

# Winbond Story





# Value Creation and Six Capitals

Winbond Group fully recognizes that while striving for business and financial growth, as well as improving societal well-being, our actions may also have adverse effects on society and the environment. Therefore, we adopt an impact-oriented approach, taking into account broader and long-term impacts in our decision-making, and identifying the risks and opportunities that sustainability management may pose for the company's future. We are committed to continuous innovation through core technologies and stakeholder collaboration, fostering a mutually beneficial and sustainable partnership between the company and society.

Winbond discloses its capital inputs, outputs, and sustainability management practices. Through the strategic allocation and utilization of various forms of sustainable capital, we gain insights into the outcomes generated through our operations

Value Creation Process:

## 1. Input

Winbond Group draws upon six forms of capital—financial, manufacturing, intellectual, human, social, and natural—as the foundation for sustainable development.

## 2. Creating Value

We uphold the core philosophy of sustainable development, emphasizing stakeholder engagement and transparent communication, while demonstrating both financial and non-financial performance. We pursue the vision of becoming a hidden champion in providing sustainable semiconductors that enrich human life. In our operations, Winbond Group grows and thrives alongside over 8,000 colleagues worldwide, continuously driving technological advancement through R&D; capabilities and contributing to economic development.

Supply chain partners and their employees play a vital role in fostering innovation across the semiconductor industry by providing essential resources such as equipment, raw materials, and talent—helping to realize a sustainable semiconductor supply chain.

As advanced process technologies evolve, Winbond continues to diversify its process technologies and product portfolio, delivering memory and logic products to global customers and reaffirming our commitment to enhancing human well-being.

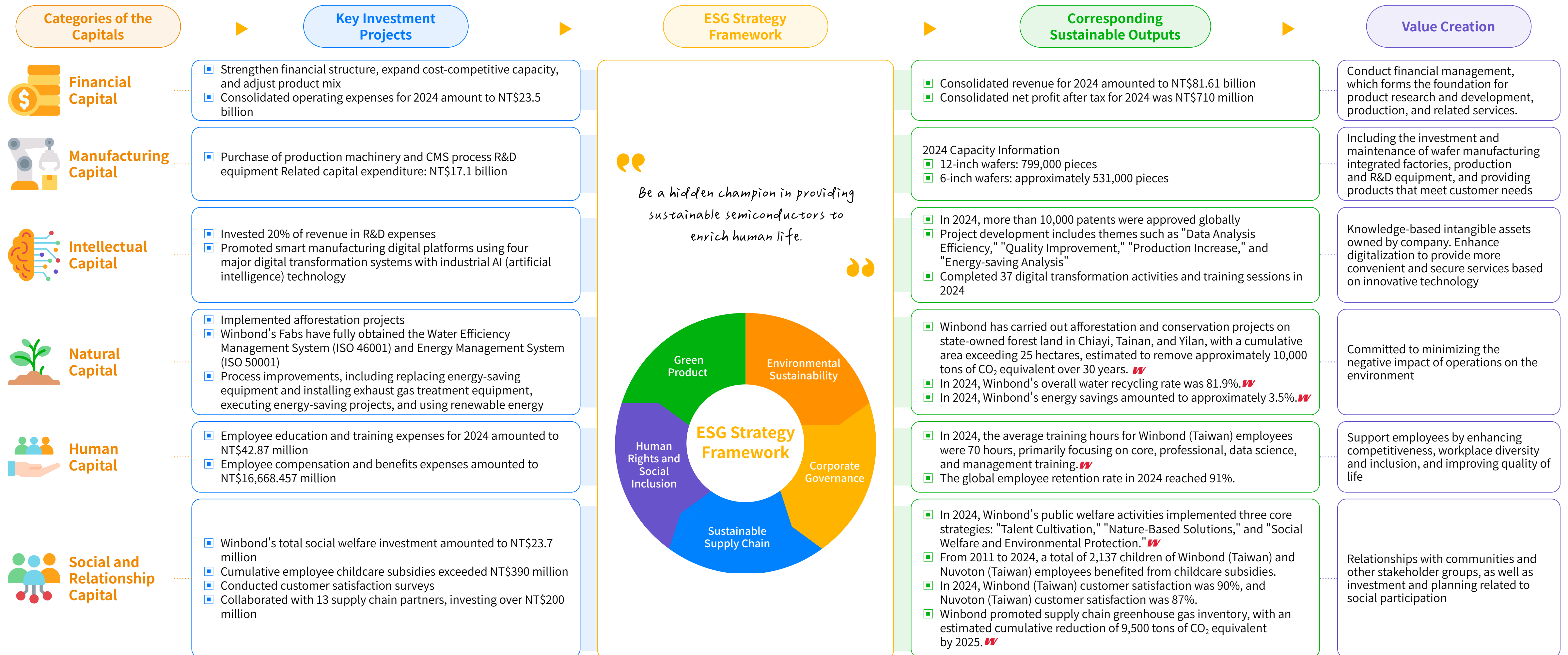
## 3. Output

Winbond Group's sustainability management framework guides our efforts across key pillars: corporate governance, environmental sustainability, green product, sustainable supply chain, human rights, and social inclusion. Each pillar is aligned with our core competencies and is supported by clearly defined strategies, goals, and action plans. We hold quarterly review meetings to monitor progress and execution, ensuring that ESG strategies are fully embedded in our daily operations.





# Value Creation and Six Capitals



Scope: Unless otherwise noted, the scope covers Winbond Group ; **W** Winbond

Manufactured Capital

Dual-Drive for Low-Carbon and Intelligent Wafer Fabs

Facing the opportunities and challenges of achieving net-zero carbon emissions, we understand that low-carbon manufacturing is not only a chance for corporate transformation but also a key to enhancing corporate competitiveness. Winbond Group's wafer fabs are jointly creating an intelligent green manufacturing ecosystem that helps save electricity and water, reduce energy consumption, and significantly improve production efficiency.

All of the manufacturing sites have passed the ISO 50001 Energy Management System certification. Through equipment upgrades and AI data prediction models, we enhance energy efficiency and reduce carbon emissions, aiming to use 50% green electricity by 2030 and reduce greenhouse gas emissions in Scope 1 and Scope 2 by 42% compared to the baseline year<sup>Note</sup>.

In terms of water resource management, Winbond and Nuvoton have passed the ISO 46001 Water Efficiency Management System certification, improving water resource efficiency and reducing water consumption to minimize environmental impact. In digital transformation and AI applications, AI technology is applied to the chiller system and hydrofluoric acid wastewater system to optimize system operations and reduce energy and chemical consumption.

Winbond's wafer fabs focus on strengthening digital infrastructure and data platforms, cultivating data talent, and promoting AI technology applications. We concentrate on project innovation and integrating large language models with CIM (Computer-Integrated Manufacturing) systems and other AI applications to achieve data empowerment, enhance production efficiency, and standardize manufacturing. We have established various digital platforms (including the iMX system platform, system monitoring platform, data platform, business intelligence platform, and AIP application intelligence platform) to accelerate digital transformation. Over the past four years, we have successfully executed more than 100 digital transformation projects, responding to global customer needs more precisely.

Winbond's Kaohsiung fab officially began operations in 2022, focusing on the establishment of intelligent manufacturing systems, including automated material handling systems (such as AMHS and ASRS) and error detection, classification, and recipe management software systems (such as MES, FDC, and RMS). To enhance efficiency, the Kaohsiung Fab and the CTSP Fab collaborate through standardized management (CIM Committee, Central Code, DevOps), aiming to replicate the intelligent production experience of the CTSP Fab to the Kaohsiung fab, further leveraging the synergy of flexible capacity allocation.

Nuvoton's 6-inch wafer foundry's intelligent manufacturing strategy initially focuses on infrastructure, emphasizing the digitization of production information. After 2020, a dedicated team was established, and related projects were included in KPIs, with regular progress tracking to ensure the effective implementation of the intelligent manufacturing strategy. Nuvoton's 2024 project goals include improving efficiency and saving labor costs through automation and AI technology, such as updating automated machine functions, establishing a Cryo-Pump health monitoring system, optimizing defect image recognition technology, and introducing an AI chiller management system. These efforts aim to save employee work hours annually, reduce electricity consumption, and enhance employees' digital literacy.

As technology demands continue to rise, and customer expectations for quality, efficiency, and delivery times increase, digital transformation becomes the key to seizing opportunities in this volatile market. Every colleague at Winbond Group will actively embrace AI opportunities, striving to achieve the company's vision of "Be[ing] a hidden champion in providing sustainable semiconductors to enrich human life."

<sup>Note</sup> Please refer to 3. Environmental Sustainability section for target descriptions.



CTSP (12-inch)



Kaohsiung Fab (12-inch)



Yanshin Plant (6-inch)

Energy and Carbon Emission Reduction Measures

High-Efficiency Digital Factory

Enhanced Waste and Emission Management

**Automated Equipment**  
Including AMHS and ASRS Automated Equipment

**Software Systems**  
Including MES, FDC, and RMS Software Systems

**Standardized Management**  
Implementing ISO 46001 to Improve Water Resource Efficiency

**Energy Management**  
Implementing ISO 50001 to Improve Energy Efficiency

**Water Resource Management**  
Implementing ISO 46001 to Improve Water Resource Efficiency

**Digital Transformation**  
Applying AI Technology to Optimize System Operations and Reduce Consumption

**Intelligent Manufacturing Strategy**  
Focusing on Infrastructure and Digitization of Production Information

**Automation and AI Technology**  
Project Goals to Improve Efficiency and Save Labor Costs



Intellectual Capital

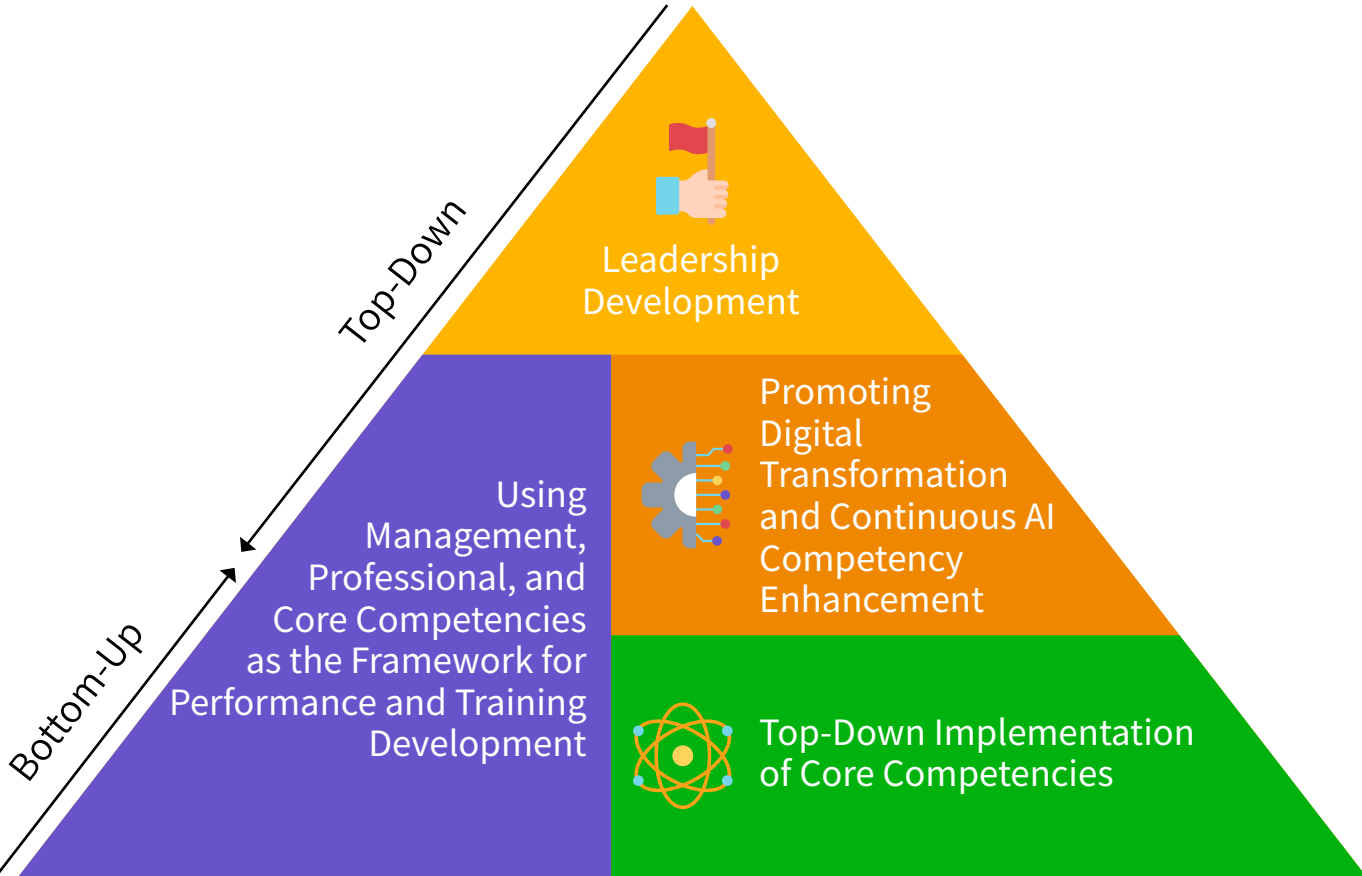
Building an Advanced Intelligent Platform to Enhance Corporate Productivity and Agility

Winbond Group actively embraces AI trends and has formulated a clear AI implementation strategy. Winbond established a Digital Transformation Committee to drive and accelerate digital transformation across all units from the top down, viewing AI capabilities as a core professional competency. The goal is to optimize existing business processes and reshape corporate culture through AI training, enabling employees to actively engage and create value during the transformation process.

Establishing AI Digital Platforms to Accelerate and Expand Digital Transformation

Winbond Group utilizes generative AI-assisted development tools and developed its first internal generative AI application tool, Albert, encouraging employees to use it. In 2024, the tool was used 123,266 times, with one in three employees incorporating it into their daily work.

To advance the digital transformation strategy, Winbond has also established various digital platforms with different functions, including the user experience-oriented iMX system platform, a system monitoring platform for real-time system health monitoring, a data platform providing a single source of truth, a business intelligence platform for easy report publishing and management, and the Application Intelligence Platform (AIP) for rapid application deployment and management. These digital platforms aim to enhance efficiency, promote collaboration across departments, and solve complex problems through data science. Modular development shortens development time and simplifies application deployment, achieving digital empowerment.



Focusing on Employee Training and Guiding Employees to Adapt to AI-Era Work Models

Winbond Group actively promotes generative AI tools such as ChatGPT, GitHub Copilot, and Microsoft 365 Copilot, providing relevant training courses for employees. In 2024, Winbond Group held its first Digital and AI Carnival to foster a culture of passionate learning and active innovation, empowering employees to use digital and AI tools and apply them in work scenarios to enhance productivity.

Additionally, Winbond has built an AI learning certification system (CCAI) website, combining internally developed courses, open courses from top universities, and practical guidance from experts and scholars. The website offers online courses in data science, data engineering, Python, and AI practical classes, allowing all employees to hone and improve their AI skills together. Before participating in project implementation, AI practical class students are required to complete over 10 hours of online courses. A total of 1,667 Winbond employees have completed at least one of these prerequisite courses. Practical class students further participate in a 9-hour practical course taught by academic experts and scholars, culminating in a practical presentation evaluated by senior executives.

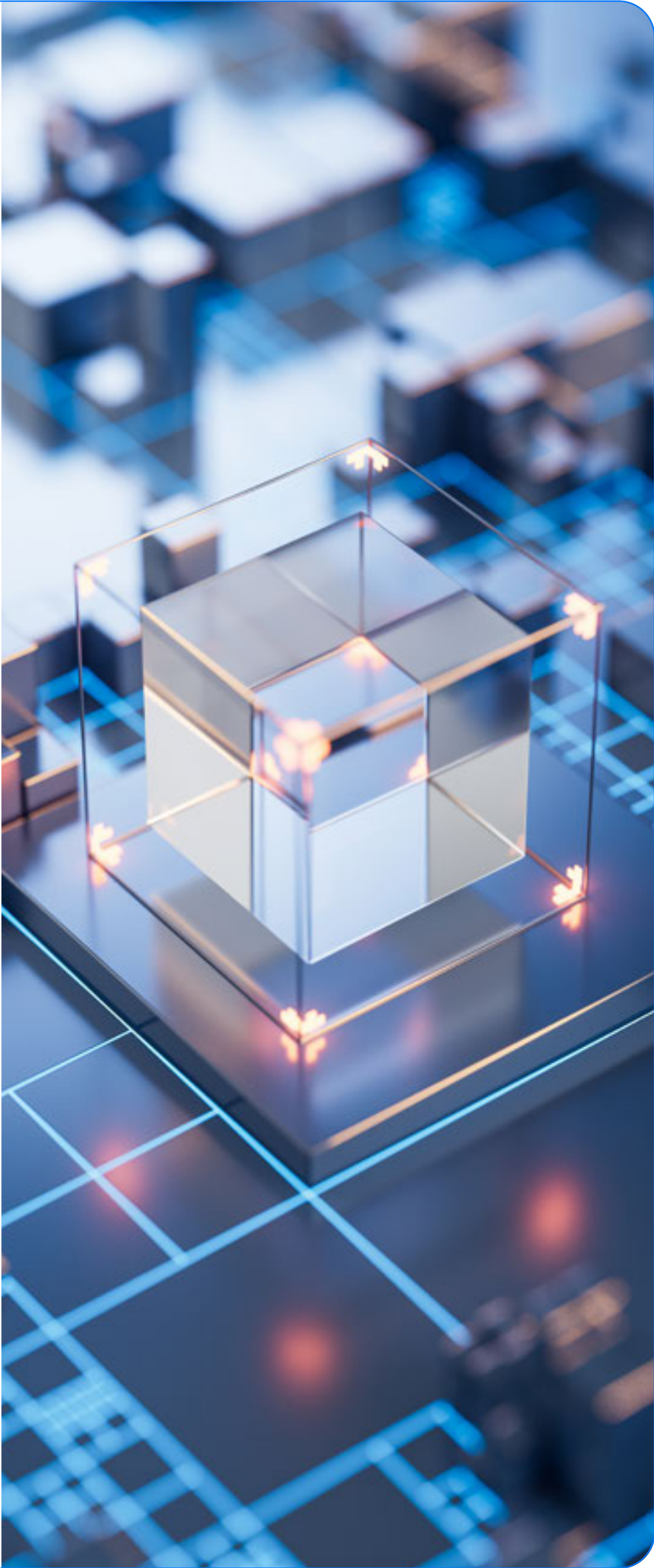
In terms of application to production lines and process optimization, we aim to enhance employees' data analysis, programming, and AI application capabilities. The training courses provided include basic Python programming (both online and in-person), data engineering (focusing on data querying and BI report creation), and data science programs (covering data analysis, machine learning, and AI implementation, including projects in collaboration with university professors).

**Digital Platform**  
Establish a strong data and cloud platform

**Talent Development**  
Train employees to utilize data science and AI

**Innovative Projects**  
Implement projects to enhance efficiency and quality

For more information, please refer to [1.3.2 Factory Digital Transformation Promotion Strategy](#)





Intellectual Capital

TIPS Taiwan Intellectual Property Management System A-Level Certification

Winbond places great importance on Corporate Governance and the implementation of intellectual property management. Since 2022, we have established an intellectual property protection management system, formulated intellectual property policies and objectives, and implemented them accordingly. By introducing the Taiwan Intellectual Property Management System (TIPS), we have strengthened our existing intellectual property management mechanisms.

In 2023 and 2024, Winbond passed the "Taiwan Intellectual Property Management System (TIPS) A-Level Re-certification," demonstrating our commitment to using TIPS principles as a foundation. This approach helps us identify potential risks or opportunities related to the acquisition, protection, maintenance, and utilization of intellectual property rights at various stages of our operations. We aim to develop concrete and feasible intellectual property management policies and objectives, ensuring that Winbond can integrate the expertise of various departments, facilitate internal communication, and make informed business decisions. This integration links intellectual property management with corporate sustainability (ESG) development. *WW*



Winbond Group Ranks Among the Top 100 Global Innovators for the Third Time

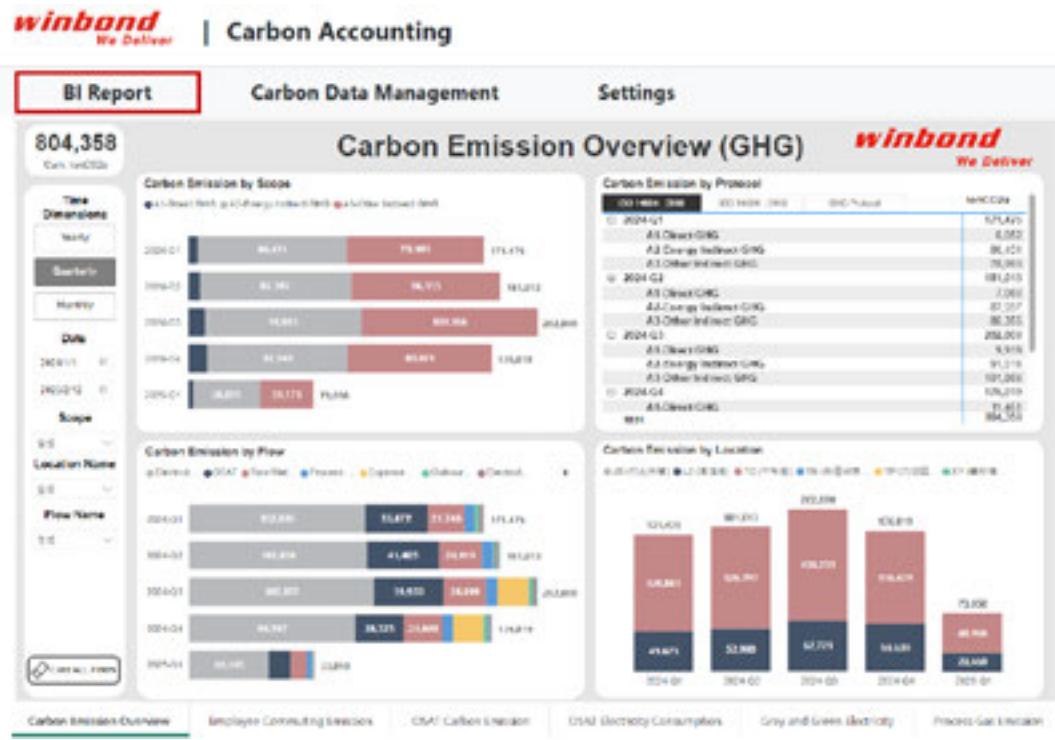
Winbond Group integrates the research and development capabilities of its global colleagues, actively investing in technology development and establishing R&D centers worldwide. By protecting innovative achievements through both patents and trade secrets, Winbond's R&D spans markets including IoT, smart industry, medical, automotive, computer communications, and consumer products. It is the only group company in Taiwan with the capabilities of DRAM, Flash, and Logic process development, product design, and marketing.

In 2024, Winbond Group's R&D expenditure accounted for approximately 20% of total revenue, with over 10,000 certified patents globally, demonstrating Winbond's strong emphasis on R&D resource investment. In 2025, Winbond was once again selected as one of Clarivate's Top 100 Global Innovators, highlighting Winbond's proactive patent deployment across multiple countries and its balanced performance in patent quality and quantity, earning international professional recognition.

Carbon Accounting Platform: Achieving Automated and Standardized Carbon Emission Data Collection

To achieve precise monitoring and management of carbon emissions, Winbond Group has established a carbon information system, the "Carbon Accounting System," based on the standards of organizational greenhouse gas inventory (ISO 14064-1:2018) and product carbon footprint (ISO 14067). This system utilizes existing carbon emission databases to develop product carbon footprint calculation methodologies, introduces a carbon coefficient database, and employs big data technology to analyze hotspots and identify carbon reduction opportunities. Artificial intelligence is used to predict future carbon emission trends and provide optimization suggestions, aiding in the formulation of corporate carbon reduction strategies.

Leveraging this data science foundation, we accelerate the reduction of product carbon footprints through measures such as Green Product development and design, energy efficiency improvement, low-carbon supply chain collaboration, energy-saving and renewable energy operations, and waste management. Additionally, we collaborate with value chain partners to manage in real-time, formulate carbon reduction plans and pricing strategies, thereby enhancing customer trust and increasing product competitiveness.



For more information on the carbon accounting platform, please refer to the [chapter page introduction](#)

Scope: Unless otherwise noted, the scope covers the Winbond Group; *WW* Winbond



Natural Capital

Winbond Group's Nature Positive goal, in collaboration with affiliated enterprises and academic institutions, initiated several long-term projects such as conservation breeding, afforestation, and preservation to promote environmental biodiversity and species restoration, aiming to care for and protect Taiwan's local ecology. In 2024, the Chairman signed the "Winbond Biodiversity Commitment," where the company pledged to reduce the impact of operations and value chain on the environment and support sustainable technologies. The goal is to achieve net positive impact and zero deforestation, ensuring the integrity of ecosystems.

Conservation Plan

Focus on protecting endangered species

Systematic Afforestation

Conduct afforestation based on expert recommendations

Native Tree Planting

Plant local tree species to promote ecological balance

Ecosystem Services

Provide benefits of natural ecosystems

Community Collaboration

Collaborate with academic institutions

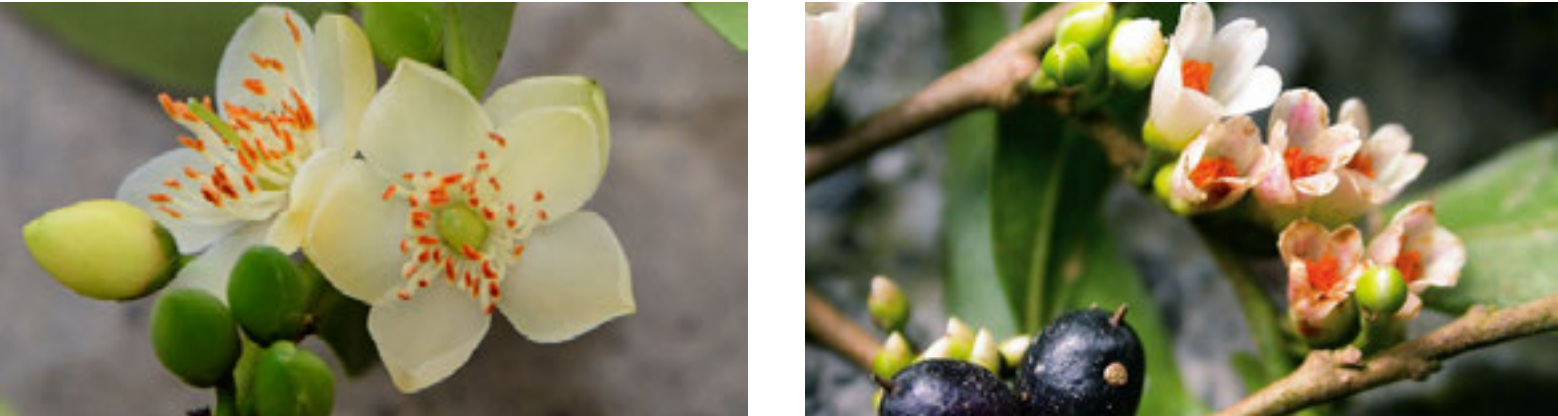
Carbon Storage Goals

Plan to reduce carbon dioxide emissions

Biodiversity

In 2024, Nuvoton participated in the Purple Crow Butterfly Ecological Restoration Project in Wufeng Township, Hsinchu. This project, in collaboration with the Forestry Bureau, Taiwan Butterfly Conservation Society, and National Yunlin University of Science and Technology, aims to restore the Purple Crow Butterfly population by providing a stable food source for larvae through habitat surveys and forest monitoring. The project combines technological conservation, community participation, and environmental education to enhance the population of the Purple Crow Butterfly. Whilst also strengthening ecosystem resilience, and deepening communication and connections with community stakeholders. Additionally, Nuvoton assisted amphibian conservation volunteers in habitat conservation actions for the endangered Sauter's frog in the Dashanbei area of Hengshan Township, Hsinchu County, achieving the goal of biodiversity environmental education.

Winbond is committed to the conservation of Taiwan's native plants. Since 2021, Winbond has initiated a species conservation and breeding program, focusing on the collection and cultivation of Theaceae plants. Currently, 33 species of Theaceae plants have been collected and cultivated. Furthermore, Winbond protects endangered wild plants, focusing on the conservation of the Habenaria plant by delaying mowing times to ensure seed propagation opportunities, thereby protecting its population. Winbond aims to maintain biodiversity and ecological health through the conservation of endangered wild plants and Taiwan's native plants.



Conservation and Breeding Operations for Theaceae Plants



Protecting the Beautiful Habitat of *Sasakia charonda*



Endangered Wild Plant - *Spiranthes sinensis*





Natural Capital

Afforestation

Winbond Group plans to implement natural carbon sequestration pathways in the field of forest carbon sinks. By leveraging its carbon-negative capabilities and collaborating with government, industry, academia, and the public, the primary goals are to enhance biodiversity, restore ecosystems, promote forestry economy, and improve people's quality of life and health. Carbon sequestration is a secondary goal, contributing significantly to the national net-zero emissions target and responding to Taiwan's 2050 net-zero emissions pathway's "natural carbon sequestration" key strategy.

Since 2021, we have actively promoted domestic afforestation and conservation projects. In collaboration with the Forestry Bureau of the Ministry of Agriculture and the National Property Administration of the Ministry of Finance, we have carried out afforestation and conservation on state-owned forest lands in Chiayi, Tainan, and Yilan, covering a cumulative area of over 25 hectares and planning to plant more than 40,000 trees.

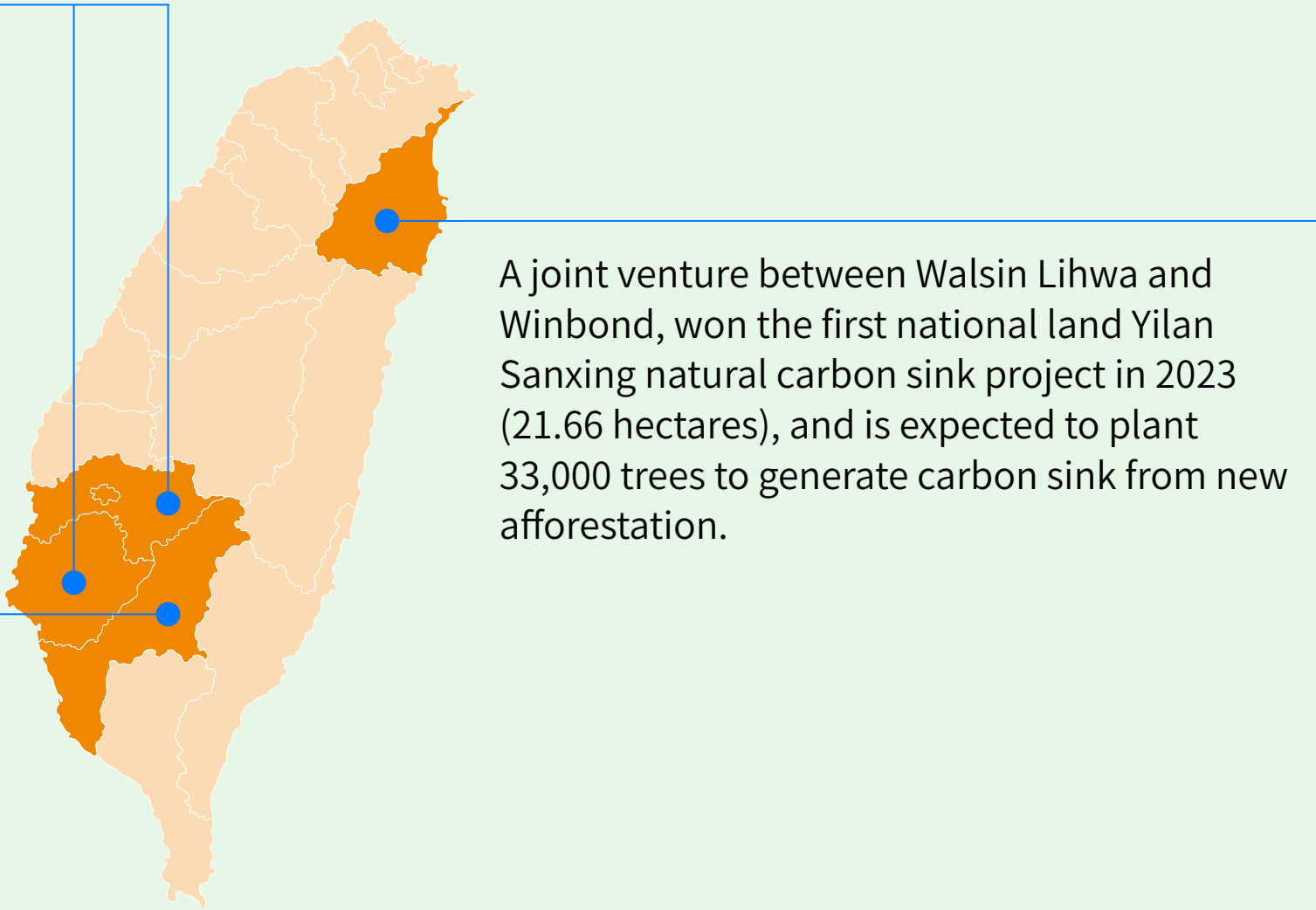
For more information on biodiversity and afforestation, please refer to section [3.6 Biodiversity](#).

Tree Adoption Plan in Chiayi: planting approximately 7,700 trees

Winbond actively participated in the tree adoption plan of the Forestry Bureau and the Nature Conservation Agency of the Ministry of Agriculture, adopting national forest land located in Tainan City and Chiayi County, planting 4 native tree species including Taiwan cherry, maple, acacia, and neem on 29,400 square meters of land, with an estimated total carbon sequestration of 990 metric tons of CO<sub>2</sub> equivalent.

Afforestation Plan in Kaohsiung: planting approximately 1,300 trees

Winbond planted 5 native tree species including Cinnamomum camphora, large-leaved mountain olive, neem, and Ligustrum lucidum at the Kaohsiung Fab, in collaboration with National Chung Hsing University, conducting a 30-year continuous afforestation plan, with an estimated carbon sequestration of 390 metric tons of CO<sub>2</sub> equivalent.





Human Capital

Implementing Human Rights Due Diligence in subsidiaries

Demonstrating commitment to human rights

Winbond Group regards human rights as the cornerstone of sustainable corporate development. Our business philosophy has evolved from merely complying with labor laws and reducing the risk of legal penalties to enhancing talent value and human rights management awareness, achieving the goal of "talent sustainability." Winbond actively invests in human rights management by supporting and safeguarding human rights, providing a safe and ethical working environment, and achieving the objectives of integrity and sustainable operations.

To optimize human rights risk management, Winbond updated its human rights policy in 2022, referencing relevant regulations and human rights development trends. We commissioned a third party to conduct human rights due diligence activities for all employees in Taiwan. Through regular human rights risk reviews, we continuously improve our human rights management mechanisms and enhance stakeholders' awareness and importance of human rights.

In 2024, Winbond, together with its subsidiary Nuvoton, actively implemented human rights policies, including formulating human rights policies, conducting due diligence, and completing human rights education and training for global employees. Winbond is also committed to creating a diverse and inclusive work environment, increasing the proportion of female employees and the employment rate of people with disabilities, and protecting employee rights through various channels.

Winbond also extends human rights to the supply chain, requiring suppliers to sign a code of conduct and conduct conflict minerals investigations and human rights risk assessments, aiming to establish a sustainable corporate culture that respects human rights.

Winbond Group adheres to the "people-oriented" philosophy, striving to create a diverse, equal, and inclusive work environment.

Winbond Group attracts global talent by offering competitive compensation packages and childcare support, promoting AI applications and data science in digital transformation to address the impacts and challenges of labor shortages, and fostering sustainable talent development in Taiwan.

Providing Competitive Compensation to Attract and Retain Talent

To attract and retain the best talent, Winbond Group offers competitive total compensation, including base salary, allowances, and employee cash bonuses and rewards. In 2024, both Winbond and Nuvoton were listed in the High Salary 100 Index, demonstrating our competitiveness in compensation. Employee engagement surveys showed that 97% of employees are willing to fully commit to their work and stay with Winbond for the next five years, reflecting the effectiveness of Winbond's policies and measures in retaining employees.



listed in the  
2024 High  
Compensation  
100 Index

Providing Childcare Subsidies to Support a Childcare-Friendly Environment

Emphasizing family-friendly workplace measures, Winbond (Taiwan) and Nuvoton (Taiwan) provide monthly childcare subsidies of NT\$6,000 and NT\$5,000 respectively for employees' newborn children until they reach the age of four. Approximately 120 to 170 employees apply for this subsidy each year. Winbond Group believes that establishing a workplace environment that supports childcare resources helps mitigate the risk of declining birth rates and aims to alleviate employees' childcare burdens, thereby supporting their career development.



Childcare Subsidies

Winbond (Taiwan) provides NT\$6,000 per month

Nuvoton (Taiwan) provides NT\$5,000 per month

Promoting Passionate Learning and AI Applications to Address Labor Shortage Challenges

Winbond Group continues to maintain competitiveness through digital transformation, utilizing AI and data science to enhance manufacturing processes and capacity. Employees continuously learn through basic Python, data engineering, and data science courses, becoming familiar with development environments and improving data application capabilities. Winbond has also established an AI learning map and certification system, promoting data analysis tools. Over 4,000 employees have completed AI course training, showcasing Winbond's ongoing investment in digital learning resources.





Social and Relationship Capital

**Winbond collaborates with suppliers to participate in the "Carbon Data Electronic Exchange Standard" to enhance the supply chain's carbon reduction capabilities through digital measures.**

Winbond has joined the Pathfinder Framework project established by the Institute for Information Industry's Digital Transformation Research Institute under the Partnership for Carbon Transparency (PACT) framework, becoming the first semiconductor company in the country to lead a supply chain transparency initiative.

Based on the continuous enhancement of green and low-carbon manufacturing concepts with suppliers, Winbond targets suppliers who are committed to shaping a carbon reduction culture, have practical experience in carbon inventory, and have long-term management consensus on carbon data digitization to participate in the pilot project.

In 2024, the project not only achieved 100% response from OSAT Suppliers in the backend packaging and testing sectors, but the entire early-stage pilot also became an annual industry achievement of the Industrial Development Bureau of the Ministry of Economic Affairs.

Executing substantial carbon reduction actions with the supply chain as the operational unit has not only become a key performance indicator for international brand manufacturers to evaluate suppliers but also one of the key industrial development strategies for governments worldwide to demonstrate national competitiveness. In the future, Winbond hopes to continue to set an example for the industry with substantial sustainable actions, leading more suppliers to gradually and practically achieve the 2050 net-zero sustainability goal. *W*



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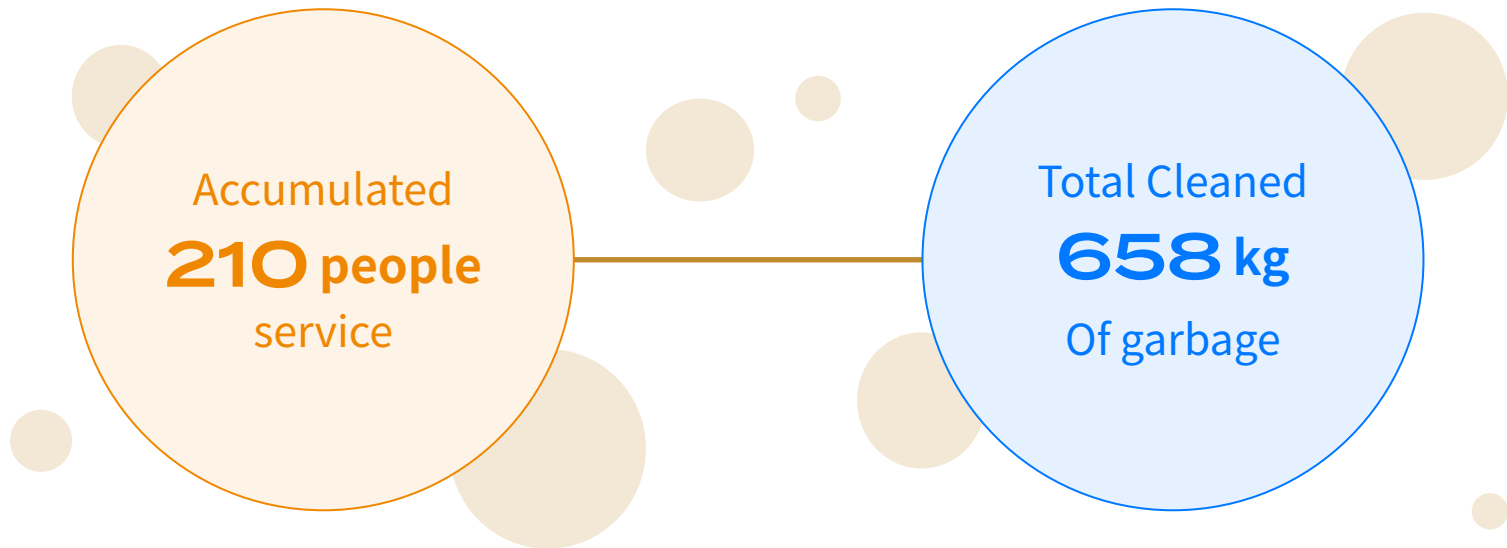


■ Social and Relationship Capital

Take actions to protect the ocean and ecology, raising public awareness on environmental issues.

In 2024, Winbond Group's employees and their families in Taiwan participated in numerous environmental conservation activities, while Nuvoton Japan focused on community volunteer cleaning activities.

We collaborated with the Society of Wilderness to conduct mountain and stream cleaning activities in the Dashanbei area of Hsinchu, focusing on protecting the habitat of the Sauter's frog. Additionally, we organized employees and their families to participate in stream cleaning in Fazi River in Taichung, wetland park cleaning and restoration in Yuanzhonggang, Kaohsiung, and beach cleaning in Nanliao, Hsinchu. A total of 210 participants cleaned 658 kilograms of garbage, demonstrating corporate social responsibility and enhancing employees' environmental awareness.



Focus on Environmental Protection and Ecology

Winbond Group volunteers participated in beach cleaning, stream cleaning, and wetland conservation activities, removing a significant amount of garbage. Through these activities, we aim to raise public awareness on Environmental Sustainability issues and take concrete actions to protect the ocean. Nuvoton participated in the Touqian River cleaning activity in response to World Rivers Day and collaborated with the Society of Wilderness for mountain and stream cleaning and ecological conservation actions in the Dashanbei area. Nuvoton Japan focused on cleaning activities around Winbond neighborhood and participated in volunteer cleaning activities organized by the local community committee of Obatagawa, Kyoto.



Protecting the habitat of the Sauter's frog



Environmental Protection Action in Nuvoton(Japan)



Clean-up of Fazi River in Taichung