equipment upgrades in 2024 increased overall production capacity by over 20% compared to 2023.
Logistics	**Green Packaging**	Wound Care: • 100% FSC-certified packaging achieved for new products; 65% for total product portfolio. Remaining gaps due to certification delays for hemostatic products in the EU. • 2024 packaging optimization project consolidated carton SKUs, saving ~250 units per stock cycle. Skin Care: • Achieved 100% FSC certification across all products in 2024. • Switched to recycled paper boxes in Taiwan, achieving a 34% transition rate and reducing total packaging carbon emissions by 6.1%. • Replaced aluminum foil packaging with recycled paperboard, lowering material carbon emissions by 62%, saving 16% in production cost, and reducing total packaging carbon emissions by 14%. China plant to implement by 2025. • QR codes and product claims are now directly printed on packaging; China's 2024 implementation rate reached 90%, reducing carbon emissions by 34% and packaging material by 0.1%. Vision Care: • 100% FSC adoption for new products in 2024, accounting for 15% of SKUs. Legacy products are being phased out and not updated. • Product instruction manuals now printed inside boxes in China, reducing paper use and ~1.48 tCO_2e emissions. • Plastic wrap sealing for new products to be eliminated in 2025. Medical packaging: • Reduced external carton strapping usage by over 400 kg annually. • Stopped printing customer logos on domestic shipment cartons. • Modified packaging for large film rolls, cutting carton usage. • Converted paper cores to reusable plastic cores in 2024, saving over 2 metric tons of material.

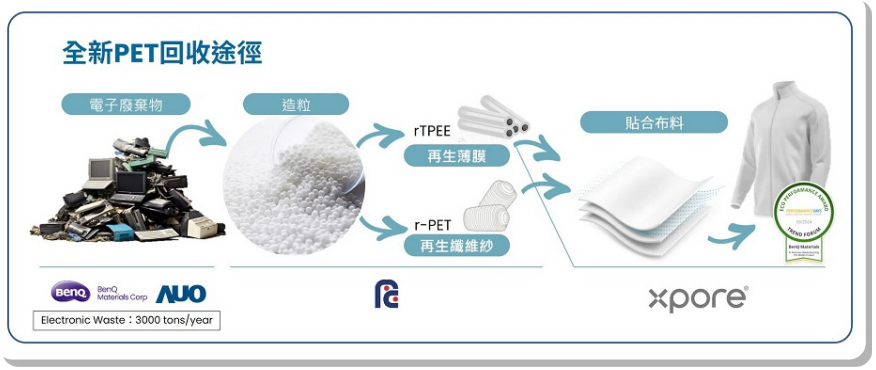
Aspect	Design Principle	Environmental Benefits
Logistics	**High-Performance Delivery**	Wound Care: • Centralized sterilization via third-party providers reduced trips during production planning; compared to 2023, cut travel by 1,800 km and fuel use by 225L in 2024, lowering emissions by ~520 kg CO_2e. Skin Care: • Double stacking of shipping containers increased efficiency by 33% (67 containers planned, 45 shipped). • Switched from loose cargo to palletized shipping, cutting costs by ~62.3%. Vision Care: • Some logistics partners transitioned to low-emission vehicles. Medical packaging: • Adopted multi-drop domestic delivery routes, reducing freight costs by ~25%.
Use, Maintenance, End-of-Life	**High-Performance Products**	Wound Care: • QuikNing Gauze demonstrates superior exudate absorption, with an average absorption ratio exceeding 14 times its weight. Clinical trials show it achieves twice the bleeding control effectiveness compared to conventional gauze. Skin Care: • DermaAngel Acne Patch delivers 3–5 times the absorption efficiency of leading market brands. • Surface features matte finish technology to reduce reflectivity and enhance discreet wear. Vision Care: • Oxygen permeability (Dk/t) reaches 193, six times higher than conventional hydrogel lenses, promoting ocular respiration. • Triple-layer encapsulation technology (Color Lock Technology) ensures pigment security and non-fading performance.Solvent-free formulation reduces allergen risk and environmental impact. • Proprietary EautraSil®Plus hydrophilic silicone technology creates a highly hydrophilic matrix, reducing protein/lipid deposition and enhancing clarity while lowering risks of allergic reaction and bacterial infection. • Enhanced moisture retention and prolonged wear comfort. • Ergonomic optical design improves lens shape for enhanced comfort. • Multi-curve lens architecture fits the eye anatomy precisely, reduces displacement and foreign body sensation; clinical satisfaction increased by 9%.
	Product Lifetime	Wound Care: • QuikNing Gauze features a five-year shelf life, exceeding the industry norm of three years through advanced manufacturing processes. Medical packaging: • Some product shelf lives extended from three to five years starting in 2024.



Aspect	Design Principle	Environmental Benefits
Use, Maintenance, End-of-Life	**Circular Economy**	Vision Care: • As part of the Green Action Initiative launched in China (since Sep 2022), over 130,000 used PP blister cups have been collected by end of 2024.  Medical packaging: • Maintained 90% reuse rate of wastewater from printing processes. • All factory waste converted into Solid Recovered Fuel (SRF) in 2024, reducing landfill waste by at least 200 metric tons. Skin Care: • Waste adhesive film from acne patch production repurposed into SRF; with 40 tons of waste film in 2024, an estimated 4.92 tCO_2e reduction was achieved.
Social Contribution	**Environmental Impact**	Skin Care: • Solvent-free manufacturing reduces Volatile Organic Compound (VOC) emissions versus traditional solvent-based adhesive processes. • Packaging light-weighting efforts—including material evaluation and structural optimization—reduce both physical volume and transportation-related carbon emissions. Vision Care: • Continued 100% recycling of polypropylene materials in 2024, reducing environmental impact through reuse. Wound Care: • Development of antimicrobial wound gel derived from natural polymers, offering lower carbon footprint due to renewable sourcing and enhanced biodegradability, helping mitigate environmental harm from medical waste.
	Social Impact	Wound Care: • Enhances home-based care, supporting elderly and disabled populations in improving quality of life. • Donated foam and hydrocolloid dressings to National Taiwan University Hospital Yunlin Branch for low-income patients, addressing healthcare equity in under-resourced regions. Vision Care: • Through the Vision of Hope Project, in partnership with Child Welfare League Foundation and Kobayashi Optical since 2014, Myoken has provided free prescription eyewear to over 2,600 economically disadvantaged children by the end of 2024. (See section 8-2-1 for details.) Medical packaging: • Sterile barrier systems help prevent hospital-acquired infections among healthcare workers and patients, supporting public health outcomes.

Waterproof and breathable textiles

Aspect	Design Principle	Environmental Benefits
Design	Structure optimization	• Advanced film microstructure design and optimized composite adhesive applications significantly enhance product performance and reliability. • e2cycle technology enables the recycling of PET from electronic waste into high-performance, eco-friendly textiles, showcasing Xpore's innovation in sustainable materials. This technology bridges environmental responsibility with functionality in technical apparel. The e2cycle mono-material polyester composite textile is scheduled for mass production in Q2 2025.
	Recyclable Materials	• Xpore is committed to sustainable textile innovation. The e2cycle product line utilizes recycled electronic polarizing film waste to manufacture high-performance textiles. • To reduce petrochemical dependency and support marine waste removal and purification initiatives, BenQ Materials combines its eco-friendly microporous membranes with ocean-recycled nylon yarns in domestic lamination facilities powered by renewable energy, launching waterproof and breathable fabrics using marine-recycled materials.
	Low-Impact Components	• Solvent-free lamination process emits no volatile organic compounds (VOCs), reducing environmental and health risks.
	Product safety	• Materials certified by Intertek to be free from PFOS and PFOA, aligning with global sustainable application trends. • The Xpore Ultra series features nano-scale waterproof-breathable membrane technology that passes the wet bacterial penetration resistance test (TTRIENISO 22610), supporting post-pandemic microbial barrier requirements.
Manufacture	High-Efficiency Manufacturing	• Introduction of automatic packaging machines increased packaging capacity by 50%. Replacing manual handling with conveyor belts reduced daily round-trip handling by 120 trips. • In 2024, improved production line speed boosted output by approximately 38% compared to 2023.
Logistics	Green Packaging	• Core pulp thickness of some shipping rolls reduced from 3 inches to 2 inches, allowing longer fabric rolls and better container volume efficiency, reducing shipment frequency. • In 2024, carton size reduced from 40 cm to 26 cm, significantly lowering paper consumption and reducing CO_2emissions by an estimated 1%.
	High-Performance Delivery	• Through communication with customers to optimize delivery schedules and consolidate shipments, pallet reuse was sustained. In 2024, the reuse rate reached approximately 60%.
Use, Maintenance, End-of-Life	High-Performance Products	• BenQ Materials' proprietary composite technology extends product life cycles, ensuring long-term reliability.
	Product Lifetime	• Xpore Ultra uses hydrophobic and breathable membranes, inherently more resistant to hydrolytic degradation than common polyurethane materials. • A new process developed in Q4 2024 is expected to increase product durability by 30%, with mass production planned for Q4 2025.
Social Contribution	Environmental Impact	• All Xpore products are 100% fluorine-free and non-toxic, prioritizing consumer safety. • All manufacturing processes strictly adhere to environmental regulations, ensuring no air or water pollution.



e2cycle: Innovative PET Recycling Technology Transforming Electronic Waste into High-Performance Textiles

According to the Global E-waste Monitor 2024, the volume of global electronic waste has reached 62 million metric tons and is projected to grow to 82 million metric tons by 2030. However, only 20% of this waste is properly recycled, with the remainder often causing severe environmental harm due to improper handling.

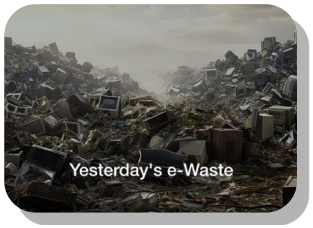
e2cycle: Pioneering a New Era of Sustainability through E-Waste

e2cycle technology recycles PET from electronic waste and converts it into high-performance, eco-friendly textiles—demonstrating Xpore's innovative capabilities in sustainable materials. This technology not only fulfills environmental responsibilities but also enhances functionality, enabling the development of high-value functional apparel and offering a comprehensive PET recycling solution that balances performance and sustainability.

The Urgent Challenge of Electronic Waste Collaborative Innovation for a Circular Future

The e2cycle PET recycling technology integrates BenQ Materials' expertise in electronics and material science with Far Eastern New Century's strength in textile manufacturing. This partnership transforms electronic waste into high-quality textile materials.

From polo shirts made with recycled PET sourced from electronic waste to waterproof functional jackets produced from discarded smartphone materials, e2cycle goes beyond traditional recycling approaches. It exemplifies the synergistic potential of the electronics and textile industries in advancing sustainable development.



Green Logistics

Green Logistics Policy

Achieving net-zero emissions is a global imperative for corporations. In addition to continuously optimizing manufacturing processes and improving water efficiency, BenQ Materials prioritizes low-carbon circular logistics management, placing low-carbon transportation and the reduction of emissions from logistics operations at the core of its logistics strategy.

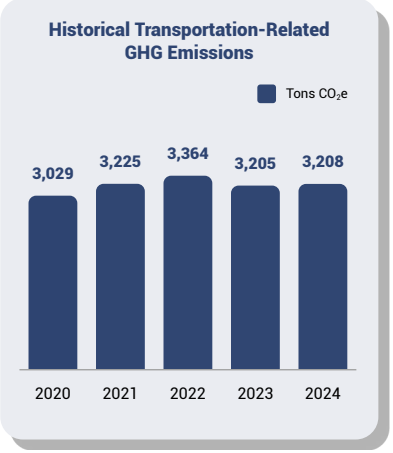
Recently, BenQ Materials has initiated product carbon footprint verification to gradually establish a product-level carbon emissions database. This database supports the development of low-carbon and energy-efficient products. Through low-carbon circular logistics practices, the company aims to realize its low-carbon manufacturing objectives.

Low-carbon Transportation	Product packaging material reduction	Packaging Material/Pallet Recycle
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.	Change the disposable cartons to recyclable packaging boxes for the shipping method, and increase the times of use of use of packahing material, in order to reduce generation of waste.	Use recyclable and reusable pallets for shipping, in order to prevent the use of disposable pallets, that may cause unnecessary wastes.

Low-Carbon Transportation

To reduce the carbon footprint associated with logistics operations, BenQ Materials revised its transportation strategy starting in 2023, gradually shifting from air freight to sea freight. In 2024, transportation-related greenhouse gas (GHG) emissions totaled 3,208 metric tons of CO_2e—representing a reduction of 156 metric tons of CO_2e compared to 2022, prior to the strategic adjustment.

Looking ahead, the company plans to further increase the share of low-carbon transport and adopt carbon intensity–based performance indicators to enhance logistics-related climate performance.



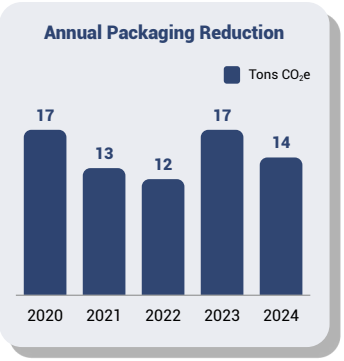
Note: Carbon reduction formula: Number of transports × [Carbon emissions per trip before implementation - Carbon emissions per trip after implementation]

Low-carbon packaging

BenQ Materials continues to implement policies such as "Recyclable Carton Box Verification," "Reduction of Outbound Shipment Frequency and Air Freight Usage," and the promotion of "Reusable Packaging Boxes" to encourage and lead customers in adopting sustainable packaging practices.

The company transitioned from single-use corrugated boxes to low-carbon packaging for outbound shipments. By applying design-for-reduction principles and using mono-materials, the packaging volume has been reduced and its environmental impact minimized through reuse.

In 2024, the polarizer production site's outbound shipment data showed that the adoption of recyclable packaging boxes significantly reduced the use of single-use packaging materials. The estimated reduction in packaging-related carbon emissions reached 3 metric tons of CO_2e, compared to 2023.



Note 1:Packaging Material Recycling Rate is calculated as the monthly volume of each type of recycled packaging material for polarizer products divided by the monthly outbound volume of the corresponding packaging material.
Note 2:The emission reduction coefficient for packaging boxes is based on data from Rong Cheng Paper Corp., indicating that the production of 1 kg of recycled cardboard using waste paper emits approximately 0.8 kg CO_2e.

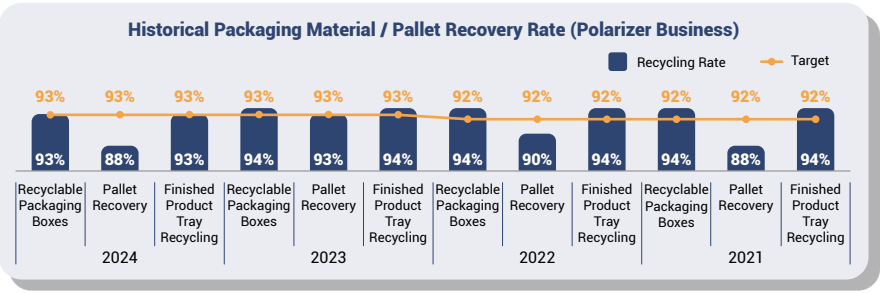
Low-Carbon Recycling Loop

The Display Materials Business adopts recyclable packaging materials and pallets for shipments, incorporating a low-carbon circular management system to track packaging material recovery volumes, recovery rates, and achievement levels. Through a packaging material recovery management mechanism, the company ensures recovery quality and extends the life cycle of packaging materials, thereby reducing material usage and cost, as well as minimizing waste generation.

In 2024, recovery performance included:

- Recyclable packaging boxes recovery rate: 93%
- Recycled pallets recovery rate: 88%
- Recycled product trays recovery rate: 93%
- Overall recovery rate: 91%, representing a 2% decrease compared to 2023.

BenQ Materials continues to monitor customers' recovery performance and arranges timely transport for recovered items to reduce the use of single-use packaging. The recovery rate target for 2025 is set at 93%.



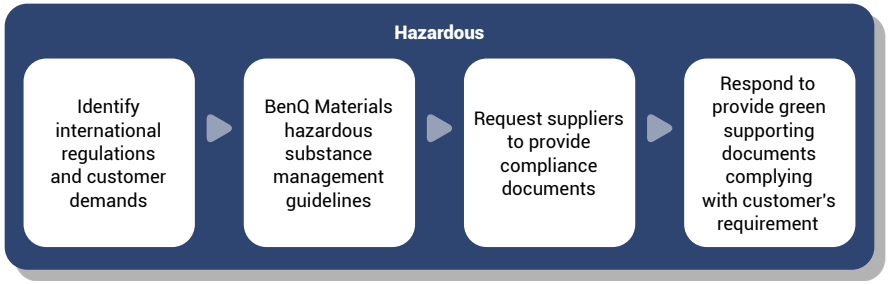
Hazardous Substance Management

Product Hazardous Substance Management

BenQ Materials established its GP Core Team in 2010 to proactively promote Hazardous Substance-Free (HSF) management. Each year, the company reviews its hazardous substance management practices based on international regulations, customer requirements, and environmental trends, and updates the "Environmental Quality Assurance Management System Operational Standard" accordingly.

All products must comply with international laws and customer requirements, including the EU Restriction of Hazardous Substances Directive (EU RoHS), the EU Registration, Evaluation, Authorisation and Restriction of Chemicals regulation (EU REACH), the Packaging and Packaging Waste Directive, and the EU Waste Electrical and Electronic Equipment Directive (WEEE).

A material hazardous substance management system has been established to ensure that the company's functional films and battery material products comply with all relevant international regulations and customer specifications. In 2024, a total of 391 product hazardous substance tests were conducted, achieving a 100% compliance rate.



Product Category	Number of Applications	Compliance Rate
Display Materials	324	100%
Specialty Products	41	100%
Battery Materials	6	100%
Biomedical Products	18	100%
Medical Packaging	2	100%
Total	391	100%

PFAS Reduction Plan

In light of the growing global concerns over the use of PFAS (Per- and Polyfluoroalkyl Substances) and increasing demands from many customers to prohibit the use of PFAS starting next year, the company has included relevant PFAS substances in its environmental management checklist and requires suppliers to control PFAS content to non-detectable (ND) levels.

To achieve the goal of completely phasing out PFAS, the company has launched the following reduction initiatives and plans to fully prohibit the use of PFAS in non-medical businesses by 2027:

Current State Assessment:

1. Continuously inventory all PFAS substances used in company products and processes, as well as their areas of application.
2. Establish a PFAS substance management database to facilitate subsequent monitoring and tracking.

Supply Chain Management:

1. Notify and require all suppliers to comply with the company's PFAS prohibition policy and provide relevant material testing reports.
2. Assist suppliers in researching and testing alternative materials to PFAS.

The phased implementation of PFAS reduction includes:

1. By 2025: Achieve complete substitution of high-risk PFAS substances, with PFAS test results in products reaching ND levels.
2. By 2027: Completely eliminate the use of all PFAS substances in products and processes.
3. Collaborate with the R&D department to assess and verify the feasibility and quality stability of alternative materials.
4. Conduct testing on alternative materials used by suppliers to ensure no additional environmental or health risks are introduced.

Customer Communication and Collaboration:

1. Product managers (PMs) or sales units proactively engage with customers to discuss alternative material solutions.
2. Continuously respond to customers' needs for PFAS reduction and substitution, assisting customers in complying with regulations and market trends.

Policy Review and Updates:

Annually review international regulatory trends, industry developments, and technological progress, and adjust the PFAS reduction roadmap and strategies accordingly.

Product Chemical Substance Management Achievements

1. Full Compliance with EU RoHS Directive:
   All BenQ Materials' products comply with the EU RoHS concentration limits for lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE). In response to RoHS 2.0 regulatory requirements since 2016, phthalates (DEHP, BBP, DBP, DIBP) have also been included in testing, with results consistently showing "not detected."
2. Halogen-Free Requirements for Electronic Products:
   While general customer requirements specify individual bromine and chlorine content <900 ppm and total halogen content <1500 ppm, BenQ Materials enforces stricter limits of <800 ppm each for bromine and chlorine. All products meet these enhanced standards.
3. Disclosure of Hazardous Substance Listings:
   Under the EU REACH regulation and its Substances of Very High Concern (SVHC) list, BenQ Materials proactively investigates suppliers upon each SVHC update and discloses results transparently to customers.

In 2024, seven new substances were added to the SVHC list, bringing the total to 242. BenQ Materials conducted and disclosed results for 484 customer requests, covering 17 display materials customers, 1 specialty product customer, and 2 battery materials customers.

To align with EU regulations (e.g., RoHS and REACH) and customer standards (e.g., green product criteria, processes, and procurement), BenQ Materials enhances its compliance assurance through ISO 9001-based process and system management. To further reinforce quality assurance and customer confidence, the company successfully maintained QC080000 certifications at both the Taoyuan and Longtan plants in October 2024.

Chemical Management in the Supply Chain

BenQ Materials connects upstream suppliers—raw material providers, processing chemical suppliers, post-cutting plants, and shipping packaging suppliers—into an effective green product value chain. This collaborative framework ensures source-level control, enabling product compliance with green product standards while minimizing environmental impact during the manufacturing process.

Supplier Management Process:

BenQ Materials manages chemical-related disclosures via a Supplier Portal. Suppliers submit required documentation through the portal → internal approval is conducted → all files remain accessible in the system. Test reports provided by suppliers must be updated and re-uploaded annually.

Product Safety and Marketing Labels

Medical Device Standards and Certifications

All medical device products sold by BenQ Materials must obtain regulatory approval and certification from the respective countries prior to market entry. Certifications acquired include those from Taiwan (TFDA), the European Union (CE), the United States (FDA), and China (NMPA). Details of each country's product certifications are available on the BenQ Materials ESG website.

During clinical trials, products must comply with ISO 14971:2019, the standard for medical device risk management, and ISO 14155:2020, the guideline for clinical evaluation of medical devices. These standards govern risk management during product development and the scientific design, execution, documentation, and reporting of clinical trials to ensure reliable and valid results.

In addition, medical devices intended for direct human contact must pass biocompatibility testing under the ISO 10993 series before market release.

Medical Device Manufacturing and Sales Permits

BenQ Materials is a licensed medical device manufacturer, having obtained official approval and registration to produce related medical device products. These products comply with the safety and manufacturing standards of various countries, and the company holds all necessary manufacturing licenses.

For product sales, BenQ Materials must also acquire a medical device distribution license and complete product registration before any product can be legally marketed. Additionally, since contact lenses are classified as medical devices, they must be sold through physical retail channels that hold valid medical device distribution licenses before reaching end consumers.

Medical Device Product Labeling and Marketing Regulations

Transport Packaging Labeling Requirements

1 Outer Packaging:

Must be clear, easily identifiable, and permanent, including the following details:

- Product catalog number
- Quantity
- Manufacturer or supplier name/logo
- Production date in ISO 8601 format
- Batch/lot number
- Basis weight (grams per square meter)
- Roll width (cm) and length (m)
- Recommended storage conditions

2 Inner Packaging or Roll Labels:

Must be clearly visible and firmly attached, including:

- Quantity
- Manufacturer or supplier name/logo
- Batch number
- Basis weight (grams per square meter)

Medical Device Labeling Requirements

All BenQ Materials' medical device labels must comply with the local medical device regulations of each target sales market. In addition, labeling follows ISO 15223-1:2021, which provides standardized symbols for labeling and product information used in medical devices.

For products governed under Taiwan's Medical Devices Act, labels, instructions, or packaging must include:

- Product name
- License number or registration number
- Performance/intended use or indications
- Manufacturing date and expiration/shelf life
- Model/specification or key components
- Warnings, precautions, usage limitations, and foreseeable side effects
- Name and address of the license holder or registrant
- Name and address of the manufacturer
- Lot number or serial number
- Any other items announced by the central competent authority

Medical Device Marketing Requirements

Marketing of medical devices must strictly comply with the relevant advertising and marketing laws in each jurisdiction.

For example, in Taiwan:

- Pre-approval is required from competent authorities for any promotional materials, including text, graphics, or verbal content.
- Promotional practices are restricted: it is prohibited to advertise through impersonation, disguised publications, interviews, or other improper methods.

Taking contact lenses as an example (regulated as medical devices), all advertisements—whether print or digital—must comply with Taiwan FDA advertising review guidelines. The Ministry of Health and Welfare regularly communicates updated rules and review principles to ensure proper implementation.

For influencer collaborations, BenQ Materials requires all branded product review content to be pre-screened by the regulatory affairs department to ensure compliance with advertising laws.

Environmental Sustainability

05

Environmental Management

Environmental Development Progress

2020
- Implemented material flow cost accounting analysis project

2021
- Yunlin Tech Plant and Suzhou Plant constructed self-generated solar photovoltaic system for self-use

2022
- Implementation of ISO 14067 Verification for Two Products
- Installation of Self-Consumption Solar Photovoltaic System at Taoyuan Factory

2023
- Taoyuan Plant Obtained ISO 46001 Certification
- Longke and Suzhou Plants Obtained ISO 50001 Certification
- Yunke Polymer Plant Established a Self-Generated Solar Photovoltaic System

2024
- Taoyuan Plant passed the Cleaner Production Assessment System Compliance Determination.
- Yunlin Manufacturing Plant 1 received the LEED Silver Certification from the U.S. Green Building Council and the Gold-Level Green Building Label from the Taiwan Architecture & Building Center.
- Suzhou Plant was certified as a Class 3A Green Factory by the Suzhou Bureau of Industry and Information Technology.
- Yunlin Polymer Plant, Yunlin Manufacturing Plant 3, and Wuhu Plant obtained ISO 50001 certification.
- Yunlin Manufacturing Plant 1 installed a new self-use solar photovoltaic system.

Note: For the complete environmental development progress, please refer to the ESG website.

Environmental Management Goals

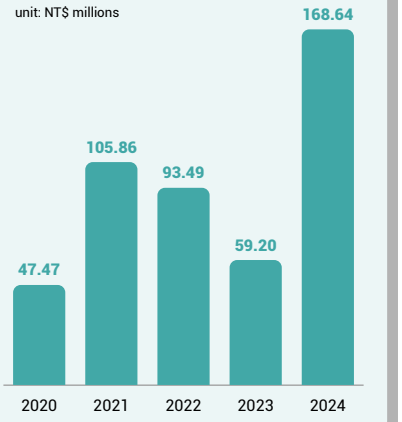
BenQ Materials has established a comprehensive environmental management framework covering energy and greenhouse gas management, water resource management, and waste management, with corresponding policies in place to actively manage resource use across multiple aspects. Specific environmental management targets have also been set.

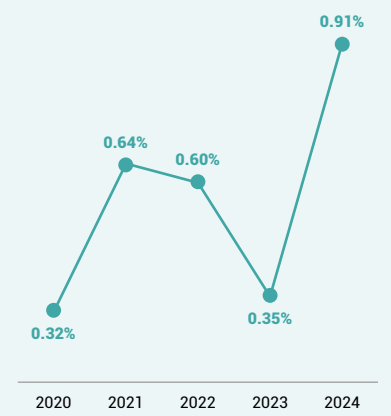
In alignment with global environmental concerns and trends, BenQ Materials conducts annual internal audits and third-party verifications to ensure the effectiveness of its management systems. The company's major operational sites are certified under the ISO 14001 Environmental Management System. Additionally, the Taoyuan site is certified under the ISO 46001 Water Efficiency Management System.

Furthermore, the Taoyuan, Longtan, Suzhou, Wuhu, Yunlin Polymer, and Yunlin Manufacturing Site III have obtained ISO 50001 Energy Management System certification. ISO 14067 Carbon Footprint verification has also been completed for products including polarizers, textile fabrics, and battery materials. For more information, please refer to Appendix 9-7: Overview of Management System Implementation.

Environmental Management Item	Environmental Management Goal
Climate Change Response	Reduce greenhouse gas emissions (Scope 1 and 2), using the baseline year 2020 as the reference.
	Increase the share of renewable energy usage.
Energy Management	Reduce non-renewable energy consumption intensity, using the baseline year 2020 as the reference.
	Promote company-wide energy-saving initiatives annually.
Water Resource Management	Reduce water withdrawal intensity (excluding reclaimed water), using 2020 as the baseline.
	Increase water reuse rate.
Zero Waste to Landfill (Reduction and Circularity)	Increase the waste resource recovery rate.

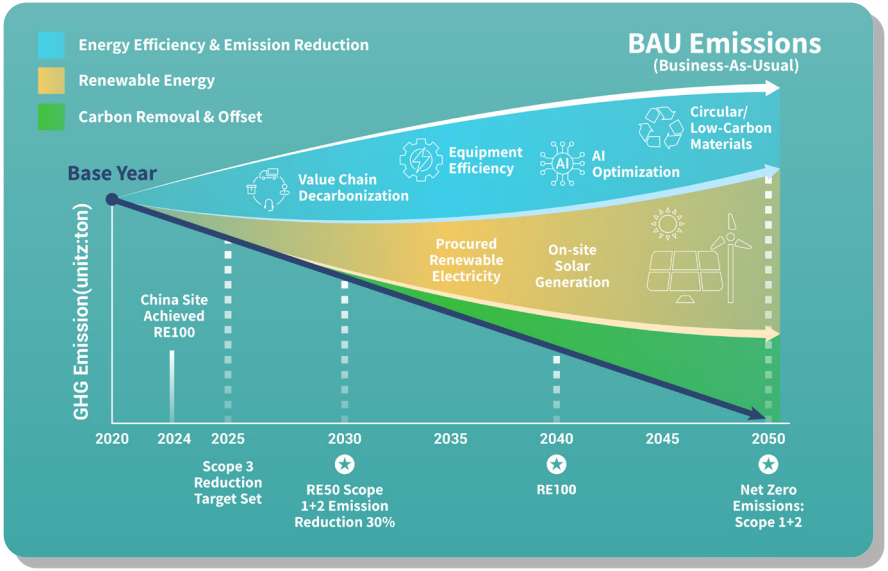
Environmental Investment Costs





Note: Environmental expenditures include costs for waste treatment, pollution control, and capital expenditures on equipment. In 2024, the primary investments were made in establishing new production processes at BMY with environmentally friendly pollution control considerations; replacing outdated boilers, regenerative thermal oxidizers (RTO), and blowers at the Taoyuan plant; as well as routine replacements of RTO heat exchange media, chemical dosing for the wastewater system, and maintenance of water treatment facilities. The total environmental expenditure amounted to NT$168.64 million, representing 0.91% of the annual revenue.

Climate Change Management



In 2021, BenQ Materials officially set its 2050 net-zero emissions target through the ESG Sustainability Committee. In alignment with the results of its greenhouse gas (GHG) inventory and the company's development trends, BenQ Materials has formulated short-, medium-, and long-term carbon reduction goals and strategies. To address climate change mitigation and adaptation, the company continues to implement the ISO 14001 Environmental Management System and ISO 50001 Energy Management System while carrying out various energy-saving, carbon-reduction, and resource efficiency improvement initiatives.

In recent years, the company has proactively invested in the application of artificial intelligence (AI) technology and new equipment to enhance production efficiency and achieve low-carbon transformation. Additionally, BenQ Materials has installed on-site solar power systems at its facilities to expand the use of renewable energy and is dedicated to developing low-carbon, green products. The company collaborates closely with sustainable supply chain partners, comprehensively advancing toward low-carbon, green, and sustainable corporate development.

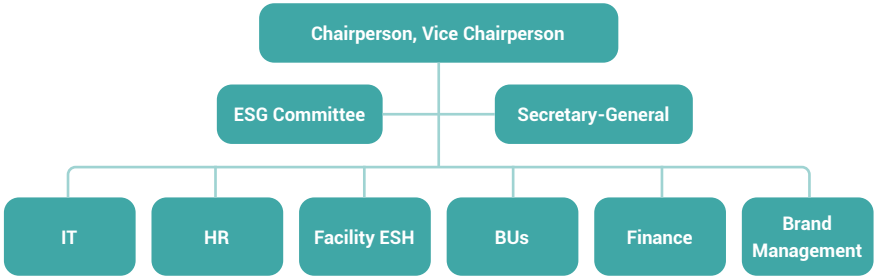
BenQ Materials supports the Paris Agreement and commits to limiting global warming to well below 2˚C and strives to pursue efforts to limit the temperature increase to 1.5˚C. Although the company has not yet obtained certification for the 1.5˚C target under the Science Based Targets initiative (SBTi), it has completed its carbon inventory and formulated carbon reduction pathways and targets. In the future, BenQ Materials will carefully assess the feasibility of applying for SBTi certification based on actual operating conditions and industry development trends.

Every year, BenQ Materials engages in regular dialogues with the Taiwan Panel & Optoelectronic Materials and Device Association (TPSA) and the Taiwan Climate Partnership (TCP), discussing sustainability topics related to climate change, including the application of carbon reduction technologies, renewable energy procurement strategies, and industry sustainability trends, as well as sharing practical experiences and challenges. Through ongoing collaboration and dialogue, the company ensures that its actions and those of its industry partners are aligned with the Paris Agreement goal of limiting global warming to 1.5˚C.

Moreover, the company regularly reviews the climate positions of its industry sectors and the trade associations it participates in to ensure alignment with its own climate commitments and the targets of the Paris Agreement. If any inconsistencies are identified, appropriate actions will be taken, including expressing its stance to the associations or re-evaluating its membership.

Climate Change Management Working Team

BenQ Materials has established the "Climate Change Management Task Force," with the CEO and General Manager serving as Chairman and Vice Chairman, respectively. The first-level supervisors from each unit serve as committee members, and the CFO/Risk Management Unit serves as the Secretary General. This task force is responsible for promoting activities related to climate change management.

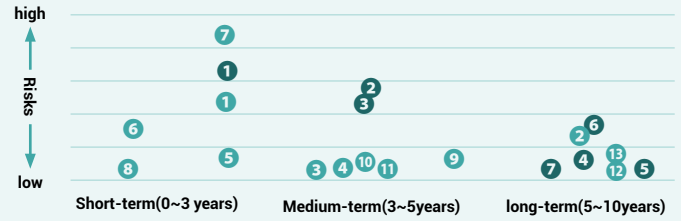


Climate Change Management Strategy and Actions

BenQ Materials manages climate-related risks and opportunities in alignment with the Task Force on Climate-related Financial Disclosures (TCFD) framework. The company identifies and evaluates five key climate-related risks and opportunities, taking into consideration potential financial impacts, urgency, co-benefits, economic viability, and technological feasibility. Based on this assessment, climate adaptation action plans are formulated and implemented.

BenQ Materials conducts internal management review meetings annually, and integrates climate risk management with its existing enterprise risk management framework. Climate strategies, targets, and action plans are reported to the Audit Committee and Board of Directors each year to ensure oversight and strategic guidance.

Aspect	BenQ Materials Strategy and Action Plan
Governance	1 The Board of Directors Regularly Reviews Climate-Related Risks and Opportunitie • Since 2022, BenQ Materials has reported annually to the Board of Directors and Audit Committee on the management of climate-related issues. The most recent report was completed on October 31, 2024. • The Climate Change Management Task Force organizational structure is shown above. Each year, the company identifies and assesses climate-related risks and opportunities. Based on a comprehensive evaluation of potential financial and other impacts, the task force formulates climate adaptation plans, which are reviewed in management review meetings chaired by the Chairperson/Vice Chairperson, ensuring alignment with corporate strategy and timely resource allocation.
Strategy	1 According to the climate-related risk and opportunity assessment methodology, internal definitions are as follows: • Time horizon for potential impacts: – Short-term: 0–3 years – Mid-term: 3–5 years – Long-term: 5–10 years • Impact severity is assessed based on: – Effects on assets and financials – Impacts on products and services – Impacts on personnel – Reputational impacts 2 Through the identification and assessment process, five key risks and opportunities have been prioritized: • Risks: – Extreme weather events (short-term) – Raw material shortages or increased costs (short-term) – Rising average temperatures (mid-term) – Changes in precipitation patterns (mid-term) – Stricter carbon disclosure requirements / carbon pricing mechanisms (short-term)



Transition Risks:

1. Strengthened carbon emission disclosure requirements/carbon pricing mechanisms
2. Requirements and regulations for existing products and services
3. Mandatory use of renewable energy
4. Insufficient training on new policies and regulations
5. Low-carbon alternative products and services
6. Stricter product regulations
7. Raw material shortages or cost increases
8. Labor market issues
9. Changes in consumer preferences
10. Increased stakeholder concerns
11. Poor performance in international initiative evaluations
12. Changes in consumer habits
13. Industry stigmatization

Physical Risks:

1. Extreme weather events
2. Average temperature rise
3. Changes in rainfall patterns
4. Wildfires
5. Food shortages
6. Increased likelihood of infectious diseases
7. Rising insurance premiums

• Opportunities:
– Research and innovation in new products and services (short-term)
– Renewable energy and energy-saving opportunities (short-term)
– Development and/or expansion of low-carbon products and services (short-term)
– Reduction of water usage and consumption (long-term)
– Recycling and reuse initiatives (short-term)

Aspect	BenQ Materials Strategy and Action Plan
Strategy	 **Opportunities:** 1. Adoption of more efficient production and distribution processes 2. Recycling and reuse 3. Transition to more efficient buildings 4. Reduction in water use and consumption 5. Work From Home (WFH) 6. Renewable energy and energy-saving initiatives 7. Development and innovation of new products and services 8. Development and/or increase of low-carbon products and services 9. Changes in consumer preferences 10. Use of new technologies 11. Entry into new markets 12. Sustainability-linked syndicated loans 3 Scenario Development Approach Includes: • Transition Scenario: Based on changes in regulations, policies, product demand, and green inflation-related transition assumptions. • Physical Scenario: Refers to SSP5-8.5 (very high emissions scenario) from the IPCC Sixth Assessment Report (AR6); due to limited external literature, China-based facilities refer to RCP8.5 from the IPCC Fifth Assessment Report (AR5).
Risk Management	1 Establishing a Climate Risk Identification Process Using the TCFD Framework: • Risks are identified and assessed following the TCFD framework, covering both transition risks (such as current and emerging regulations, legal, policy, technology, market, and reputational risks) and physical risks (both acute and chronic). • Identified risks are prioritized and analyzed based on the assessment results, and findings are reported to the Climate Change Management Task Force during its annual management review meetings to ensure effective implementation. 2 Integration of Climate-Related Issues into Enterprise Risk Management Processes: • High-risk climate issues are incorporated into executive-level management discussions. • Transition and physical risks are reviewed annually, and the corresponding adaptation action plans are adjusted dynamically. (Refer to Section 3-5 Risk Management in this report.)
Metrics and Targets	1 Climate Performance Management Indicators and Targets: • Greenhouse Gas Emissions: 30% reduction by 2030 compared to the baseline year 2020. • Renewable Energy Usage: 50% by 2030 and 100% by 2040. • Carbon Reduction for Existing Products: 55% reduction by 2030 compared to the baseline year. • Ultimate Goal: Achieve net-zero emissions by 2050. 2 Annual GHG Inventory and Strategy Review under ISO 14064-1:2018: • Conduct greenhouse gas inventory in accordance with ISO 14064-1:2018 and obtain third-party assurance statements. • Target a 30% reduction in emissions by 2030 compared to the 2020 baseline. • Strive for net-zero emissions by 2050 and achieve key climate-related goals in product design. • For detailed climate adaptation actions, please refer to the table below.

Climate Change Adaptation Action Plan

Climate-Related Risk/ Opportunity	Category	Time Horizon	Potential Impact	Potential Financial Impact	Management Strategy / Response	Response Cost
Physical Risk	Extreme Weather Events	Short term (0–3 years)	Power/water outage or factory flooding affecting production	Over 20M	• Strengthen factory power system resilience • Enhance factory water system resilience • Consider extreme weather risks in new facility design stage	Over 20M
	Changes in rainfall patterns and extreme weather	Mid term (3–5 years)	Labor shortage due to travel disruption, increased facility maintenance costs	5M-10M	• Identify low-lying roads near plants • Assess and introduce water-saving irrigation systems (Automation already implemented in plants)	1M-5M
Transition Risk	Policies & regulations, including carbon pricing and renewable energy mandates	Short to Mid term (0–5 years)	Carbon fees, higher product costs, potential penalties due to unmet green electricity requirements	10M-15M	• Install solar PV systems • Promote energy-saving and carbon-reduction measures • Participate in Taiwan green power market, integrate renewable energy	Over 20M
	Market: raw material cost increase or shortage	Mid to Long term (3–10 years)	Unstable raw material supply, cost increase	Over 20M	• Develop substitute material programs • Assist suppliers in energy-saving and carbon-reduction	Over 20M
	Technology: investment/ R&D failure in low-carbon alternatives	Short term (0–3 years)	Inability to meet customer expectations, potential revenue loss	Revenue-related, may affect financial forecasts	• Develop low-carbon products • Reduce production waste and promote circular reuse • Reduce packaging	Over 20M
	Consumer behavior change	Short term (0–3 years)	Order decline	Revenue-related, may affect financial forecasts	• Adjust product portfolio, expand other application fields	5M-10M
Opportunity	Develop or expand low-carbon goods and services	Short to Mid term (0–5 years)	Cost reduction, meet customer expectations, increase revenue	Revenue-related, may affect financial forecasts	• Introduce low-carbon materials • Green manufacturing • Reduce raw material usage • Equipment optimization	Over 20M
	R&D and innovation of new products and services	Long term (5–10 years)	New products contribute to increased revenue	Revenue-related, may affect financial forecasts	• Apply innovative technologies, develop alternative materials	1M-5M
	Use of more efficient production and distribution processes	Short term (0–3 years)	Reduce direct costs	1M-5M	• Process optimization	1M-5M
	Recycling and reuse	Short term (0–3 years)	Reduce indirect costs, increase revenue	15M-20M	• Packaging recycling • Rework of consumables • Regeneration and reuse	1M-5M

Currency: NTD

Greenhouse Gas Management

GHG inventory

BenQ Materials has established a comprehensive greenhouse gas (GHG) inventory mechanism in accordance with ISO 14064-1:2018 and the Greenhouse Gas Protocol issued by the World Resources Institute (WRI). Since 2008, the company has progressively built complete GHG emissions inventories for each manufacturing site and conducts annual GHG inventories.

Beginning in 2023, subsidiaries such as Cenefom Corp. and Jenjet Biotech Co., Ltd. initiated the implementation of self-inventoried GHG emission systems.

BenQ Materials' GHG emissions primarily originate from two major sources:

1 Scope 2-Indirect emissions from purchased electricity used in operations.

2 Scope 1-Direct emissions from internal activities involving the combustion of fuels such as natural gas and gasoline.

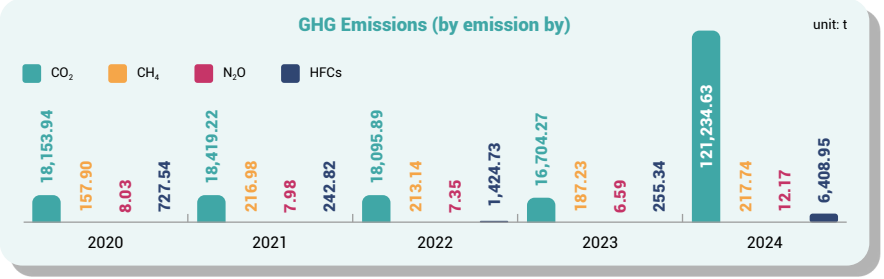
In 2023, the company re-identified and assessed Scope 3 categories, prioritizing based on the accessibility of activity data and emission factors. Selected Scope 3 categories included upstream transportation and distribution, business travel, employee commuting, purchased goods and services, capital goods, and waste generated in operations.

- In 2023, the Scope 3 boundary expanded to include employee commuting and downstream transportation and distribution.
- In 2024, additional Scope 3 items were inventoried, including purchased goods and services and upstream transportation and distribution.

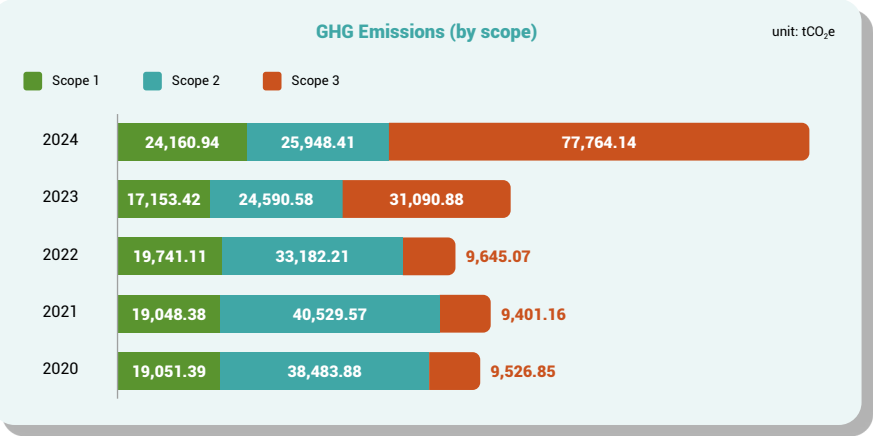
In 2024, combined Scope 1 and Scope 2 emissions totaled 50,109.36 metric tons of CO_2e, representing a 20.04% increase from 2023, mainly due to emissions from newly established production lines. However, this also reflects a 12.91% reduction compared to the 2020 baseline.

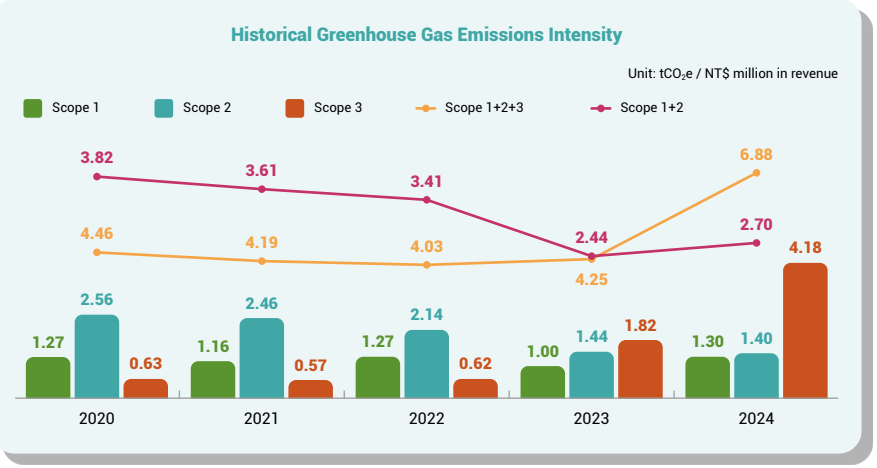
GHG emissions intensity (Scope 1 + 2) has steadily decreased since 2017. In 2024, emissions intensity reached 2.70 metric tons CO_2e per NT$ million revenue, reflecting a 10.60% increase from 2023 but a 29.49% reduction compared to 2020, driven by the adoption of renewable energy and carbon reduction investment projects.

Scope 3 emissions in 2024 totaled 77,764.14 metric tons of CO_2e, marking a 150.12% increase from 2023 and a 716.26% increase from 2020. The rise is primarily due to the expanded Scope 3 boundaries based on facility-specific characteristics and improved accessibility of emission factors, particularly in categories such as purchased goods and services and upstream transportation and distribution.



Note: BenQ Materials does not emit greenhouse gases such as perfluorocarbons (PFCs) or sulfur hexafluoride (SF_6), nor does it generate any biogenic GHG emissions.





Note 1: The operational sites verified by a third-party include: BenQ Materials Headquarters, Taoyuan Plant, Lungke Plant, Yunkang Plant, Suzhou Plant, Wuhu Plant, Lienhwa Medical, Hailu Plant, BMC (No. 28), BMM, and DTB. Scope 3 emissions have been accounted for at headquarters and Taiwan sites since 2019, and for overseas sites starting in 2022. Subsidiaries including Web-Pro, Cenefom, and GENE JET Biotech have only completed internal inventories; data from these sites are not yet disclosed in the current scope but are expected to be included after third-party verification in 2025.

Note 2: The GHG inventory is conducted based on ISO 14064-1:2018. As of 2023, all sites have completed third-party verification.

Note 3: The electricity emission factor for Taiwan sites is based on the 2023 emission factor published in 2024 by the Bureau of Energy: 0.494 tCO_2e/MWh.

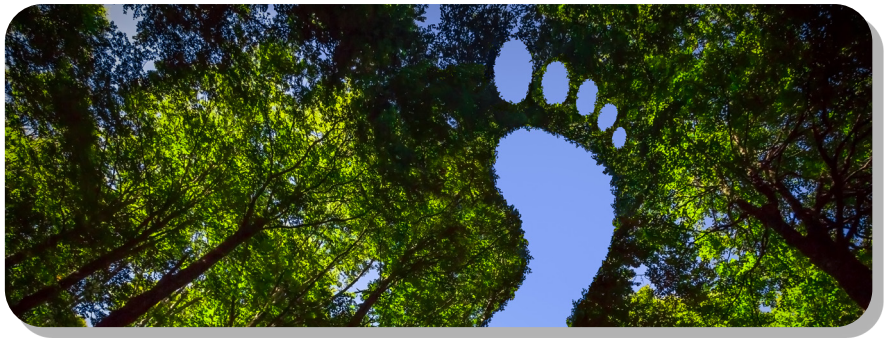
Note 4: The electricity emission factor for China sites is based on the 2022 national average carbon emission factor published by the Ministry of Ecology and Environment of China: 0.5366 tCO_2e/MWh.

Note 5: The organizational boundary for BenQ Materials Headquarters, Taoyuan Plant, Lungke Plant, Yunkang Plant, Suzhou Plant, Wuhu Plant, Lienhwa Medical, Hailu Plant, BMC (No. 28), BMM, and DTB is set using the Operational Control approach.

Note 6: GWP values used for emissions calculations:

For BenQ Materials Headquarters, Taoyuan Plant, Lungke Plant, Yunkang Plant, Lienhwa Medical, Hailu Plant, and BMC (No. 28): IPCC Fifth Assessment Report (AR5).

For Suzhou Plant, Wuhu Plant, BMM, and DTB: IPCC Sixth Assessment Report (AR6).

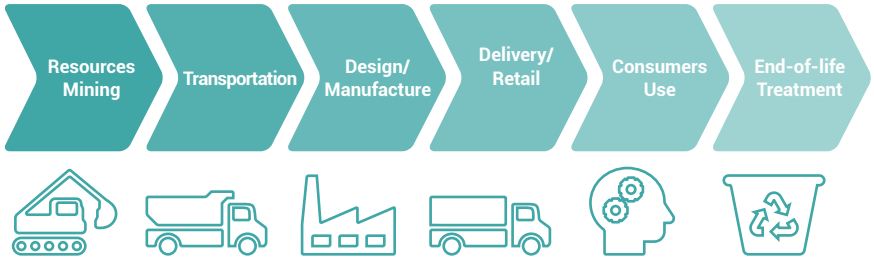


Product carbon footprint verification

BenQ Materials initiated product carbon footprint assessments starting in 2022.

To date, carbon footprint inventories have been completed for three product categories: waterproof breathable functional fabrics, polarizers for display materials, and advanced battery separator films.

All products have obtained carbon footprint statements based on a cradle-to-gate boundary.



Completed carbon footprint inventory and the proportion of carbon emissions at each stage for each product

Product Type	Raw Material Stage	Transportation Stage	Manufacturing Stage
Waterproof and Breathable Functional Fabric	92.68%	1.87%	5.45%
Display Material (Polarizer) Products	55.49%	0.48%	44.03%
Advanced Battery Separator Membrane Products	26.92%	0.17%	72.91%

Internal Carbon Pricing and Carbon Fee

BenQ Materials has long aligned with national greenhouse gas reduction policies and actively invests in energy-saving and carbon-reduction initiatives. Since 2021, the company has implemented an internal carbon pricing mechanism to proactively manage future carbon emission risks and enhance internal awareness of carbon management. Each year, reduction targets and performance reviews are governed through the ESG Committee oversight platform.

To accelerate its company-wide net-zero transition and promote decarbonization across operations, BenQ Materials launched an internal carbon fee system in 2023. Under this mechanism, a uniform carbon fee is applied to each business unit based on actual monthly energy-related emissions. A fee of NTD 900 per metric ton of CO_2e was initially adopted, with revenues collected into a centralized decarbonization fund, designated for investments in in-house energy efficiency upgrades and procurement of renewable energy.

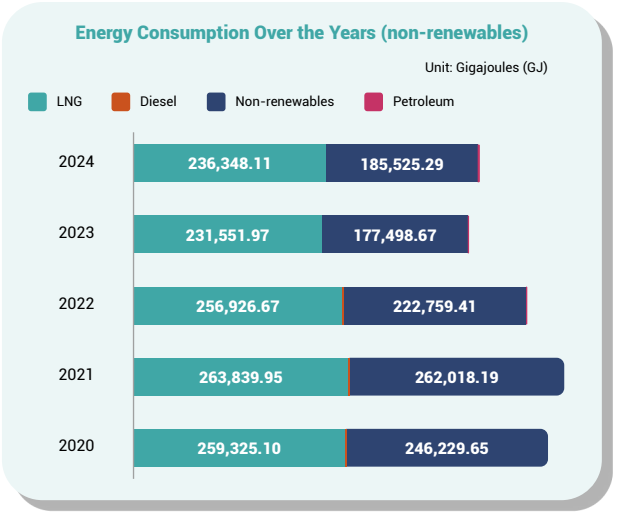
In 2024, the internal carbon price was increased to NTD 1,100 per metric ton (approximately USD 33.8).

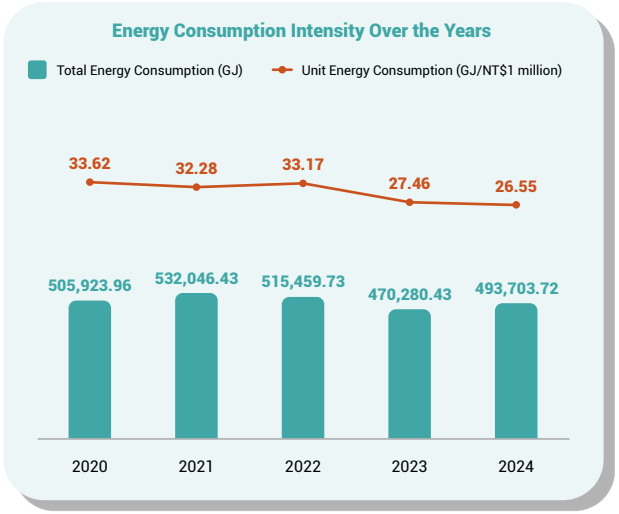
Energy Management

Energy Usage Data

In 2024, the main sources of energy used by BenQ Materials were natural gas and purchased non-renewable electricity, followed by diesel. The total energy consumption in 2024 included 6.2735 million cubic meters of natural gas, 68.8586 million kWh of electricity (including both non-renewable and renewable electricity), 10.9 thousand liters of gasoline, and 5.8 thousand liters of diesel. This equates to a total energy consumption of 497,266.58 GJ, representing an increase of 26,986.14 GJ or 5.74% compared to 2023.

Using revenue as the denominator, the 2024 energy intensity (defined as energy consumption per NT$1 million in revenue) was 26.74 GJ/million NT$, reflecting a decrease of 0.71 GJ/million NT$ or 2.60% compared to 2023.





Note 1: The 2024 disclosure scope for energy management includes the following operational sites: BenQ Materials Headquarters, Taoyuan Plant, Lungke Plant, Yungkang Plant, Suzhou Plant, Wuhu Plant, Hailu Plant, BMC (No. 28), BMM, and DTB.

Note 2: Energy consumption data from 2021 to 2024 has been updated. Data for subsidiaries (Web-Pro, Cenefom, and GENE.JET Biotech) is not included in the current disclosure and is expected to be incorporated in 2025 upon completion of third-party verification.

Emission Reduction Actions and Outcomes

To mitigate global warming and reduce operational risks associated with climate change, BenQ Materials continuously promotes green manufacturing by implementing energy-saving, emission-reduction, and resource-circulation initiatives aimed at minimizing resource use and consumption.

In 2024, a total of 21 electricity-saving projects were implemented, resulting in an annual electricity savings of 1.2623 million kWh and a corresponding reduction of 635.66 metric tons of CO_2e emissions. Additionally, six natural gas-saving projects were carried out, achieving an estimated annual reduction of 310.2 thousand cubic meters of natural gas and cutting carbon emissions by 588.49 metric tons of CO_2e.

Item	Main Energy-Saving Measures Implemented in 2024
1	Energy-Efficient Operation of Nitrogen Generators Upgraded operational controls to improve the energy efficiency of nitrogen generation systems.
2	Replacement of Lighting Fixtures with High-Efficiency Models Phased replacement of traditional lighting with energy-saving LED or high-efficiency fixtures across facilities.
3	Installation of Heat Pumps in MAU Systems at Yunlin Plant II Enhanced energy performance of Make-Up Air Units (MAUs) by adding heat pump systems.
4	Replacement of FFU AC Units with DC Motors / RCU with EC Fans Upgraded from alternating current (AC) motors to direct current (DC) and electronically commutated (EC) fans to increase ventilation energy efficiency.
5	Replacement of Aging Motors with High-Efficiency Permanent Magnet Motors Improved operational efficiency by replacing obsolete motors with energy-efficient permanent magnet types.
6	Installation of High-Efficiency Boilers at Taoyuan Plant Replaced outdated boilers with newly installed high-efficiency energy-saving boilers to enhance thermal efficiency.

Year	Electricity conservation effectiveness (kWh)	Emissions reduction effectiveness (tCO_2e)
2020	707,809	355.32
2021	779,358	391.24
2022	2,405,830	1,264.99
2023	1,413,562	732.75
2024	1,262,304	635.66

Note:All reduction measures fall under Scope 2.

Year	Natural gas conservation effectiveness (m3)	Emissions reduction effectiveness (tCO_2e)
2020	341,808	646.02
2021	505,615	950.05
2022	293,972	552.37
2023	87,777	178.40
2024	310,197	588.49

Note:All reduction measures fall under Scope 1.

Energy Transition – Use of Renewable Energy

In 2023, BenQ Materials, following the renewable energy strategic goals of the Qisda Group, advanced its original RE100 target timeline from 2050 to 2040 and established a concrete strategic roadmap for achieving RE100. In addition to continuing investments in self-built solar power generation systems for on-site use, the company has actively collaborated with renewable energy electricity providers to gradually expand its procurement of renewable energy, thereby fulfilling its commitments to energy transition and net-zero carbon emissions.

As of 2024, BenQ Materials' total annual renewable energy consumption reached 16,336.3 MWh (equivalent to 16.3363 million kWh), comprising:

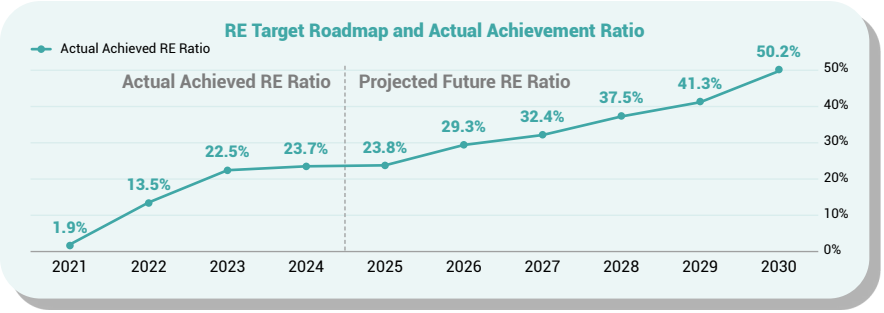
- Electricity generation from self-built solar power systems totaling 3,384.3 MWh (338.43 million kWh).
- Procurement of externally purchased renewable energy totaling 2,451.0 MWh (245.10 million kWh).
- Purchase of China-issued GEC/I-REC renewable energy certificates for the China facilities, totaling 10,501.0 MWh (1,050.10 million kWh).

The above renewable energy usage has been utilized to offset the carbon emissions associated with externally purchased electricity across all sites during 2024, as part of the company's voluntary carbon reduction initiatives.

Looking ahead to 2025, the company will continue to increase investments in self-built solar power generation systems for on-site use and further expand external procurement of renewable energy, moving steadily toward achieving the RE100 targets set by the Group and the ESG Sustainability Committee.

Among these efforts, BenQ Materials' textile production facility located in Yunlin (hereinafter referred to as the "Yunlin Textile Plant") completed the installation of its solar power generation system in 2024. The system operates under a "self-generation and self-consumption" model, supplying electricity required for the plant's operations. According to statistics, the total electricity consumption of the Yunlin Textile Plant in 2024 amounted to 287,862 kWh, all of which was supplied by the self-installed solar power system, thereby achieving the goal of 100% renewable energy usage for the plant's annual electricity needs.

To enhance transparency and ensure credibility in external disclosures, the Yunlin Textile Plant has also applied for and obtained a total of 804 "Self-Use Renewable Energy Certificates" from the Taiwan Renewable Energy Certificate Center (T-REC), corresponding to its actual renewable electricity generation for the year. The certificates fully cover the facility's total annual electricity consumption.



Self-Generated Renewable Energy

Since 2021, solar power systems have been progressively installed at various plants to supply electricity for internal use, thereby reducing purchased electricity and carbon emissions. In 2024, a new solar power installation project was completed and commissioned at the YCT Manufacturing Plant 1. The total electricity generated across all plants in 2024 reached 3.3843 million kWh. In 2025, the scale of solar power generation systems will continue to expand at YCT Manufacturing Plant 1 and Plant 2. It is estimated that the total electricity generation across all plants will reach 5 million kWh in 2025.

Year	Generation capacity (kWh)
2021	1,379,200
2022	2,530,591
2023	2,796,485
2024	3,384,296

Green Building Certification

In 2024, the YCT Manufacturing Plant 1 obtained the LEED BD+C Silver certification from the U.S. Green Building Council, and in 2025, it received the Golden Level Green Building Label from the Taiwan Architecture & Building Center. The facility is designed as a central air-conditioning-type plant using top-tier energy-efficient chilled water systems. The three-story steel-frame building features an energy-saving envelope and high-reflective Low-E glass windows to reduce external heat transfer and increase natural lighting for energy conservation. The plant is equipped with high-efficiency LED lighting, including LED panel lights in office areas. Rooftop solar panels provide green electricity and serve as thermal insulation to reduce air-conditioning energy consumption. During construction, recyclable building materials were reused to minimize construction waste. For water conservation, water-saving certified fixtures were installed, and both air conditioning condensate and rainwater are reused for cooling towers and landscape irrigation.

Promotion of Green Factory Certification

In response to global climate change and environmental protection trends, and upholding the spirit of corporate sustainable development, BenQ Materials actively promotes the attainment of green factory certifications for its facilities in both Taiwan and overseas, striving to create environmentally friendly, energy-efficient, and high-performance manufacturing environments.

The company is committed to reducing resource waste at the source, improving energy efficiency, and adopting low-carbon, low-pollution production technologies. It has implemented ISO 14001 environmental management systems and energy management systems, while strengthening waste sorting, recycling, and reuse mechanisms to realize green supply chain management. Employees are encouraged to participate in green initiatives and environmental education to enhance overall environmental awareness.

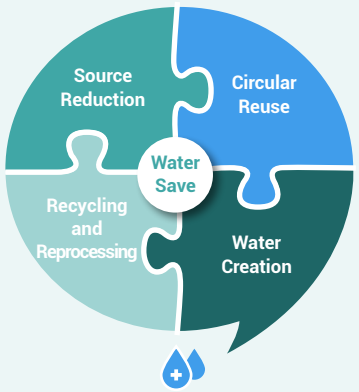
In 2024, the Suzhou plant obtained the 3A-level Green Factory Certification from the Suzhou Municipal Bureau of Industry and Information Technology. Establishing green factories not only reduces operational risks and costs but also reflects the company's commitment to corporate social responsibility. BenQ Materials will continue taking concrete actions to implement green principles and move toward a low-carbon, sustainable future.

Water Resource Management

Starting from the sustainable use of water resources, BenQ Materials follows three main principles: water inventory, water-saving measures, and recycling and reuse. These principles extend to four strategic stages: wastewater reduction, wastewater recycling, development of new water sources, and zero wastewater discharge. Wastewater reduction and recycling are approached from four main water usage areas: domestic, process, air conditioning systems, and boiler water. The company aims to gradually improve water use efficiency and strategies. In 2023, the Taoyuan Plant introduced the ISO 46001 Water Efficiency Management System and passed the verification.

Starting from Sustainable Water Resource Utilization, Implementing Four Major Water Usage Directions to Enhance Water Reuse Rate

- Using water-saving facilities, such as water-saving toilets and faucet aerators
- Improving the water production rate of the pure water system
- Utilizing rinsing in the production line to replace high water-consuming membranes to reduce water usage

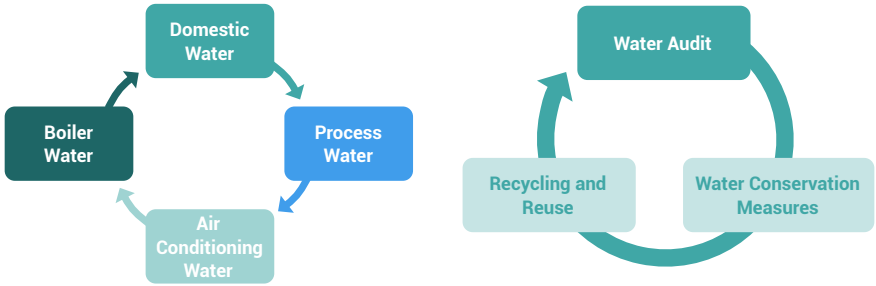


- Recycling steam condensate
- Filtering and circulating water in production line tanks
- Circulating water usage in cooling towers

- Classifying and recycling wastewater from production processes
- Recycling and reusing pure water system wastewater
- Recycling and reusing domestic wastewater

- Recycling and using air conditioning condensate
- Storing and using rainwater/reclaimed water for toilet flushing and irrigation

Water Principles and Directions



Water Consumption Overview

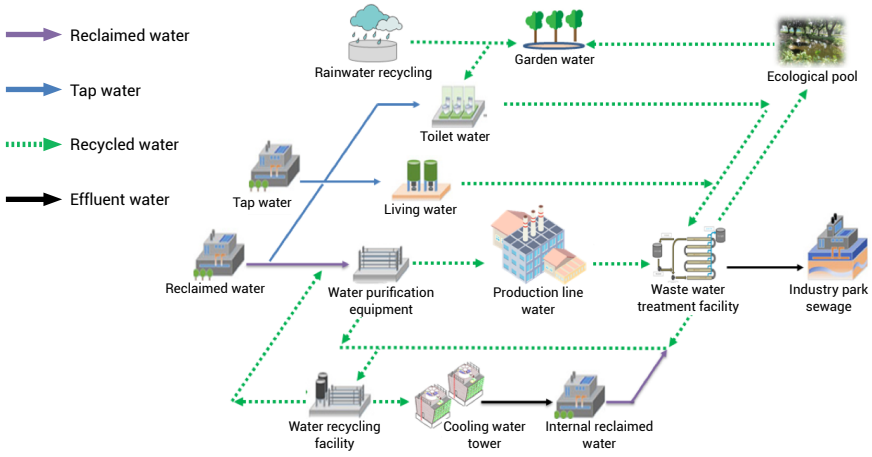
BenQ Materials' main water uses at each plant can be divided into process water, fire-fighting water, and domestic water. The water sources and supply units are specified according to their respective locations.

Business Location	Withdrawal Source	Usage			Supply Unit
		Process	Firefighting	Living	
Taoyuan Plant	Shihmen Reservoir, and some from groundwater	●	●	●	Taiwan Water Company
Longtan Tech Plant	Shihmen Reservoir	●	●	●	Taiwan Water Company
Yunlin Tech Plant	Hushan Reservoir and Jiji Weir	●	●	●	Taiwan Water Company
Suzhou Plant	Yangcheng Lake Area (Yangtze River water consumption scope)	▲	●	●	Suzhou Qingyuan Water Resource Ltd.
Wuhu Plant	Yangtze River	●	●	●	Wuhu Huayen Water Resource Ltd.

Note: The scope of water resource disclosure for 2024 includes: BenQ Materials Headquarters, Taoyuan Plant, Longtan Plant, Yuntech Plant, Suzhou Plant, Wuhu Plant, Lianhe Medical Materials, Hailu Plant, BMC (No. 28), BMM, and DTB.

Currently, all plants in Taiwan are equipped with on-site wastewater recycling and treatment facilities. 100% of the discharged wastewater is directed to the industrial park wastewater treatment plants for further processing. Each industrial park treatment plant has established influent standards that must be met for discharge. At the Suzhou plant, domestic wastewater is discharged into the municipal sewage system and treated by the municipal wastewater treatment center. At the Wuhu plant, process wastewater from coating roller cleaning undergoes coagulation, sedimentation, and filtration, then is combined with domestic sewage, treated via a septic tank, and finally discharged into the sewage pipeline. In 2024, no water quality abnormalities were reported at any plant.

Plant Water Consumption Process



Wastewater discharge standard and inspection items

Business Location	Wastewater Discharge Standard	Inspection Item
Taoyuan Plant	Sewage Water Quality Standard of Guishan Industrial Zone Service Center Sewage Treatment Plant	Water temperature, pH, BOD, COD, SS, boron, fluoride salts, copper, zinc, nickel
Longtan Tech Plant	Longtan Park Sewage Usage Fee Calculation Standard of Hsinchu Science Park Bureau, Ministry of Science and Technology	Water temperature, hydrogen ion concentration index (pH), biochemical oxygen demand (BOD), chemical oxygen demand (COD), SS, boron, fluoride salt, copper, zinc, nickel, anionic surfactant, ammonia nitrogen, nitrate nitrogen, cyanide, cadmium, total chromium, hexavalent chromium, total mercury, arsenic, lead, indium, gallium, molybdenum, true color
Yunlin Tech Plant	Sewage Water Quality Standard of Yunlin Technology Park	Water temperature, pH, COD, SS, ammonia nitrogen
Suzhou Plant	"Sewage Comprehensive Discharge Standard" GB8978-1996, "Sewage Water Quality Standard for Discharging Sewage into Cities and Towns" GB/T31962-2015	Animal and vegetable oils, pH, COD, SS, ammonia nitrogen, total phosphorus (TP)
Wuhu Plant	"Sewage Comprehensive Discharge Standard" GB8978-1996 Level 3 standard	Animal and vegetable oils, pH, BOD, COD, SS, ammonia nitrogen

In 2024, BenQ Materials (excluding subsidiaries) recorded a total water withdrawal of 357.25 million liters (ML) across all facilities, representing an increase of 14.80 ML compared to 2023. The total wastewater discharge amounted to 276.48 ML, which was directed to industrial park wastewater treatment plants—an increase of 7.24 ML compared to 2023. The water consumption was 80.77 ML, mainly due to evaporation losses from cooling towers in the chilled water system.

In 2024, the discharge rate (wastewater discharge / total water withdrawal) for BenQ Materials was 76.03%. Considering internal water reuse, including process water recovery, scrubber water recovery, reclaimed process water treatment, ROR circulation reuse, wastewater treatment reuse, and HVAC water reuse, the R2 (reuse rate) reached 86.73%. Including water reused from cooling towers, the R1 (total plant reuse rate) reached 97.39%.

Statistics of Water Withdrawal Over the Years

Unit: Megaliters (ML)

Withdrawal Source	Type	2020	2021	2022	2023	2024
Groundwater	Freshwater	0.16	9.17	0.07	0.10	0.4
Water from third party	Freshwater	442.36	439.02	425.85	342.35	356.85

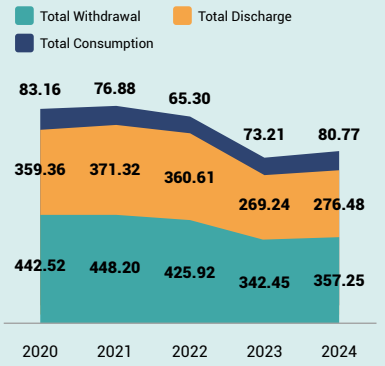
Statistics of Historical Water Discharge Amount

Unit: Megaliters (ML)

Withdrawal Source	Type	2020	2021	2022	2023	2024
Discharge amount according to destination	Water from third party	359.36	371.32	360.61	269.24	276.48
Discharge amount according to water quality	Freshwater	359.36	371.32	360.61	269.24	276.48
Discharge by level of water quality treatment	Primary treatment	68.39	77.54	75.96	61.85	63.67
	Secondary treatment	204.66	203.75	207.89	136.69	136.29
	Tertiary treatment	86.32	90.02	76.76	70.70	76.53

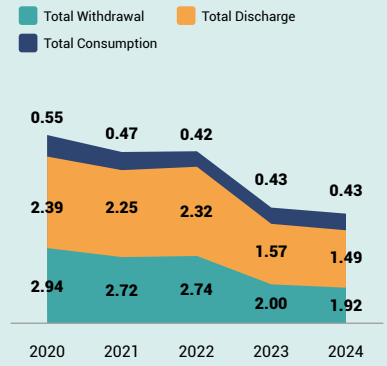
Annual water resource utilization intensity

Unit: million cubic meters per hundred million dollars



Annual water resource utilization overview

Unit: hundred cubic meters



Note 1: BenQ Materials uses the WRI Aqueduct water risk assessment tool to analyze the geographical locations of its operating sites. In the short term, only the Suzhou facility in mainland China is identified as a high water stress risk area, accounting for approximately 11.93% of total water withdrawal.

Note 2: The scope of 2024 water resource disclosures includes the following operational sites: BenQ Materials Headquarters, Taoyuan Plant, Longtan Plant, Yungke Plant, Suzhou Plant, Wuhu Plant, Lianhe Medical Materials, Hailu Plant, BMC (Plant 28), BMM, and DTB.

Note 3: Water resource data for the years 2021–2024 have been updated. The disclosed figures do not include subsidiaries (Web-Pro, Cenefom, and GENE.JET Biotech). Third-party verification is expected to be completed in 2025, after which these subsidiaries will be included in the disclosure scope.

Water risk management

According to the Global Risks Report 2023 by the World Economic Forum (WEF), the fourth most severe global risk over the next decade is natural resource crises, which includes water scarcity. Referencing data from the AQUEDUCT Water Risk Atlas by the World Resources Institute (WRI), BenQ Materials has assessed the water-related risks of its operational sites.

The assessment results show that in the short term, only the Suzhou facility in mainland China faces a high water stress risk. Other sites are considered to be at low water risk levels.

However, taking long-term climate change impacts into account, the Yungke site in Taiwan is projected to experience increased water stress and a shift to medium-level water risk. Accordingly, response strategies must be developed to enhance water risk resilience at this location.

Analysis of Significance of Water Impact

Business Location	Supplier	Supply Volume1 (Ml/day)	Consumption Volume2 (Ml/day)	Significance of Impact3
Taoyuan Plant	Danna Purification Plant	38.25	0.03	0.09%
Longtan Tech Plant	Longtan Purification Plant	13.76	0.04	0.28%
Yunlin Tech Plant	Yunlin Tech Purification Plant	1.6	0.002	0.14%
Suzhou Plant	Suzhou Qingyuan Water Resource Ltd.	45	0.008	0.02%
Wuhu Plant	Wuhu Huayen Water Resource Ltd.	87	0.002	0.002%

Note 1: Water supply data source: Official data published by the local government.
Note 2: Water consumption data source: Average water volume statistics from the plant.
Note 3: Usage impact = (Water consumption ÷ Regional water supply) × 100%

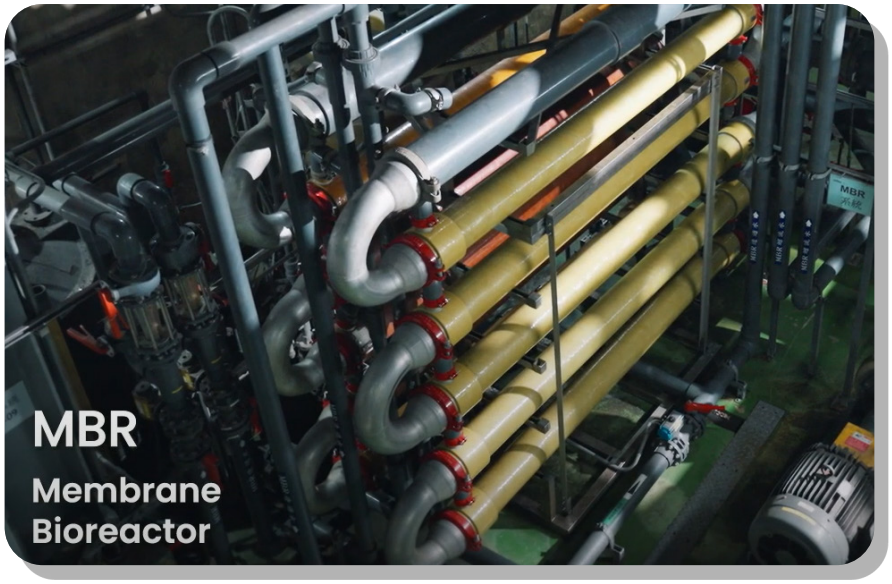
Water is one of the key global resources. Additionally, the risk and importance of water availability and use matter our operational activities and supply for the supply chain. In response to business disruption resulting from the potential risk of water suspensions and droughts due to climate change, we have established three major risk response strategies: external water information reporting system, internal water management system, and emergency response mechanism to enhance overall water risk resilience.

Water risk management approaches

- Establish a plant-wide water conservation management program and implementation plan and set up a task force.
- Analyze, inventory, and calculate plant water consumption, establish feasible solutions, and implement water conservation plans.
- Take the water conservation awareness education courses and training organized by the government and professional organizations.
- Enhance awareness and enrich professional knowledge of water conservation through awareness education and internal training.
- Each department sends seed personnel to implement water conservation work.
- Establish the water incoming and suspension information management report system to enhance the warning and response capabilities of water risks.
- Establish the drought response mechanism according to the government's water condition indicator.

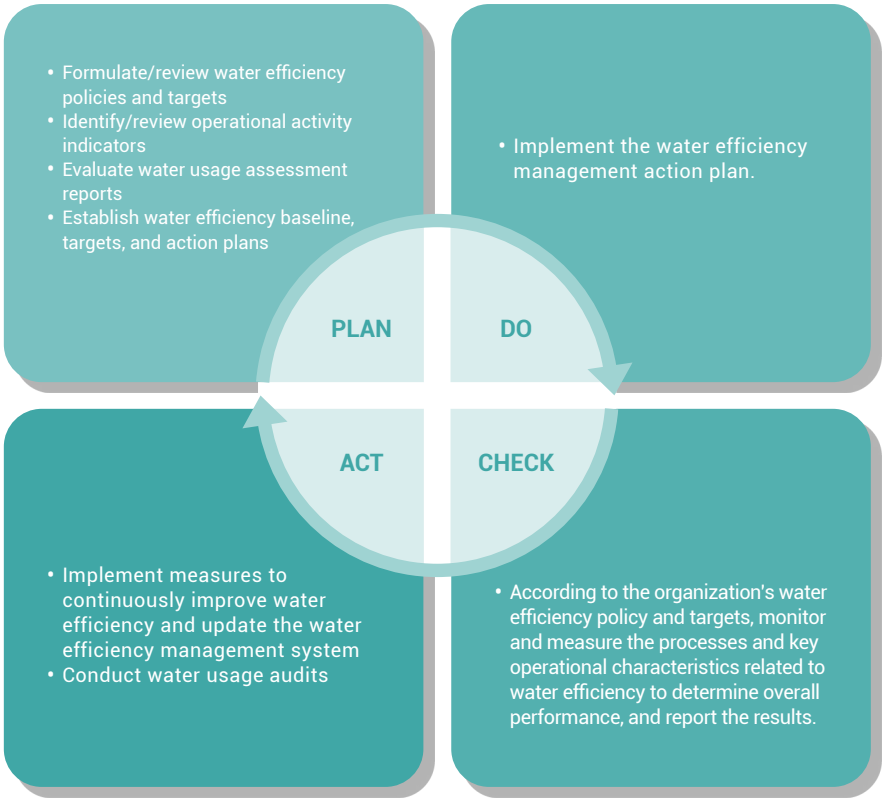
Drought Response Mechanism

	Rationing Stage	Government Policy	BenQ Materials' Response Plan
Condition Blue Normal Water Conditions	NA	Water supply stabilization	Normal withdrawal for production use
Condition Green Slightly Tight Water Conditions	NA	Recommendation for fallowing	Trial operation of the well water system every two weeks Notification of water tank contractors
Condition Yellow First Stage Water Restrictions Nighttime Reduced Pressure Supply	Stage 1 rationing	Supply with reduced pressure at off-peak hours and specific periods	Trial operation of the well water system every week Notification of water tank contractors
Condition Orange Second Stage Water Restrictions Reduced Supply of Non-Essential Water	Stage 2 rationing	1,000MT/month for industrial users Supply reduction by 5-20%	Initiation of the well system at Taoyuan Plant Notification of water tank contractors
Condition Red Third or Fourth Stage Water Restrictions Rotational Water Supply	Stage 3 rationing	Supply by region or time-based water suspension	Initiation of the well system at Taoyuan Plant Activation of water tank supply



Establishment of the water efficiency management system

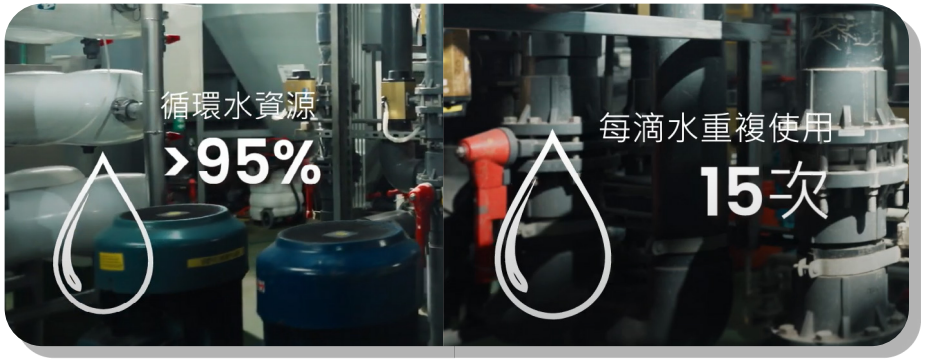
In 2023, the Taoyuan Plant began establishing the operational system for the ISO 46001 Water Efficiency Management System. By the end of 2023, the plant completed the verification and introduced a water use baseline. Daily audits of water use rationality were conducted to enhance the company's water resource management level and achieve environmental sustainability goals.



Water Conservation Solutions

In 2024, BenQ Materials continued to implement water-saving initiatives, including ongoing collaboration with production lines to recover regenerated ultrapure water, enhance the efficiency of wastewater recovery systems, improve process wastewater recycling, and recover condensate water—consistently reducing water resource consumption in manufacturing processes.

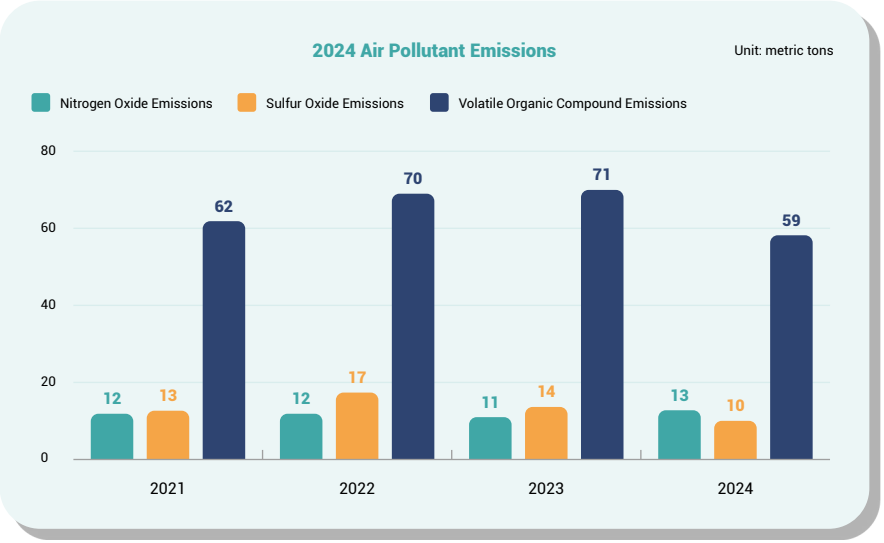
Year	Effectiveness (m3)
2020	14,290
2021	49,439
2022	12,562
2023	12,879
2024	**7,238**



Air Population Control

BenQ Materials monitors air pollutant emissions through its ISO 14001 environmental management system and has installed pollution control equipment such as regenerative thermal oxidizers (RTO), scrubbers, and baghouse dust collectors to treat process exhaust gases and minimize air pollution impacts. All pollution control facilities are operated and maintained by dedicated personnel, and monitoring is strengthened through centralized control systems and inspection mechanisms, with a focus on controlling volatile organic compounds (VOCs).

From 2021 to 2024, VOC emissions showed a decreasing trend. In 2024, the total VOC emissions amounted to 59 metric tons, representing a reduction of approximately 16.9% compared to 2023. This data covers the Taoyuan, Lungke, and Yungkang sites, which are the only sites with VOC emissions, achieving 100% coverage. VOC treatment efficiency has remained stable at over 98%, surpassing the regulatory requirement of 92%, and all emissions data have been subject to unannounced inspections and audits by environmental authorities.



Note 1: Air pollutant emissions at BenQ Materials mainly include nitrogen oxides (NO), sulfur oxides (SO), and volatile organic compounds (VOCs). Emissions data cover the Taoyuan, Lungke, and Yungkang sites. These sites do not emit persistent organic pollutants (POPs), hazardous air pollutants (HAPs), or particulate matter (PM). The Suzhou and Wuhu sites, as well as subsidiaries Cenefom, GENE.JET Biotech, and Web-Pro, do not generate air pollutant emissions.

Note 2: Air pollutant emissions are estimated based on emission factors from the "Air Pollution Control Fee Collection Regulations."

Circular Economy

Waste Management

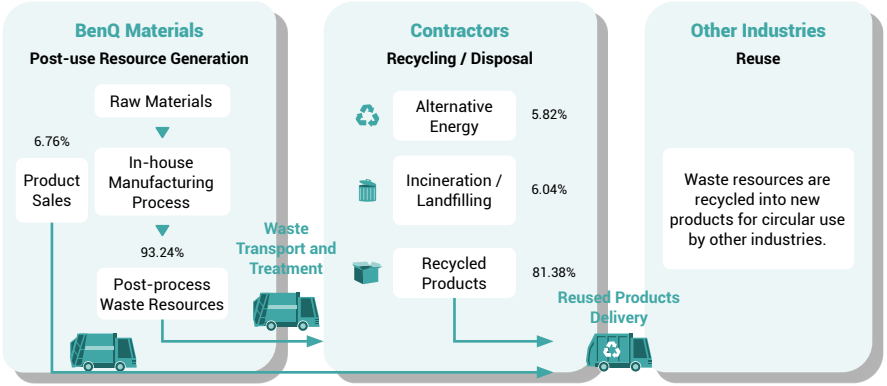
The waste generated during business operations must be properly managed, as improper disposal can cause severe environmental pollution and negatively impact the quality of life of local communities. BenQ Materials is committed to minimizing the environmental impact of its products throughout their life cycle—from raw material selection, manufacturing, storage, transportation, and use to disposal. The company actively promotes responsible production and pursues a "zero production waste" goal through reduction and circular management strategies.

All major operational sites are certified under the ISO 14001 Environmental Management System, ensuring that environmental issues are systematically managed, effectively controlled, and continuously improved. Each year, BenQ Materials sets concrete environmental improvement targets and implements waste reduction and resource optimization strategies to lower environmental impact and reduce waste generated during production.

At the source, BenQ Materials actively evaluates strategies to minimize resource consumption (Reduce), optimizes material usage parameters and process technologies, and collaborates with supply chain partners to enhance material utilization efficiency—reducing waste generation at its root.

In alignment with circular economy principles, BenQ Materials prioritizes material recycling and energy recovery through meticulous resource sorting and classification. Waste materials that can no longer be used in-house are handled by qualified waste processors for proper reuse, with incineration or landfill reserved only as a last resort when recycling is not feasible. This ensures minimal environmental impact.

Through these initiatives, BenQ Materials not only reinforces its environmental responsibility but also advances toward a more sustainable production model—achieving a balance between environmental protection and economic development.

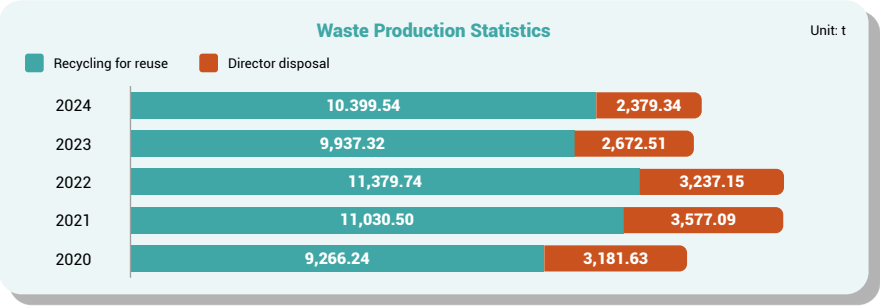


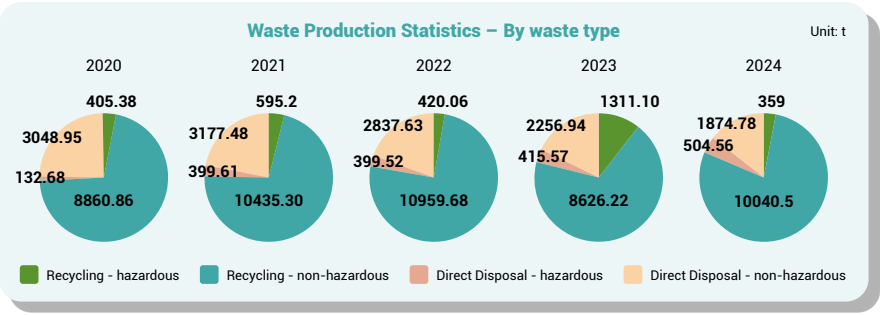
Waste Production Volume

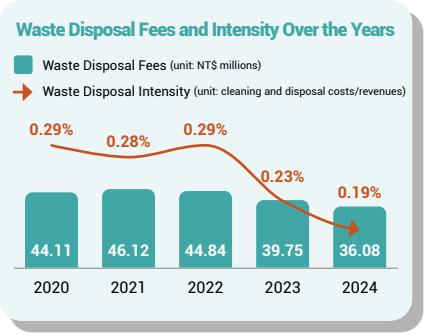
The types of waste generated at each BenQ Materials facility can be classified into seven categories: general industrial waste, potassium iodide, membrane waste, waste liquids and adhesives, recyclable waste liquids, solid waste, and recyclable resources.

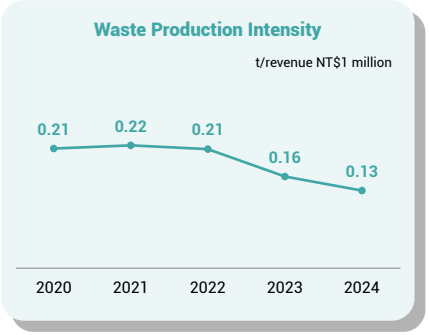
In 2024, the total waste generated was 12,778.87 metric tons, representing an increase of 169 metric tons compared to the previous year. The waste recycling and reuse rate in 2024 was 81.38%, an increase of 2.57% from the previous year. The waste removal and disposal cost in 2024 was approximately NT$36.08 million, accounting for 0.19% of revenue.

In 2024, the waste direct disposal intensity (direct disposal waste weight per NT$ million in revenue, excluding recycling) was 0.13









Waste Resource Recycling and Circular Reuse

BenQ Materials conducts monthly reviews of its waste recycling targets to ensure that all action plans are effectively implemented. To increase the recycling ratio of resource waste, the company has established formal waste management procedures and recovery goals. These are reviewed quarterly by the ESG Sustainability Committee to ensure long-term monitoring and performance tracking.

The company continuously explores reuse methods for various types of waste—either by developing new products or enabling circular reuse. Current efforts focus on distilled ethyl acetate (EAC), which is reused internally at production sites to reduce raw material consumption and waste generation. Additionally, BenQ Materials collaborates with external industries to use distilled EAC as their raw material.

The company is also seeking partners to reuse non-iodine white film waste as feedstock for other industries and continues to evaluate alternatives to auxiliary fuel as a disposal method.

BenQ Materials' main revenue-generating product is polarizers, whose primary material is base film. Due to current technological limitations, recycled materials from polarizers or other electronics cannot be reprocessed into base film suitable for polarizer production. Therefore, the company does not implement product take-back programs or e-waste recovery but instead handles waste through internal recycling or authorized external reuse channels.

In 2023, three circular reuse projects were launched and are still ongoing. The company continues to refine internal practices to enhance resource efficiency and promote environmental sustainability.

Distilled EAC (Ethyl Acetate) On-site Circular Reuse

Management Approach:

1. Conduct distillation treatment of waste solvent.
2. Perform quality verification on the recovered EAC.
3. Reintroduce distilled EAC into the production process for reuse.

Reduction Performance:

- Monthly replacement of virgin raw materials by approx. 5,295 kg of reused EAC.
- Circular reuse rate: 60%

Reusing Waste White Film as Raw Material for Other Industries

Management Approach:

1. Collect, sort, and recover waste film at production line.
2. Ensure that the recovered material meets downstream customer specifications.
3. Inspect edge cut and winding quality of film before shipment.

Reduction Performance:

- Waste film is reused as feedstock in other industries.
- Monthly waste volume reduced by 28 metric tons, simultaneously reducing treatment cost.

100% Reuse of Potassium Iodide (KI)

Management Approach:

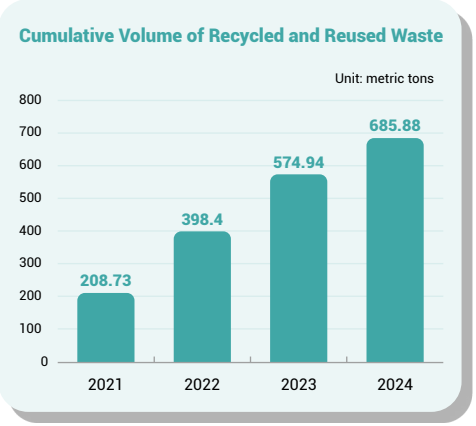
1. Modify pipeline to collect discharged KI solution for reuse.
2. Use low-temperature circulation filtration to purify the solution.
3. Concentrate the diluted solution after replacement for reuse.

Reduction Performance:

- Annual reduction in KI consumption: 3,093 kg
- Waste chemical solution discharge reduced by 1,050 metric tons

Recycling and Circular Resource Utilization Data

In 2024, the recycling and reuse rate of waste reached 81.38%, showing a 2.57% improvement compared to 2023. The efficiency of PSA adhesive distillation units was further optimized, enhancing the distillation quality and characteristics. The recovered material was fully reintegrated into the production process, achieving 100% substitution of virgin materials, which effectively reduced raw material procurement and created economic value.



Since 2021, a cumulative total of 685.88 metric tons of reclaimed material has been reused on-site. The company continues to seek qualified downstream recyclers and industrial partners to upcycle waste as secondary raw materials or remanufactured products for factory reuse.

For detailed waste data, please refer to Appendix 9-1-1 Environmental Performance Data.

To advance toward a circular economy, BenQ Materials is exploring innovative production technologies, alternative raw materials, waste reduction measures, green supply chain initiatives, and "zero-discharge" solutions. In 2024, the company already introduce Solid Recovered Fuel (SRF) manufacturing units to convert in-plant waste into SRF, which can be reused as fuel for industrial boilers, replacing part of coal consumption.

In addition to SRF initiatives, the company is also exploring waste-to-product applications. Currently under testing, one project aims to repurpose residual film waste into construction bricks, extending the life cycle of materials and giving waste a "second life," thus embodying the circular economy concept.