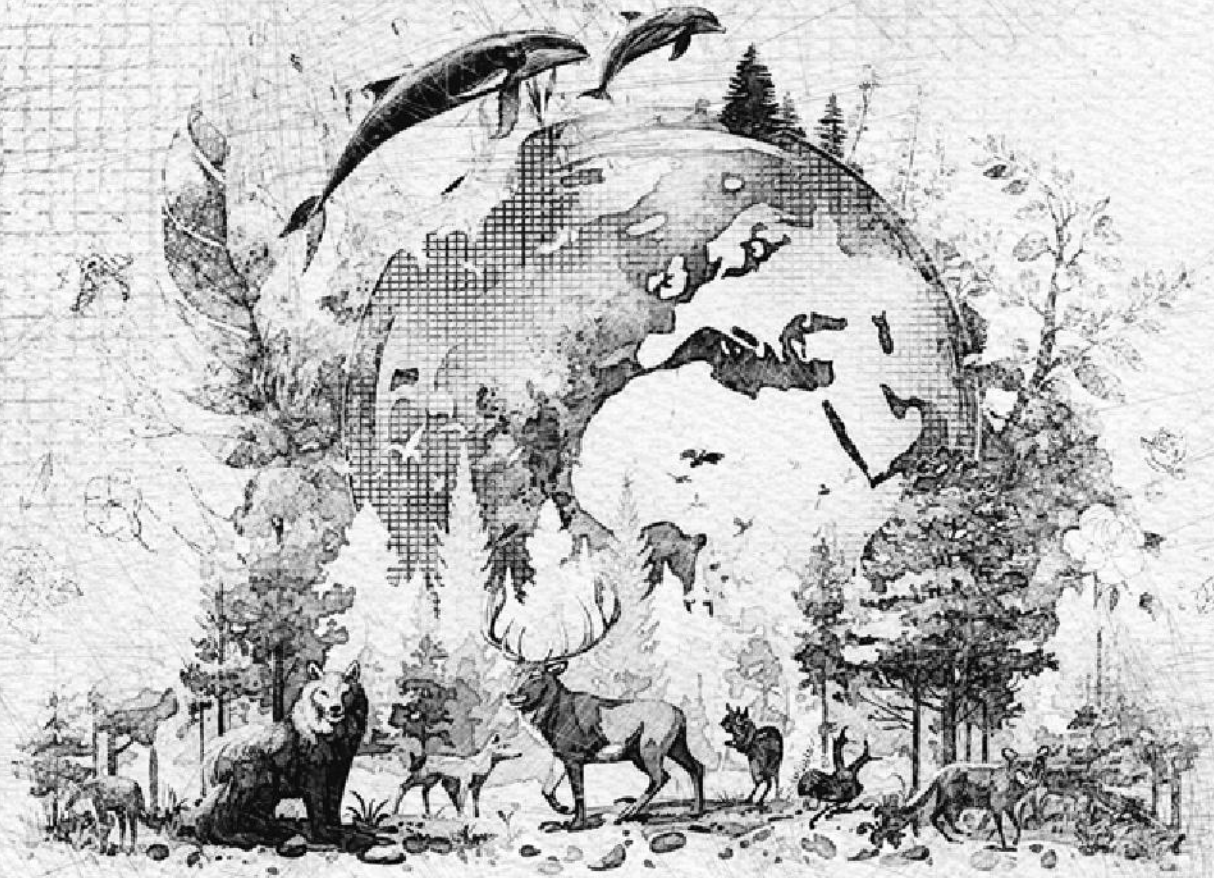


winbond

華 邦 電 子 股 份 有 限 公 司



2023 Task Force on Climate-related Financial Disclosures Report

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Preface Important Milestones in Climate Change Adaptation



1998

- Obtained ISO14001 certification for environmental management system



2000

- Participated in World Semiconductor Council's PFC Emissions Reduction Program

2006

- Implemented ISO 14064 greenhouse gas inventory



2010

- Established CSR policy
- Established EICC Promotion Team
- Verified through (BSI) PAS 2050 Carbon Footprint Standard
- Obtained Carbon Footprint Label from Taiwan Electrical and Electronic Manufacturers' Association
- Set Green Semiconductors as our corporate vision



2011

- Formulated Corporate Social Responsibility Procedures

2015

- Established CSR Committee
- Completed first CSR report in 2014



2020

- Registered for EPA's TM002 Offset Project



2021

- Wafer products verified through ISO 14067 Product Carbon Footprint
- Implemented ISO 14046 Water footprint assessment
- Implemented TCFD framework
- Received four awards from TCSA



2022

- Established ESG Committee
- Implemented ISO 50001 Energy Management System
- Completed ISO 14067 Product Carbon Footprint assessment for IC products
- Joined Taiwan Climate Partnership (TCP)
- Participated in CIX Auctions, obtained voluntary carbon credits from world's largest blue carbon project
- Celebrated Zero Carbon Family Day by adopting blue carbon offsets
- Acquired 15% equity stake in CHIA-HO Green Energy Corporation
- Established Carbon Emissions Information Platform
- Received three awards from TCSA



2023

- Published the first independent TCFD report
- Implemented ISO 46001 Water efficiency management systems
- Obtained the first T-REC through procuring green energy
- Joined Taiwan Carbon Solution Exchange (TCX), obtained international voluntary carbon credit
- Participated in Tree Planting plan of Taiwan Forestry and Nature Conservation Agency
- Participated in TSIA's Net Zero Emissions and Voluntary Reduction initiatives
- Received six awards from TCSA
- Achieved B list (Management Level) in "Climate Change" and "Water Security" in Carbon Disclosure Project (CDP)
- Received Taichung City low-carbon sustainable city outstanding contribution Award
- Collaborated with 13 suppliers to apply for the Ministry of Economic Affairs' "Large Lead Small" subsidy program for low-carbon transformation and smart upgrading of manufacturing industry and obtained full funding



▲ Participated in Taiwan Carbon Solution Exchange (TCX)

▲ Received six awards from TCSA

▲ Obtained the first T-REC

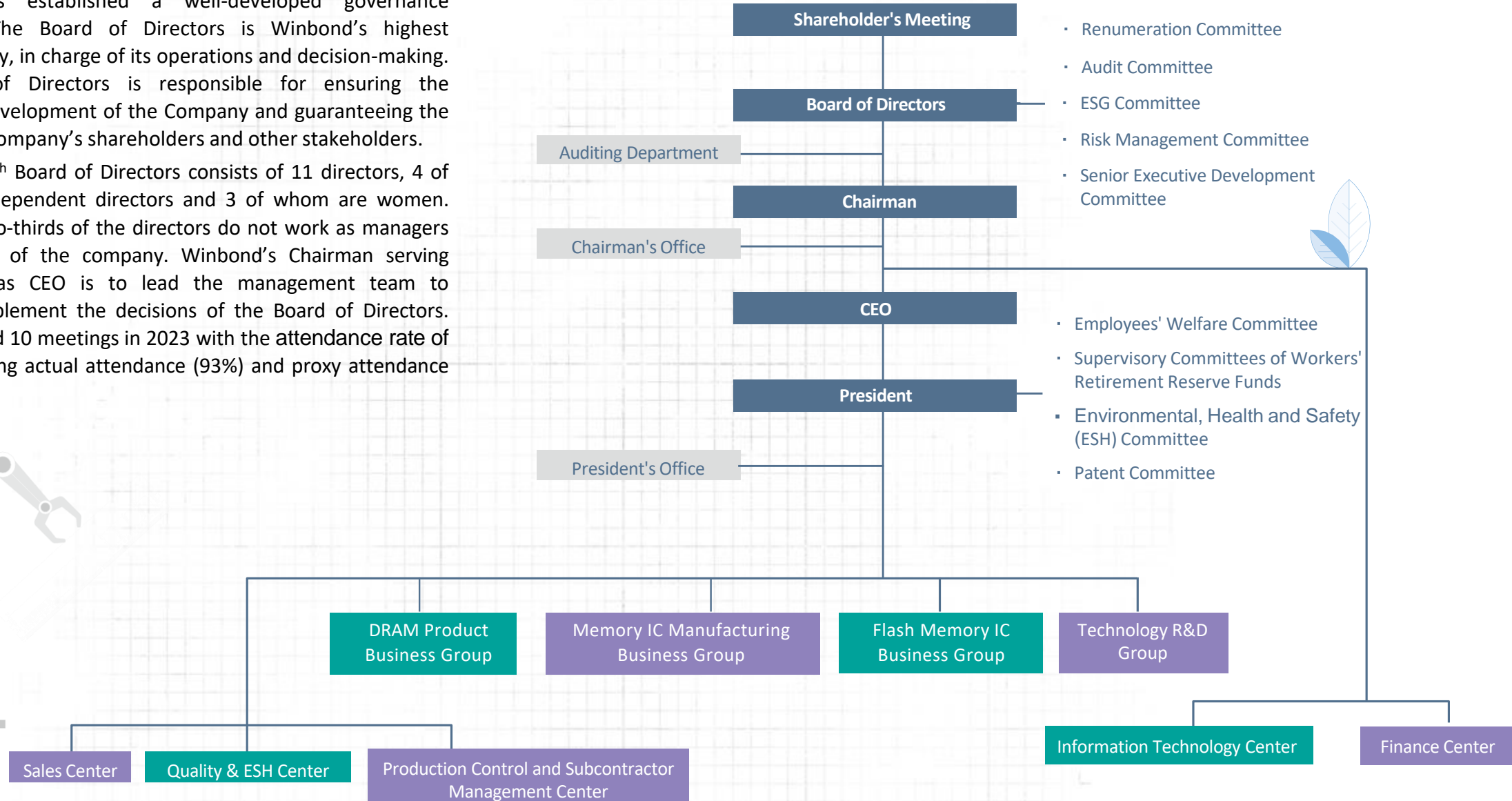
1. Climate Governance

1.1 Climate Organizational Framework

Winbond has established a well-developed governance framework. The Board of Directors is Winbond’s highest governing body, in charge of its operations and decision-making. The Board of Directors is responsible for ensuring the sustainable development of the Company and guaranteeing the rights of the Company’s shareholders and other stakeholders.

Winbond’s 13th Board of Directors consists of 11 directors, 4 of whom are independent directors and 3 of whom are women. More than two-thirds of the directors do not work as managers or employees of the company. Winbond’s Chairman serving concurrently as CEO is to lead the management team to effectively implement the decisions of the Board of Directors. The Board held 10 meetings in 2023 with the attendance rate of 100%, including actual attendance (93%) and proxy attendance (7%).

Winbond Organization Chart



Functional Committees Main Duties

To establish a well-developed governance framework, Audit Committee, Remuneration Committee, ESG Committee, Risk Management Committee, and Senior Executive Development Committee have been established under the Board of Directors. Each functional committee is responsible to the Board of Directors and submits proposals to the Board of Directors for resolution.

The ESG Office and its five functional teams focusing on the areas of Environmental Sustainability, Green Product, Human Rights and Social Inclusion, Sustainable Supply Chain, and Corporate Governance were formed under the ESG Committee. Members of the functional teams with the requisite expertise were tapped to form the TCFD project team.

Audit Committee

- Composed of 4 independent directors, the convener is Mr. Allen Hsu.
- In 2023, 8 meetings of the Audit Committee were convened, with the attendance rate of 100%, including actual attendance (88%) and proxy attendance (12%).

Responsibilities

Supervises the fair presentation of the company's financial statements, appointment (dismissal) of the CPA as well as the CPA's independence and performance, assists the Board of Directors in performing supervisory duties such as: Control of compliance with relevant laws and regulations and existing or potential risks by the company.

Remuneration Committee

- Composed of 4 independent directors, the convener is Mr. Stephen T. Tso.
- In 2023, 3 meetings of the Remuneration Committee were convened, with an actual attendance rate of 100%.

Responsibilities

Responsible for setting and reviewing the performance evaluation and remuneration policy, system, standard, and structure as well as individual compensation for Winbond directors and managers. The "Rules for Remuneration of Directors and Performance Assessment of the Board of Directors" and "Guidelines for Managers' Remuneration and Performance Evaluation Management" were also drawn up to maximize the long-term effectiveness of the Board and to ensure a close linkage between the managers' compensation and the company's sustainability performance (economic, environmental, social)

Winbond established the "Rules for Remuneration of Directors and Performance Assessment of the Board of Directors", which specifies the basis for directors' remuneration, and submits it to the Remuneration Committee every year for review to see if adjustments are required. Both the Audit Committee and the Remuneration Committee of Winbond is composed of all independent directors and are independent. Winbond does not have a remuneration claw-back mechanism. For information on the remuneration of directors, President and Vice President, please refer to page 15 ~ page 19 of Winbond's 2023 Annual Report.

ESG Committee

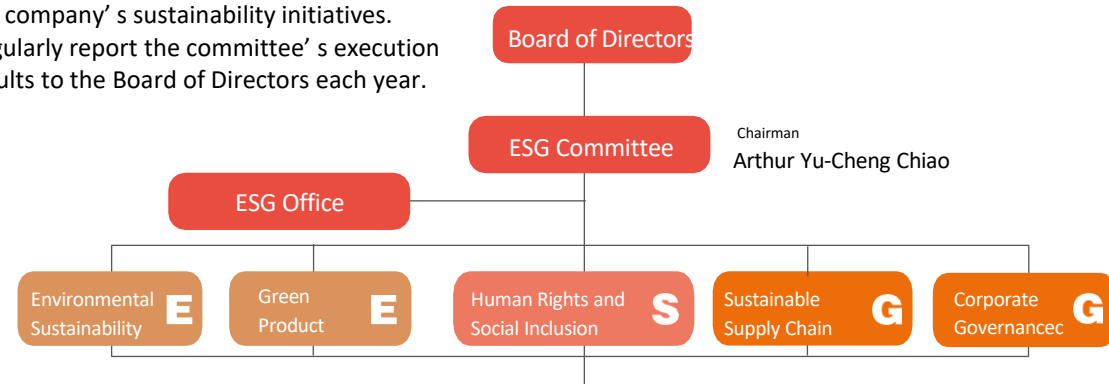
- Composed of 4 independent directors, the convener is the Chairman, Mr. Arthur Yu-Cheng Chiao.
- In 2023, 2 meetings of ESG Committee was convened, with the attendance rate of 90%.

Responsibilities

- 1) Formulate corporate sustainability policies and related management guidelines.
- 2) Develop short-term, medium-term, and long-term sustainable development strategies and goals.
- 3) Review, track, and revise the implementation status and effectiveness of the company's sustainability initiatives.
- 4) Regularly report the committee's execution results to the Board of Directors each year.

Established the ESG Office and five task forces, including Environmental Sustainability, Green Products, Human Rights and Social Inclusion, Sustainable Supply Chain, and Corporate Governance, regularly report to the Board of Directors every year to ensure the promotion and implementation of relevant work for corporate sustainability. The committee is led by the chairman personally and consists of independent directors. It convenes meetings twice a year, where each task force reports on the progress (achievements) of the current year and submits plans for the following year.

ESG Committee Organization Chart



The TCFD was coordinated by the **Corporate Governance** task force, which appointed members of the five functional teams with the requisite expertise to be Task Force members.

Risk Mangement Committee

- Composed of all the board members, the convener is the Chairman, Arthur Yu-Cheng Chiao.
- In 2023, 1 meeting were convened with the attendance rate of 100%, including actual attendance (80%) and proxy attendance (20%).

Responsibilities

- 1) Responsible for overseeing the overall risk management of the company, formulating risk management policies, frameworks, and establishing qualitative and quantitative management standards, adjusting as needed based on the company’s actual development or objective environmental changes.
- 2) Execute risk management decisions of the Board of Directors and review the development, establishment, and effectiveness of the company’s overall risk management mechanisms.
- 3) Set risk appetite and review and manage the company’s overall risks.
- 4) Assist and supervise various units in conducting risk management activities and coordinate cross-unit interactions and communication related to risk management.
- 5) Adjust risk categories and assumptions based on environmental changes.

Senior Executive Development Committee

- The committee members consist of directors from Winbond/Nuvoton, who serve as mentors, with the committee chair appointed by mutual recommendation among the directors, currently held by independent director, Chung-Ming Kuan. The mentees are senior executives from Winbond and Nuvoton, with the list of mentees discussed and adjusted annually by the board.
- Established on: December 22, 2023. The attendance rate of mentees at the inaugural meeting was 100%.

Objectives

- 1) To enhance the knowledge of the participating mentees beyond their professional field.
- 2) To broaden the international perspective of the mentees.
- 3) To allow directors to gain a better understanding of the company’s internal operations.

Method of operation

1. Study sessions for all mentee

Study sessions for all mentee held once a month in principle, except when the lecturer or students have special circumstances, the timing is adjusted accordingly. The speaker can be a director from Winbond/Nuvoton or an external expert, with the current planned topics as follows:

- 1) International economic environment
- 2) Industry trends and strategies
- 3) SDGs & ESG trends and progress
- 4) Technology and business innovation
- 5) Leadership and management
- 6) History and humanities

2. Mentor/mentee mechanism between mentors and mentees

- 1) The first version of mentor-mentee pairing has been established, allowing mentors to observe and guide mentees more closely.
- 2) The pairing of mentors and mentees is adjusted annually, based on the increase or decrease of mentees or individual needs.



1.2 Accountability Measures

Reporting to the Board of Directors

Winbond continues to incorporate climate change-related proposals into the decision-making process of the Board of Directors to ensure corporate leadership and sustainability in addressing climate change.

Professional Excellence of Directors

The 11 directors all have extensive business operations experience. The ages of board members cover different generations, and their professional background covers different industries. All board members possess the ability to perform their duties, supervise, and give constructive feedback and strategies. The directors take classes outside themselves or participate in multi-faceted training courses organized by Winbond. Training hours for director education and training and environmental sustainability related courses (2050 Net Zero , climate change, sustainable finance) were 33 hours, for courses related to corporate business (Global Economics, AI Smart Operation Management, International Situation) were 43.5 hours, and for courses related to compliance were 12 hours. In 2023, the directors obtained a certificate of study with an average of 8.05 hours.

Competence Development for Managers and Employees regarding Climate Change

Winbond has invested a great deal of time and resources into successfully communicating the risks and impacts of climate change to all of the company's employees. The Company uses a range of channels to actively cultivate the basic awareness of employees in the hope of instilling the concept of carbon reduction. Through a combination of internal and external training courses, slogans on the company intranet, and shared articles, Winbond encourages every employee to pay extra attention to the impact of climate change on both work and life, and to spread the idea to their family members and even implement the eco-friendly practices promoted by the Company at home. Doing so makes it easier for the Company to bring employees onboard when promotion carbon reduction actions to realize the goal of net zero emissions.

Important Climate-Related Proposals and Reports for the 2023 Board of Directors

Report quarterly on the planning of greenhouse gas inventory and timeline (including subsidiary companies)

Approval of increased capital expenditure budget for equipment replacement with energy-efficient equipment

Approval of revised Winbond's Sustainability Development Best Practice Principles

Authorized the procurement of 30MW of offshore wind energy through SUSTAINABLE ENERGY SOLUTION CO.

Green energy procurement report

Investment report of Kai-Hong Energy Co., Ltd.

2023 Board of Directors Climate-Related Competency Development Topics

Utilizing policy diverse resource strategy to connect Taiwan local communities to achieve corporate CSR goals

The development and challenges of international new net-zero technologies

(2050 Carbon Neutrality) start from 2027 「Hsinchu Baoshan Native Plant Conservation and Environmental Education Park」 plan

The development and implications of International Carbon Border Adjustment Mechanism

2023 Cathay sustainable finance and climate change summit

ESG Sustainable operation



Corporate Culture learning



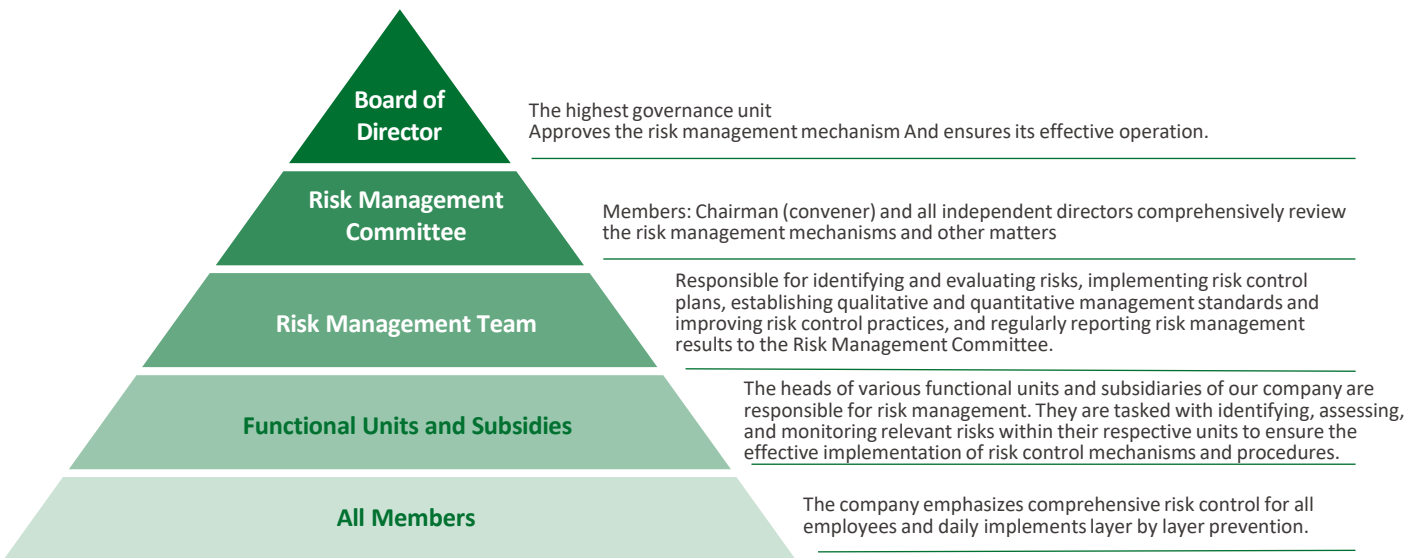
▲ Winbond ESG learning platform

2. Climate Risk Management

2.1 Risk Management Framework

Winbond belongs to the semiconductor manufacturing industry. Facing natural disasters, accidents, human-made incidents, changes in international political and economic situations, the emergence of new technologies, and changes in policies and regulations may all cause serious impacts on its operations and finances. Therefore, Winbond established a “Risk Management Committee” under the Board of Directors. This committee is one of the functional committees and organizes existing departments or units responsible for risk to enhance the overall risk management organizational structure. It formulates sound internal management regulations and operating procedures for each unit’s scope of responsibility and conducts risk management.

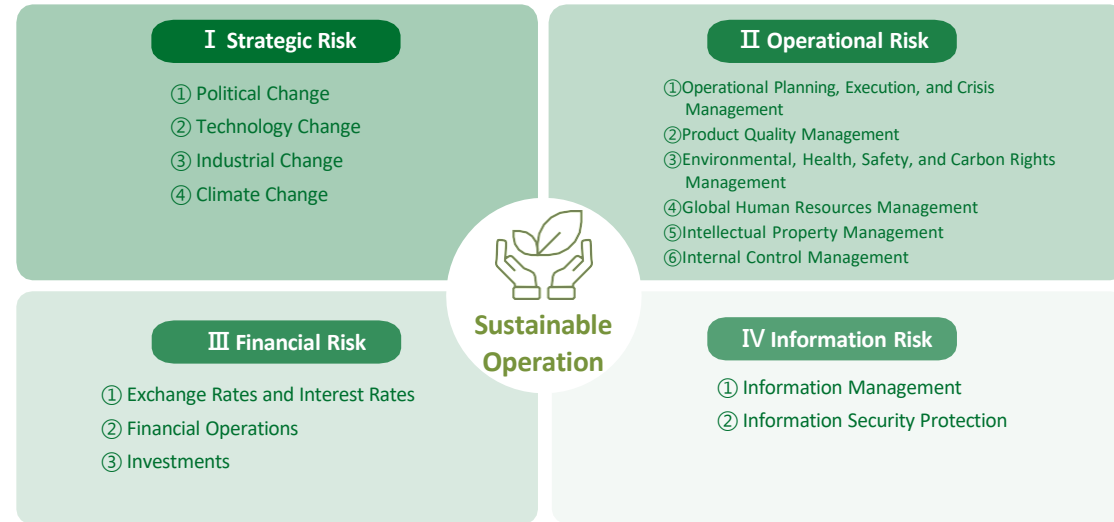
In 2023, Winbond revised the “Risk Management Committee Chapter” and formulated the “Risk Management Policy and Procedures” after receiving approval by the Board of Directors. It actively manages the four major types of risks faced by contemporary enterprises: “strategic,” “operational,” “financial,” and “information security.” It develops comprehensive plans and processes for pre-assessment, risk avoidance, loss prevention, and crisis management for various operational activities and regularly reports to the management and governance units to ensure that all corporate risk control goals are achieved. The risk management team should pay attention to the development of international and domestic risk management systems and changes in internal and external operating environments, adjust control mechanisms, report to the Risk Management Committee and the Board of Directors for approval, and enhance the effectiveness of risk management implementation. For details on the operation of the Risk Management Committee, please refer to Section 1.1.2 Operations and Main Duties of the Functional Committee.



Winbond Risk Management policy and procedures

Including but not limited to the following items:

- ① Risk management objectives
- ② Risk management organizational framework and Responsibilities
- ③ Risk management Procedures



Winbond Risk Management Objectives

Winbond aims to manage various risks that may impact the achievement of company goals through a comprehensive risk management framework. By integrating risk management into operational activities and daily management processes, Winbond aims to achieve the following objectives:

- ① Achieve company goals.
- ② Enhance management efficiency.
- ③ Provide reliable information.
- ④ Allocate resources effectively.

Winbond's risk management procedures include at least five elements: risk identification, risk analysis, risk assessment, risk response, and supervision and review mechanism. The specific procedures and methods for each element are as follows:

(1) Risk Identification

- Each functional unit and subsidiary should identify the risks of the short-, mid-, and long-term objectives and the business operations based on the company's risk management policies and procedures.
- Various feasible analysis tools and methods (such as process analysis, scenario analysis, questionnaire surveys, PESTLE analysis, etc.) should be used for risk identification. Risks should be analyzed from both topdown and bottom-up perspectives, considering internal and external risk factors, stakeholder concerns, etc., to comprehensively identify potential risk events that may affect the company's goals or cause losses or adverse impacts.

(2) Risk Analysis

- Each functional unit and subsidiary should analyze the probability and impact of identified risks based on existing control measures, past experiences, industry cases, etc., and calculate the risk value accordingly.
1. Risk Analysis Measurement Standards
 - The risk management team should establish appropriate quantitative or qualitative measurement standards based on the company's risk characteristics as the basis for risk analysis.
 - Qualitative measurement standards refer to expressing the probability and impact of risk events through textual descriptions, while quantitative measurement standards refer to expressing the probability and impact of risk events through specific measurable numerical indicators (such as days, percentages, amounts, numbers, etc.).
 2. Risk Appetite

risk management team should develop risk appetite (risk tolerance) and report it to the Risk Management Committee and the Board of Directors for determining the company's acceptable risk threshold. Based on the risk appetite, the risk management team should discuss the corresponding risk levels for each risk value and the response methods for each risk level, serving as the basis for subsequent risk assessment and risk response.

(3) Risk Assessment

- Each functional unit and subsidiary should, based on the results of risk analysis, align with the risk appetite approved by the Risk Management Committee and the Board of Directors. They should then plan and execute subsequent risk response measures according to the risk levels.
- The relevant results of risk analysis and assessment should be accurately documented and reported to the Risk Management Committee.

(4) Risk Response

- After assessing business risks, each unit should propose appropriate risk response measures and control operations and report them to the risk management team for review.

(5) Supervision and Review

- The risk management team should regularly report the implementation results of risk management procedures to the Risk Management Committee as a reference and report major risk events to the Risk Management Committee and the Board of Directors, as necessary.



Winbond has included climate change risk into the long-term operation and management of the enterprise, and in order to understand its impact on the environment and operations, since 2021, Winbond has adopted the Task Force on Climate-Related Financial Disclosures' (TCFD) framework, and based on the observation on international regulatory trends and market outlook, every year, we regularly identify and disclose the financial impacts of climate-related risks and opportunities (both quantitative and qualitative), providing comments on the situation as well as proposing a management strategy. Winbond will continue to monitor the impact of risks brought by the climate, strengthen the company's operational capabilities, promote various carbon reduction plans, improve energy efficiency, and steadily move towards sustainable development. Please refer to 1.6 Climate Change Management for detailed information.

2.2 Procedures for Identifying Climate Change Risks and Opportunities

Continuing the framework and workflow from the previous year’s TCFD, Winbond convened 15 department-level units and nearly 30 members to establish the TCFD project team. Members are divided into teams according to the nature of their job. Each team discusses climate change issues with relevance to their area of operations, utilizing Winbond TCFD platform to identify and generate the matrixes. The evaluation results have been reported in the ESG Committee meetings.



▲ TCFD project team meeting

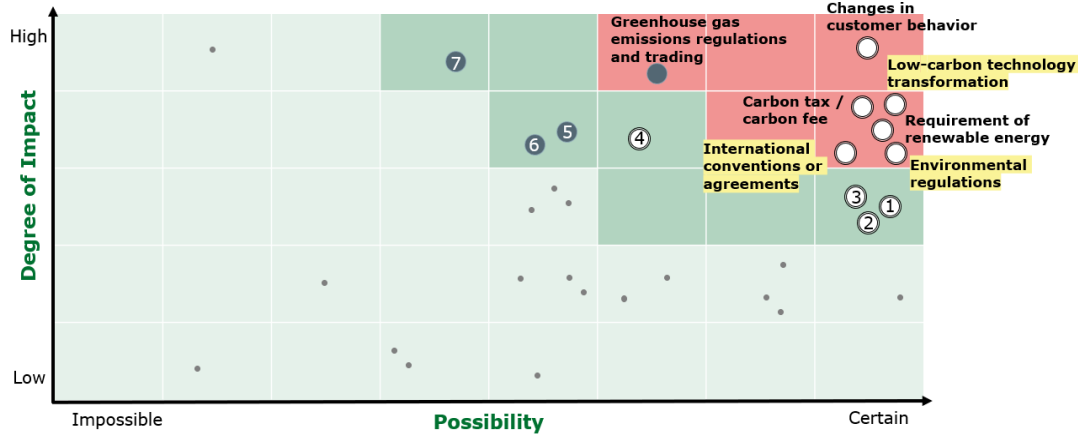


2.3 Climate Risk and Opportunity Matrix

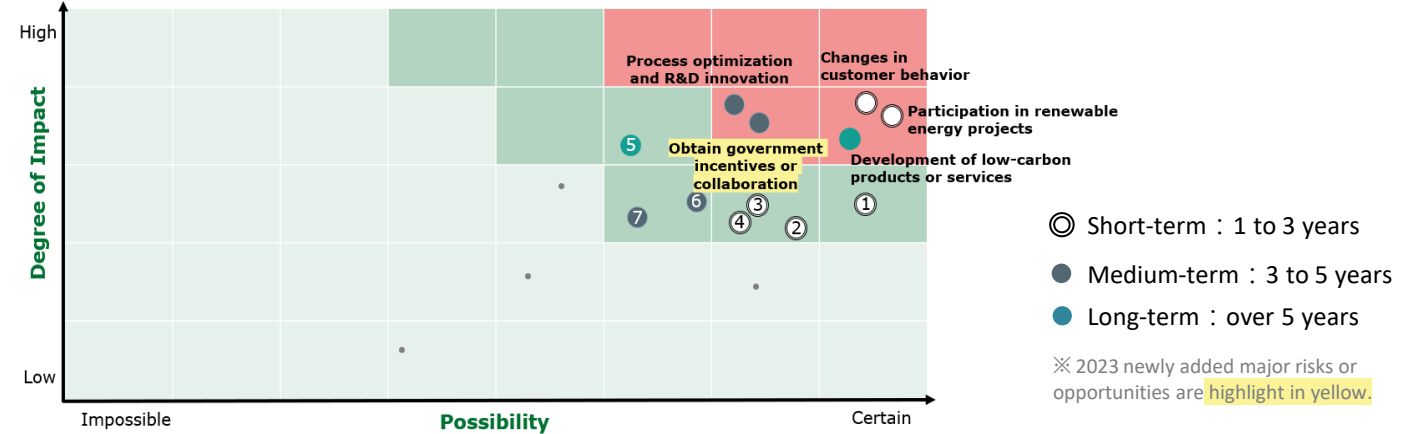
Impacts of Major Climate Change and Responses

Through the course of workshops and educational training, and by utilizing Winbond TCFD platform to identified climate risks and opportunities. Winbond has identified seven major climate risks and seven minor climate risks from 35 climate risks, as well as five major climate opportunities and seven minor climate opportunities from 18 climate opportunities.

— Climate Risk Matrix —



—Climate Opportunity Matrix—



Major Risks

- ① Changes in customer behavior
- ② Low-carbon technology transformation
- ③ Carbon tax/carbon fee
- ④ Requirement of renewable energy
- ⑤ Environmental regulations
- ⑥ International conventions or agreements
- ⑦ Greenhouse gas emissions regulations and trading

Minor Risks

- ① Productivity and labeling regulations
- ② Generate negative feedback
- ③ Lack of regulations and legality
- ④ Legal litigation
- ⑤ Changes in rainfall patterns and distribution
- ⑥ Uncertainty of physical risks
- ⑦ Changes in natural resource availability

Major Opportunities

- ① Changes in customer behavior
- ② Participation in renewable energy projects
- ③ Development of low-carbon products or services
- ④ Process optimization and R&D innovation
- ⑤ Obtain government incentives or collaboration

Minor Opportunities

- ① Improvements in energy efficiency
- ② Development of new fund resources
- ③ Use of low-carbon energy
- ④ Water resource management
- ⑤ Energy-saving buildings
- ⑥ Exploration of alternative and diverse resources
- ⑦ Changes in transportation modes

2.4 Impacts of Major Climate Change and Responses

Major Climate Risks

Climate Risk	Time of Occurrence	Potential Financial or Operational Impacts (-) represents a negative impact (+) represents a positive impact	Response
Changes in customer behavior	Short-term	<ul style="list-style-type: none"> Decrease in sales of non-low-carbon products (-) Increased communication with customers, which also resulted in higher labor costs (-) 	<ul style="list-style-type: none"> Continuously stay informed about the requirements and specifications for green products from clients. Compile this information into a database to facilitate the provision of low-carbon, carbon-reduction, and energy-efficient green products that meet demand. Promoting the introduction of new product designs (design in) to meet customer needs, increasing the portfolio of green or low-energy consumption products. Utilize carbon information platform to assess product carbon footprints and hotspots, and formulation of reduction pathways and optimization plans Participation in domestic and international sustainability evaluations to enhance transparency in terms of sustainability practices.
Low-carbon technology transformation	Short-term	<ul style="list-style-type: none"> Capital expenditure for new equipment (-) R&D cost increase (-) Reduction in carbon emissions leading to a decrease in carbon tax/fee expenditures (+) 	<ul style="list-style-type: none"> Devote efforts to process improvement to reduce greenhouse gas usage. This includes accelerating the replacement of energy-saving components at machine terminals and installing tail gas treatment equipment. Continuously execute energy-saving projects for production machinery and facility infrastructure. Incorporate renewable energy sources to decrease greenhouse gas emissions. Engage in ongoing discussions with outsourcing partners regarding low-carbon technologies and production planning.
Carbon tax / Carbon fee	Short-term	<ul style="list-style-type: none"> Increase in indirect costs (-) Suppliers pass on their carbon tax/fee expenditures, leading to increased procurement costs(-) Limited capacity expansion(-) 	<ul style="list-style-type: none"> Company-wide target of net-zero emissions in 2050. Develop a carbon accounting system. Devote efforts to process improvement to reduce greenhouse gas usage. This includes accelerating the replacement of energy-saving components at machine terminals and installing tail gas treatment equipment. Continuously execute energy-saving projects for production machinery and facility infrastructure. Incorporate renewable energy sources to decrease greenhouse gas emissions. Encourage high-electricity-consuming suppliers to conduct greenhouse gas inventories. Monitor and collect information on suppliers listed by environmental agencies. Provide training courses on carbon costs and valuation to increase supplier awareness and motivation for carbon reduction. Maintain a resource usage investigation mechanism for sustainable supply chain management, adjusting survey questions based on annual results and regulatory trends. Join the Singapore Carbon Exchange (Climate Impact X, CIX) and the Taiwan Carbon Solution Exchange (TCX) to diversify carbon credit acquisition channels and stay informed about developments in carbon offset systems.

Major Climate Risks (Cont.)

Climate Risk	Time of Occurrence	Potential Financial or Operational Impacts (-) represents a negative impact (+) represents a positive impact	Response
Requirement of renewable energy	Short-term	<ul style="list-style-type: none"> Higher green energy prices result in increased production costs (-) Reducing carbon emissions leads to a decrease in carbon tax/fees (+) Suppliers pass on their renewable energy expenditures, leading to increased procurement costs (-) Limited production due to difficulty in acquiring renewable energy (-) 	<ul style="list-style-type: none"> Establish a Customer Green Energy Demand Survey System to accurately understand our customers' green energy demand. Communicate customer requirements for green energy to suppliers and discuss related plans with packaging and testing outsourcing partners based on Winbond' s resolution on renewable energy usage. Collect information on the impact of purchasing green energy on negotiation prices and devise corresponding strategies. In 2023, complete the first purchase of renewable energy electricity, with an expected annual supply of nearly 10 million kilowatt-hours of renewable energy. Continuously plan for additional renewable energy purchases. In 2023, participate in the establishment of Kai-Hong Energy Co., Ltd. and continue evaluating other renewable energy investments. The rooftop renewable energy generation system at the CTSP fab will be converted to self-use in 2024. Also, additional renewable energy generation are under continuous evaluation. Plan and implement an REC management system to systematically manage green energy demand and internal and external production planning.
Environmental regulations	Short-term	<ul style="list-style-type: none"> Compliance costs increase due to regulatory requirement(-) Penalties for non-compliance(-) Rising environmental fee as indirect costs(-) 	<ul style="list-style-type: none"> Plan effective compliance management systems, including inventory unit compliance execution methods and designing a compliance platform. Increase human resources for researching relevant regulations and actively participate in legislative discussions. Implement three measures for supply chain management: real-time information aggregation and dissemination, organizing ESG workshops for suppliers, and conduct regular surveys on the usage of supplier resources.
International conventions or agreements	Short-term	<ul style="list-style-type: none"> Indirect costs arising from post-agreement commitments(-) Capital expenditures resulting from post-agreement commitments (-) Reducing carbon emissions decreases carbon tax/fee expenses(+) 	<ul style="list-style-type: none"> In 2023, the Taiwan Semiconductor Industry Association declared a joint goal of achieving net-zero emissions: using 2020 greenhouse gas emissions as a baseline, aiming for an absolute reduction of 10% by 2030 (compared to BAU reduction of 40%). The goal is to achieve net-zero emissions by 2050. Commit to process improvements to reduce greenhouse gas usage: accelerate the replacement of energy-saving components in machinery, install exhaust treatment equipment, execute energy-saving projects for production machinery and facilities, and utilize renewable energy to lower emissions.
Greenhouse gas emissions regulations and trading	Mid-term	<ul style="list-style-type: none"> Penalties for excessive emissions increase indirect costs(-) Early replacement of existing equipment reduces asset value(-) Introducing renewable energy increases production costs(-) Capacity expansion constraints(-) 	<ul style="list-style-type: none"> Increase human resources for researching relevant regulations and actively participate in legislative discussions. Continuously monitor voluntary greenhouse gas reduction projects and the management of incremental emissions offsets. Acquire carbon credits at advantageous prices to offset excess emissions and closely track carbon price trends.

Major Climate Opportunities

Climate Opportunities	Time of Occurrence	Potential Financial or Operational Impacts	Response
Changes in customer behavior	Short-term	<ul style="list-style-type: none"> Product portfolio changes that accelerate positive development across entire supply chain Obtaining orders and expanding revenue Increased order stability and reduced revenue fluctuations Improved company reputation 	<ul style="list-style-type: none"> Continuously stay informed about the requirements and specifications for green products from clients. Compile this information into a database to facilitate the provision of low-carbon, carbon reduction, and energy-efficient green products that meet demand. Drive the design and integration of new products to meet customer needs, emphasizing green or low-energy consumption product combinations. Utilize carbon information platforms to assess product carbon footprints and identify carbon hotspots. Establish reduction pathways and optimization plans for product carbon emissions. Participate in sustainability evaluations both domestically and internationally to enhance sustainability transparency.
Participation in renewable energy projects	Short-term	<ul style="list-style-type: none"> Reduction in carbon emissions leading to a decrease in carbon tax/fee expenditures Diversified sources of electricity to mitigate risks Support for compliance with renewable energy regulations and achieving corporate goals 	<ul style="list-style-type: none"> In 2023, complete the first round of renewable energy electricity procurement, aiming to provide nearly ten million kilowatt-hours of renewable energy annually. Plan for additional renewable energy electricity procurement. Invested in Jiawei Green Energy Co., Ltd. in 2022 and participated in the establishment of Kai-Hong Energy Co., Ltd. in 2023, evaluating other renewable energy investment opportunities. The rooftop renewable energy generation facility at the CTSP fab will transition to self-use in 2024, with ongoing assessments for additional renewable energy installations.
Development of low-carbon products or services	Long-term	<ul style="list-style-type: none"> Increased product prices Expansion in market share and increase in revenue 	<ul style="list-style-type: none"> Understand customer needs and evaluate possibilities to customize low-carbon/green products From the supply chain perspective, we focus on specific products or services with low carbon potential based on raw material carbon emission factors and factory usage. <ul style="list-style-type: none"> Organize sustainable supply chain upgrade forums and advanced packaging technology forums to enhance supplier awareness of product carbon footprints and low-carbon technology development. Collaborate with outsourcing partners to explore advanced low-carbon packaging technologies. Participate in the Ministry of Economic Affairs' "Large Lead Small" low-carbon subsidy program, conducting product carbon footprint assessments for suppliers with high carbon intensity at the CTSP fab. Specific suppliers are required to identify improvement areas during the assessment process and submit improvement reports.
Process optimization and R&D innovation	Mid-term	<ul style="list-style-type: none"> Reduction in carbon emissions leading to a decrease in carbon tax/fee expenditures Reduction in water and resource consumption leading to lower production costs Obtain orders to expand revenue. 	<ul style="list-style-type: none"> Invite suppliers to share energy-saving keys related to products and technical services, as well as how to utilize advanced electronic materials to stabilize specific process quality. Collaborate with outsourcing partners to explore advanced low-carbon packaging technologies.
Obtain government incentives or collaboration	Mid-term	<ul style="list-style-type: none"> Reduce capital expenditures by obtaining government subsidies. Lower indirect costs by obtaining government subsidies. Enhance the company's reputation. 	<ul style="list-style-type: none"> In 2023, collaborate with 13 suppliers to apply for the Ministry of Economic Affairs' "Large Lead Small" low-carbon subsidy, receiving a full subsidy of NT\$30 million. The total investment for this project exceeds NT\$200 million, with an expected annual reduction of 5,886 tCO₂e from the project's completion.

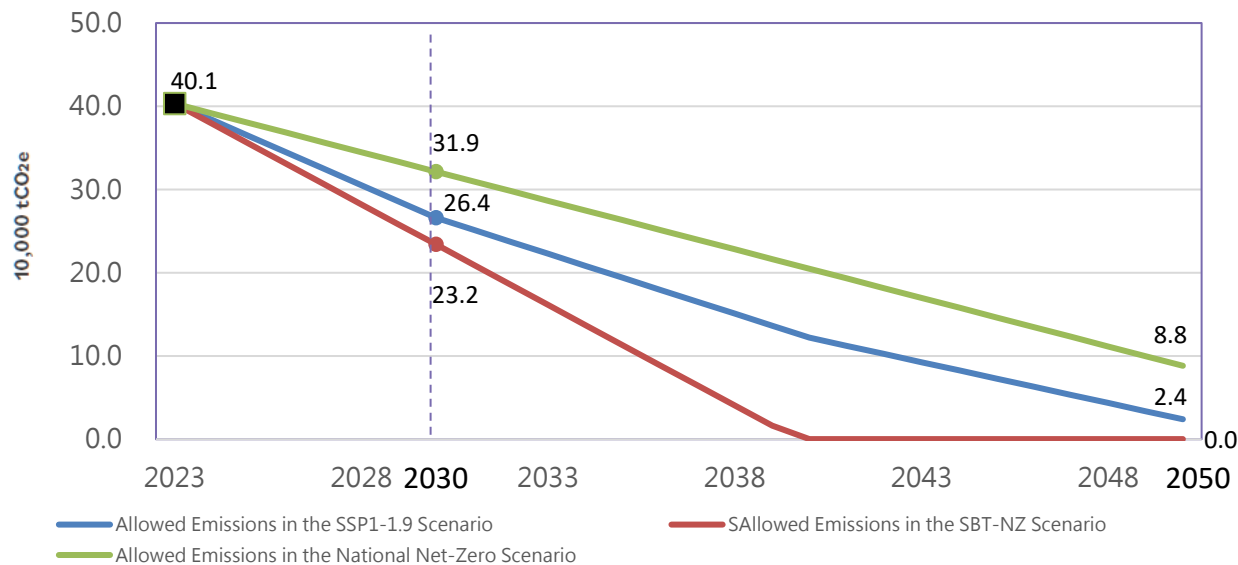
3. Scenario Analysis

3.1 Transition Risk Scenario Analysis

Winbond conducted risk simulations using three scenarios:

(1) National Net-Zero Pathway, in Taiwan which mainly assesses domestic regulatory risks, (2) The SSP1-1.9 scenario from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, which represents an extremely low-emissions pathway, (3) an annual reduction rate of 4.2% as required by the Science-Based Targets Net-Zero (SBT-NZ) Standard for carbon emissions.

External Scenario	Description	Assessed sources of emissions
National Net-Zero Pathway	Based on Taiwan's current net-zero target	Scope 1 + Scope 2
SSP1-1.9	Based on the SSP1-1.9 pathway in the IPCC Sixth Assessment Report	
SBT-NZ	Based on the emissions reduction pathway required to achieve the SBT's net-zero criteria by 2050	



Climate change issues may have financial implications for Winbond in terms of regulations, technology, the market, and reputation. In particular, the implementation of carbon tax and carbon fee, compliance with regulations for intensive electricity users to use of renewable energy electricity are expected to result in a financial impact of approximately 0.3-4.0% of revenue in 2030.

Carbon Tax Imposition			
External scenario	Assumption	Financial impact on revenue in 2030	
		Amount	Revenue Impact
National Net-Zero Pathway	Estimated at US\$2 ~ 10/tCO ₂ e from 2021 to 2050 by referring to SSP2-4.5	< NT\$ 0.2 billion	0.1% to 0.2%
SSP1-1.9	It will reach about US\$650 per ton CO ₂ e in 2050 by referring to SSP1-1.9	> NT\$ 1 billion	2.0% to 4.0%
SBT-NZ			

Carbon Fee Imposition			
External scenario	Assumption	Financial impact on revenue in 2030	
		Amount	Revenue Impact
National Net-Zero Pathway	Carbon exemption quota of 25,000 metric tons per year is estimated at NT\$1,500 per metric ton of CO ₂ equivalent	< NT\$ 0.2 billion	0.1% to 0.2%

Use of renewable energy power			
External scenario	Assumption	Financial impact on revenue in 2030	
		Amount	Revenue Impact
National Net-Zero Pathway	Procurement costs are estimated based on the average wholesale price of Taipower's renewable energy power plus power supply costs	< NT\$ 50 millions	< 0.03%
SSP1-1.9			
SBT-NZ			

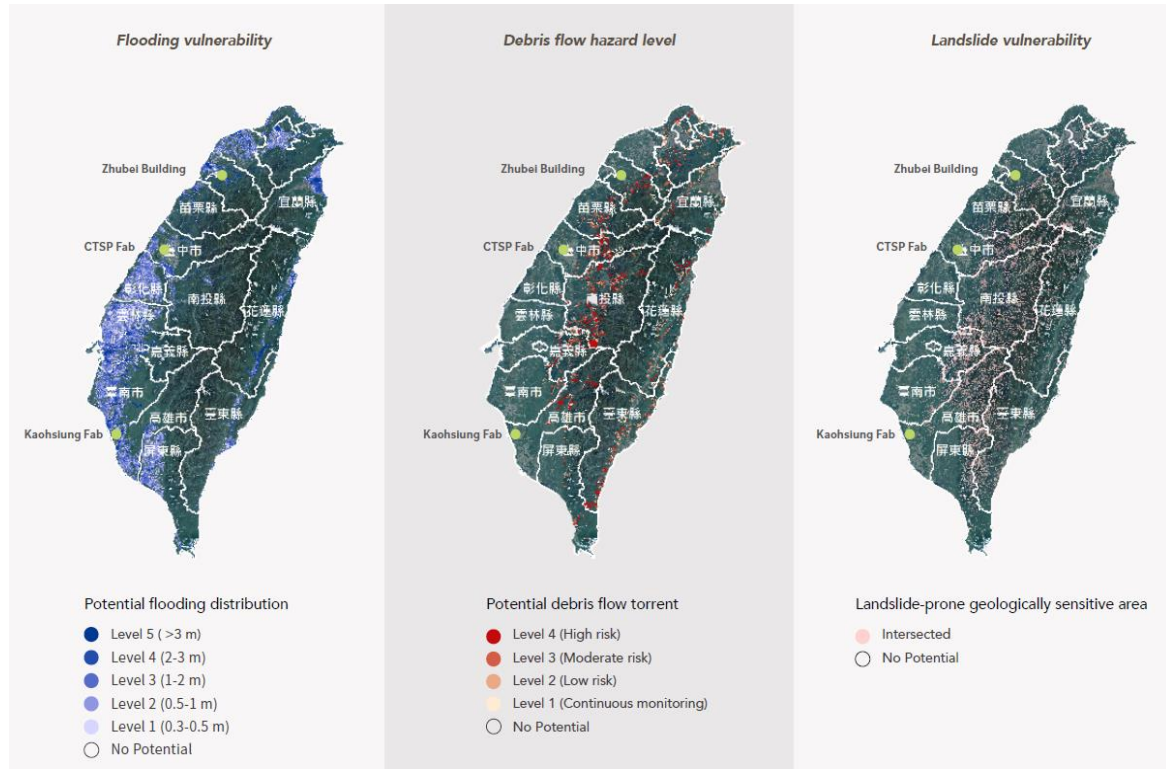
Note: Considering the current international trend towards carbon taxation, carbon fee collection is only considered in the National Net-Zero Pathway scenario.

3.2 Physical Risk Scenario Analysis

Winbond follows the IPCC's Climate Models to evaluate the risks of flooding, debris flows, and landslides resulting from extreme precipitation. We conduct scenario simulations using data from the Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP), National Science and Technology Council (NSTC), National Science and Technology Center for Disaster Reduction (NCDR), and various climate models to avoid biased results.

The following results show that by the end of the 21st century, Winbond's main fabs and offices (including the CTSP Fab, Kaohsiung Fab and Zhubei Building) have a risk level of 0 (low possibility of flooding, debris flows, and landslides) under the four global warming scenarios.

Physical Risk Scenario Analysis of Winbond's main fabs and offices



Risk value =

- Risk of flooding, debris flows, and landslides
- Categorized by risk level:

Level	Risk Value
Low	0-12
Moderate	13-25
High	26-50

Hazard ×

- Extreme rainfall: Possibility of cumulative rainfall reaching 650 millimeters within 24 hours
- Four scenarios: RCP 2.6, RCP 4.5, RCP 6.0, RCP 8.5
- Categorized by hazard level:

Level	Return Period
1	1,000 Years
2	500 Years
3	100 Years
4	50 Years
5	< 50 Years

Vulnerability × Exposure

- Flood potential: Defined based on the criteria set by Water Resources Agency of the Ministry of Economic Affairs and the government's flood relief qualifications :

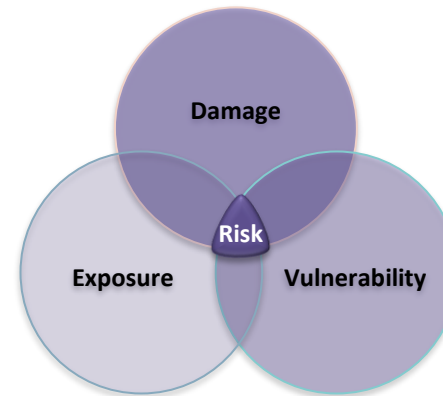
Level	Flood Magnitude Class	Level	Flood Magnitude Class
0	No potential	3	1.0-2.0m
1	0.3-0.5m	4	2.0-3.0m
2	0.5-1.0m	5	➤ 3.0m

- Debris flow potential: Defined based on the criteria set by Soil and Water Conservation Bureau of the Council of Agriculture, Executive Yuan :

Level	Potential Magnitude of Class	Level	Potential Magnitude of Class
0	No potential	3	Moderate
1	Continuous Monitoring	4	High
2	Low		

- Landslide potential: Defined based on the criteria set by Central Geological Survey of the Ministry of Economic Affairs :

Level	Potential Magnitude of Class	Level	Potential Magnitude of Class
0	No potential	1	Intersected



4. Mitigation and Adaptation Measures

- 1.2V HyperRAM saves 33% in power consumption compared to 1.8V HyperRAM
- Winbond has developed the world's first NOR Flash supporting a working voltage of 1.2V, which saves 45% in power consumption compared to 1.8V NOR Flash.
- Process evolution to achieve smaller form factors
- Packaging type evolution

- Investment of NT\$955 million in renewable energy investment plan
- Cumulatively obtained 13,500tCO₂e of international voluntary carbon credits
- Signed a NT\$20 billion Sustainability-Linked Loan



- The cumulative carbon reduction in the supply chain reaches 63,000tCO₂e ^{note}
- 100% completion rate of product carbon footprint for major packaging products type
- Incorporated climate change measures into supplier sustainable-related risk assessments
- Applied for the Ministry of Economic Affairs “Large Lead Small” low-carbon subsidy program to promote low-carbon supply chain transformation

- Optimized the major energy consuming equipment through ISO 50001 Energy Management System in 2022
- Completed the first purchase of onshore wind energy in 2023, with an estimated 2.1 million kWh of green power
- Cumulative electricity savings of 456 GWh from 2019 to 2023
- Participated in TSIA’s Net Zero Emissions and Voluntary Reduction initiatives in 2023

- 82.2% Water Recycling Rate in 2023
- Achieved B List in “Water Security” of Carbon Disclosure Project (CDP)
- Introduced ISO 46001 and the CTSP Fab obtained the certification in January 2024

Note: The amount of cumulative carbon reduction in the supply chain is the difference in emissions in 2022 compared with the base year (2021).The emissions in the 2021 and 2022 have been inspected by the inspection agency. The newly added amount of carbon reduction in 2023 will be disclosed in 2024 due to scheduling issues of the inspection agency.



4.1 Green Products

Winbond provides global customers with comprehensive specialty Memory solutions. Core products include Code Storage Flash Memory, TrustME® Secure Flash Memory, Specialty DRAM, and Mobile DRAM, making Winbond the only Taiwanese manufacturer with proprietary technologies in both Flash and DRAM. Winbond leverages the synergies generated by its product portfolio and adopts a green product design philosophy to meet diverse customer needs. This enables customers to combine their expertise with Winbond’s innovative green products for applications in hand-held devices, consumer electronics, computer peripherals, artificial intelligence, automotive, and industrial electronics markets. To achieve environmental friendliness and sustainable growth while providing customers with high-quality and innovative products and services, Winbond continuously invests in research and development, technology, and talent. Winbond is committed to developing innovative products and technologies and remains focused on the following issues:

- 1) Development of green products in Flash memory, Secure Flash memory, Specialty DRAM, and Mobile DRAM
- 2) Development and production processes of green products, along with achievements in carbon reduction and energy saving
- 3) Key technology development focusing on high performance, small size, low energy consumption, high quality, and security
- 4) Refinement in design and process miniaturization Innovation and intellectual property management

Key Technology	Highlight Products	Application
Low-Power NOR Flash Memory	<ul style="list-style-type: none"> ➤ 1.2V Flash Memory <ul style="list-style-type: none"> • Winbond launched the market's first 1.2V 64Mb SpiNOR Flash Memory: W25Q64NE • 128Mb and 256Mb are expected to be launched in 2024. 	<ul style="list-style-type: none"> ✓ Wearable devices and other low-power demand application products ✓ Meets the low operating voltage requirements of advanced processes, eliminating the need for Power Management IC (PMIC), further reducing costs and minimizing sizes.
High-performance NAND Flash Memory	<ul style="list-style-type: none"> ➤ 8-Channel NAND Flash (Octal NAND) <ul style="list-style-type: none"> • Winbond’s 46nm serial NAND Flash Memory technology, introduces the first high-speed NAND Flash Memory in the market to support 8-channel input and output • Supports products that require higher capacity and higher transfer speed 	<ul style="list-style-type: none"> ✓ Automotive electronics (e.g. dashboard and Advanced Driver Assistance Systems...etc.) can meet the requirement of rapid firmware startup and quick updates ✓ Smart visual doorbells can meet the application demands for fast startup detection.
Secure Flash Memory	<ul style="list-style-type: none"> ➤ Anti-quantum computing attack. Integrating PQC (Post-Quantum Computing Cryptography) Leighton-Micali (LMS algorithm) <ul style="list-style-type: none"> • Supports asymmetric key encryption algorithm (LMS : Leighton-Micali) ,enabling devices to achieve secure OTA through LMS-OTS (one-time signature) specified by NIST800-208. • The component supports a high-performance Quad-SPI interface of 166MHz, expands the support of Replay-Protected Monotonic Counter (RPMC), increases to 8 counters, and is suitable for security enhancement and data protection of personal computers (UEFI and BIOS). 	<ul style="list-style-type: none"> ✓ The first memory supplier to integrate the LMS algorithm, meeting emerging security regulatory requirements and setting new standards in the industry. Optimized for industrial IoT, network, server, and critical infrastructure applications.
Low-Power Mobile Memory	<ul style="list-style-type: none"> ➤ 1.2V Low Voltage Mobile Memory <ul style="list-style-type: none"> • Compared to traditional SDRAM/DDR 3.3V, HyperRAM 1.8V operating power is only 25%. • The new generation of HyperRAM operating voltage is further reduced to 1.2V, further reducing 33% power consumption, prolong usage time of wearable devices. 	<ul style="list-style-type: none"> ✓ Digital wearables devices, IoT devices, and digital meters and other related products.



Code Storage Flash Memory

As a leading manufacturer of Flash memory, Winbond continuously strives to reduce product manufacturing carbon footprints and energy consumptions. Taking Winbond's NOR Flash as an example, with the evolution of processes to the new generation 58 and 45 nanometers products, the area of a single chip has been significantly reduced. Additionally, the new generation products also support smaller packaging types, greatly reducing the carbon footprint of Flash products in wafer manufacturing and packaging stages. For instance, in the new generation 58nm RV series, the 8Mb 3V NOR Flash has reduced the chip area by 60% compared to products with the same capacity at 90nm, and it can also support smaller XSON packaging. Ultimately, the carbon footprint is reduced by 34% compared to the 90nm DV series.



The area of a one-dollar coin is approximately **11 times** the size of an SOP 8 (208 mil), and **52 times** the size of an XSON 8 (3x2).

Additionally, in terms of power consumption and extending battery life, Winbond developed new processes and circuit architectures. It introduced the world's first NOR Flash supporting an operating voltage of 1.2V. When paired with SoCs designed with advanced processes for low voltage, it achieved high-performance reading while significantly reducing power consumption, thus meeting the goals of high efficiency and energy savings.

1.2V NOR Flash

	45% less power consumed compared to the 1.8V NOR Flash in mainstream use today <ul style="list-style-type: none"> In the scenario of daily operation for 8 hours in a true wireless application environment, with the total sales volume of 1.2V NOR Flash in 2023, compared to 1.8V NOR Flash, approximately 1,160,785 kWh of power consumption is saved, with an equivalent of 4,178,826 MJ. This saving is roughly equivalent to reducing 574.6 metric tons of carbon dioxide emissions, which is also approximately equivalent to the carbon absorption capacity of 1.49 Daan Forest Parks (Note.).
	Performance Maintains similar transition level as 1.8V/3V Flash
	Product applications Wireless headphones, smart watches, smart wristbands, smart glasses, and other wearable devices with high power-saving requirements

Note: Based on the 2022 electricity emission factor of 0.495 published by the Ministry of Economic Affairs, and data from the Forestry and Nature Conservation Agency of the Ministry of Agriculture and the Department of Land Administration of the Taipei City Government: with an area of 25.93 hectares and a carbon sequestration rate of 14.9 tCO₂e per hectare per year, Daan Forest Park annually absorbs approximately 386 tCO₂e.

Specialty DRAM and Mobile DRAM

In 2022, Winbond launched the HyperRAM 3.0. This series of products is ideal for use in low power consumption IoT devices such as wearable devices. It is able to support voice control and tinyML calculations, and can also be used in vehicle dashboards, entertainment systems, machine vision, HMI displays, and communications modules. To meet the emerging consumer trends of low-power wearable and smart devices, Winbond launched the HyperRAM 3.1 product series in 2023, featuring low voltage and small size packaging options such as the 1.2V WLCSP and 1.35V BGA49. These became crucial components for low-power wearable devices. With the expansion of the Internet of Things (IoT) market, the number of portable devices is rapidly increasing. The ultra-low power performance of this series effectively extends battery life. Leveraging the low power advantage of HyperRAM 3.1, it is applied in wearable smart sports and lifestyle products. Its 16-bit interface accelerates data transfer rates, speeding up the loading and transmission of high-resolution images. This sets new benchmarks in low power consumption, smart processing, and UI display fields, providing customers with simplified, competitive, and long-lasting battery life smart wearable design solutions.

Joint Electron Device Engineering Council (JEDEC) standard DDR3 Specialty DRAM is widely used in various products. Through technological advancements, product power consumption is reduced. In addition, Winbond continues to expand its product lines to meet the needs of various applications, such as DDR4 and higher bandwidth and speed ASIC DRAM products, applied in networking and emerging artificial intelligence applications.

HyperRAM™ 3.1	HyperRAM Form Factor	DDR3
The 3.1 generation of our HyperRAM™ products utilizes the all-new 16-bit extended Hyper-speeds up to 1 GBps through the same commands, format. It features the same standby power consumption, and only requires an adjustment to a small number of signal pins. The product also features a higher frequency	Winbond initially introduced the BGA 24 6x8mm ² package in the new HyperRAM™ series, which, compared to SDRAM's BGA 54, reduces carbon emissions by 10%. In 2023, Winbond continued to improve packaging types and introduced the BGA 49 size, which supports a 16-bit data width. Furthermore, the size was reduced to 4x4mm ² , resulting in a 20% reduction in carbon emissions compared to BGA 54.	Shrinking from 25nm to 20nm. Operating efficiency goes up with each technology node, and our 2Gb DDR3 products have 10% reduced power consumption. Winbond has continued to supply DDR3 products, making sure to satisfy long-term customer demand.

4.2 Green and Low-carbon Supply Chain

Since 2022, Winbond has established the Co-Sustainability Project to communicate its carbon reduction goals and priorities to the supply chain through activities and sustainability supply chain resource usage surveys. In 2023, Winbond further segmented its efforts in supply chain decarbonization into four areas. First, it promotes the transformation of the supply chain towards low-carbon to achieve a 10% carbon reduction by 2030, This including comprehensive training, surveys, and the introduction of resources from industry, government, and academia. Second, it enhances sustainable procurement capabilities (including local procurement, circular procurement, and green procurement). Third, it strengthens the management of low-carbon work by outsourcing partners. Finally, it actively develops internal green logistics systems.



2023 Results of Sustainable Supply Chain Influence

- Tier one main suppliers (Note) sustainability supply chain resource usage surveys response rate: >90%
- Completion Percentage of carbon footprint inventory for major packaging types of products: 100%
- The first semiconductor manufacturer received full subsidies of NT\$30 million from the IDA of MOEA for "Large Leads Small Initiative."

Low Carbon Supply Chain Management Process



Note : Tier 1 suppliers refer to those who supplied to Winbond in 2023 and were directly or indirectly related to the products, technologies, or services comprising Winbond's offerings.

Low Carbon Supply Chain Initiatives

Management Process	Item	Description
Identify conflicts and establish a reciprocal mindset	<ul style="list-style-type: none"> ESG co-learning workshop for suppliers Internal ESG Training 	<ul style="list-style-type: none"> Utilizing the Supplier ESG Learning Forum as a platform, starting in 2022, invite critical suppliers who have been engaged in carbon reduction for many years with outstanding performance to exchange views on carbon reduction work. In 2023, we plan to expand the scope of internal staff ESG education and training to enhance the empathy of internal staff towards supplier carbon reduction work. Encourage, assist, and reciprocate instead of demanding to reduce resistance from various suppliers towards carbon reduction work, facilitating the subsequent disclosure of information in category three and gradually improving the transparency of carbon information in the supply chain.
Declare carbon reduction goals and establish sustainability objectives	<ul style="list-style-type: none"> Sustainable Supply Chain Upgrade + Forum 	<ul style="list-style-type: none"> Publicly disclose the supply chain 2030 reduction target as 10%, 2050 Net-Zero
Collect and enhance supply chain carbon emission data transparency	<ul style="list-style-type: none"> Sustainable Supply Chain Resource Usage Survey Outsourced Product Carbon Footprint Inspection and Calculation 	<ul style="list-style-type: none"> In 2023, an assessment was conducted on Tier 1 primary suppliers, evaluating their performance in electricity consumption, water usage, waste generation, greenhouse gas emissions, international climate governance efforts, and the energy consumption and carbon footprint of various resources used in their production processes ^{NOTE1} Number of survey participants: 152 2030 supply chain carbon reduction target: 10% Annual electricity savings: 39 million kWh Annual water conservation: 2.828 million metric tons Annual waste reduction: 77,500 metric tons Number of ISO 14064-1:2018 Certified Companies: 35 Number of greenhouse gas reduction companies: 91 Number of ISO 14067:2018 Certified Companies: 14 Number of ISO 50001 Certified Companies: 19 Number of Companies Participating in CDP Survey: 58 Types of Packaging with Product Carbon Footprint: BGA, SOP, SON, WLCSP, RDL ^{NOTE2}
Conduct training and open discussions	<ul style="list-style-type: none"> Sustainable Supply Chain Upgrade + Forum Advanced Packaging Technology Forum 	<ul style="list-style-type: none"> Since 2023, Winbond holds three Sustainable Supply Chain Upgrade+ Forums to enhance suppliers' knowledge of sustainability. The topics of the forums include international standards, management benchmarks, and disclosure. Professionals are invited to serve as speakers and outstanding suppliers are also invited to share their experiences. Each forum concludes with a Q&A session and further discussion. Through this platform, Winbond and suppliers unify their efforts towards sustainable learning.
Introduce resources from industry, government, and academia to collaborate on carbon reduction	<ul style="list-style-type: none"> Winbond Leads and Supports Small Suppliers Institute for Information Industry (III) and College Teams Provide Carbon Reduction Guidance 	<ul style="list-style-type: none"> Led by Winbond, a total of 13 suppliers including raw materials, packaging and testing, machinery and equipment, and plant engineering were invited to form an ESG sustainable supply chain team. Winbond applied to the Industrial Development Administration (IDA) of the Ministry of Economic Affairs for the "Large Leads Small Initiative: Advancing Low-Carbon and Smart Transformation in the Manufacturing Industry" and successfully secured full subsidies amounting to NT\$30 million. Incorporating carbon reduction consulting resources from the Institute for Information Industry and university teams (including Ming Chi University of Technology, Southern Taiwan University of Science and Technology, and National Cheng Kung University Sustainability Center) for the tier one suppliers in the first stage.

Note 1: The electricity conservation volume was the difference between the electricity consumption calculated from the Scope 2 emissions in 2022 and the baseline year (2021). The emissions for both years were verified by a verification body. The water conservation volume and waste reduction volume were management data provided by suppliers based on the principle of good faith.

Note 2: Ball-grid arrays (BGA), Small Outline Package (SOP), Small Outline No-lead Package (SON), Wafer Level Chip Scale Package (WLCSP), Redistribution Layer (RDL)

Large Leads Small Initiative

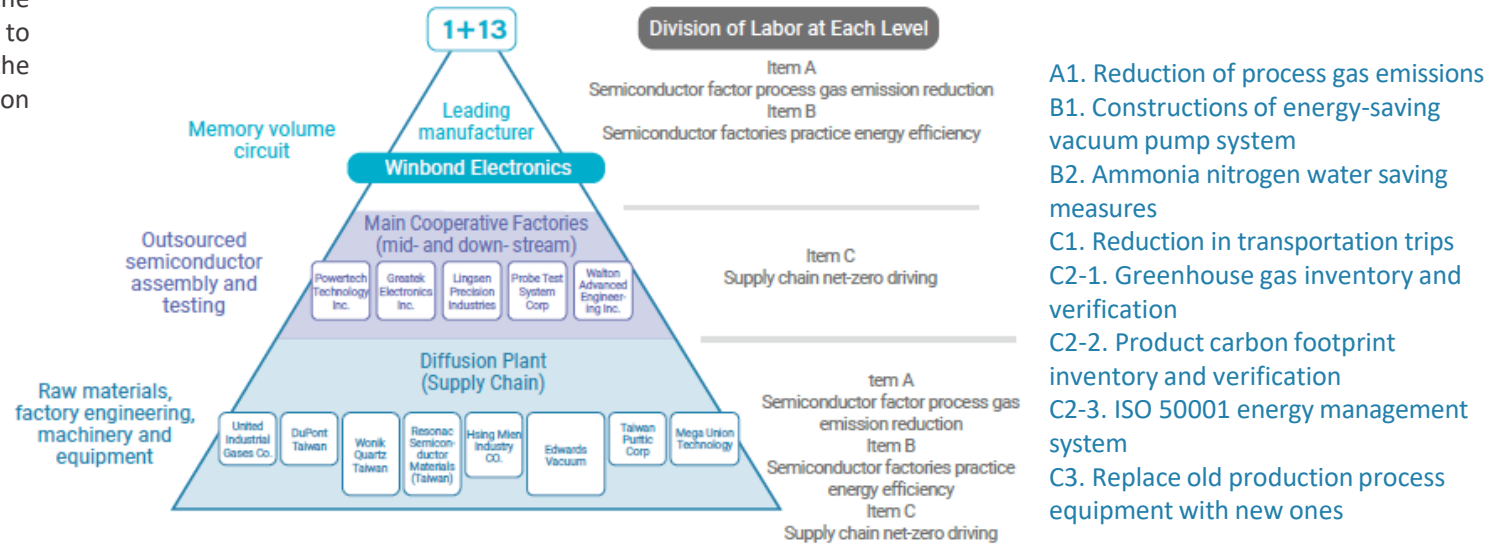
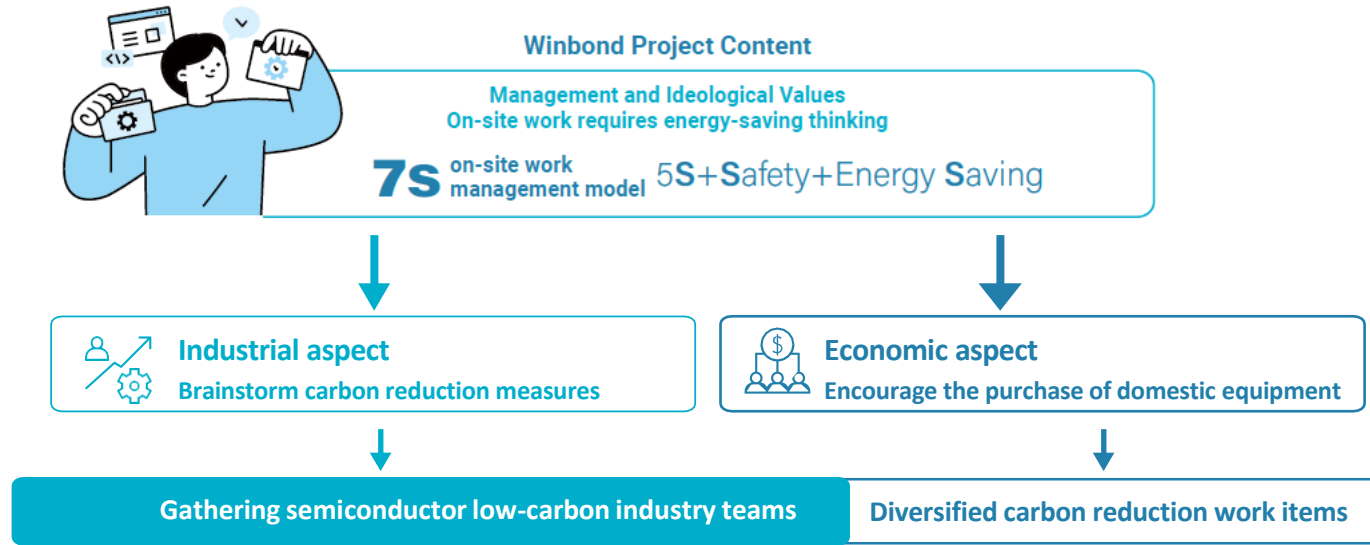
Advancing Low-Carbon and Smart Transformation in the Manufacturing Industry
Winbond Sustainability Supply Chain Low-Carbon Transformation Project



In 2023, Winbond collaborated with 13 companies including Powertech Technology Inc., Greatek Electronics Inc., Probe Test System Corp., Lingsen Precision Industries, Walton Advanced Engineering, Inc., DuPont Taiwan, Resonac Semiconductor Materials (Taiwan), Wonik Quartz Taiwan Co., LTD., United Industrial Gases Co., LTD., Hsing Mien Industry CO., LTD., Edwards Vacuum, Taiwan Puritic Corp., and Mega Union Technology Inc. to execute three major projects: “Reduction of Factory Process Gas Emissions,” “Implementation of Lean Electricity and Water Conservation Measures in Factories,” and “Promotion of Greenhouse Gas Inventory and Hotspot Analysis in the Supply Chain.” During the collaborative period of this project, a total investment of over 200 million New Taiwan Dollars was made. Within two years, these initiatives aimed at promoting low-carbon transformation gradually increased their carbon reduction capacity. It is anticipated that when the projects completed in 2025, an annual reduction of approximately 5,866 tCO₂e will be achieved, equivalent to 14 times the annual carbon sequestration by the Daan Forest Park annually. This achievement not only serve as a model promoting the low-carbon transformation of the semiconductor industry supply chain but also showcases the multifaceted qualitative and quantitative operational methods with benefits, which make Winbond the first semiconductor to receive a full subsidy of NT\$30 million. Therefore, the Ministry of Economic Affairs ‘ Industrial Development Administration invited Winbond to the “2023 Supply Chain Transformation and Innovation Forum” as a representative of the semiconductor industry to share its experiences in sustainable operations and low-carbon transformation.



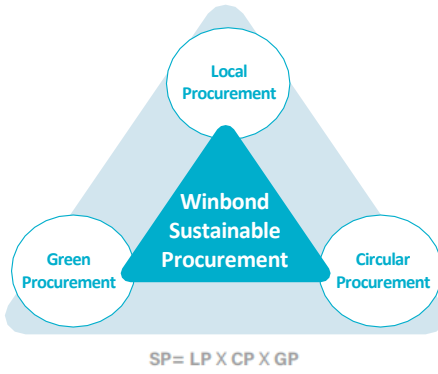
Winbond Project Content



Note: Based on data from the Forestry and Nature Conservation Agency, Ministry of Agriculture, and the Taipei City Government’s Department of Land Administration, Daan Forest Park covers 25.93 hectares and has a carbon fixation rate of 14.9 tCO₂e per hectare per year. As a result, the park contributes to the annual absorption of approximately 386 tCO₂e.

Sustainable Procurement

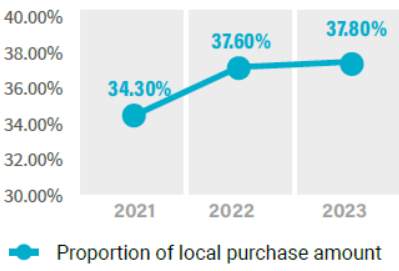
Since 2023, Winbond has redefined the proactive significance of procurement work in sustainability and has planned corresponding procurement strategies. These strategies include local procurement, which effectively reduces GHG emissions generated by international transportation distances, circular procurement to promote material recycling and reuse, and green procurement to encourage domestic suppliers to provide green products/services. These initiatives are integrated into Winbond's sustainable procurement promotion efforts. In the future, the green procurement is highlighted by leveraging the economic value generated by procurement activities and collaborating with suppliers to implement our sustainable development.



Local Procurement

To ensure the sustainability of CTSP and Kaohsiung Fabs, the focus of local procurement was on materials directly related to wafer manufacturing, including chemicals, gases, targets, wafers, and key consumables. In 2023, Winbond actively adjusted the procurement ratios of various raw material suppliers, due to the external impacts such as climate change, inflation control, and conflicts in Ukraine, Israel, etc., and internal demands for green products and process improvements. The proportion of local procurement increased from 37.6% in 2022 to 37.8%, marking a 0.2% annual increase. Looking ahead, Winbond will continue to explore the potential for localizing various raw materials to minimize carbon emissions and supply chain risks while optimizing management costs.

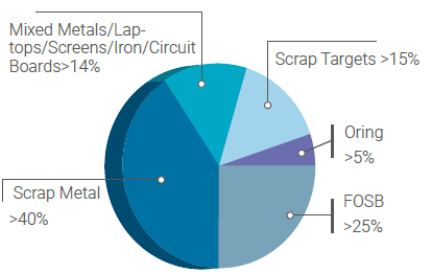
Proportion of local procurement amount of raw materials



Circular Procurement

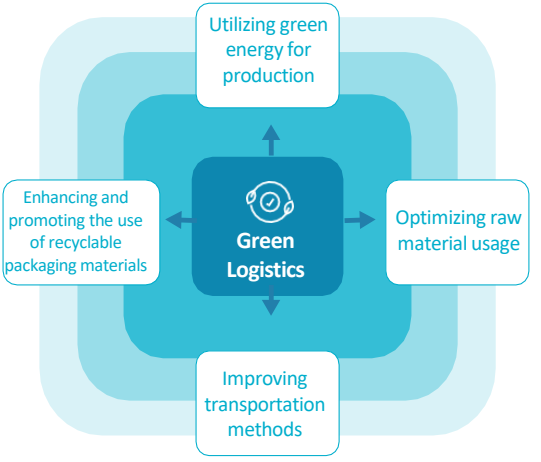
Following the EU's definition of circular procurement, Winbond applies the concept of closing the loop in the circular economy to identify products or services that can generate economic benefits through circularity in the operations of CTSP and Kaohsiung fabs. By leveraging its bargaining power and negotiating with suppliers, Winbond achieved over NT\$2.3 million in sales performance from the recycling and sale of various waste products in 2023, including Scrap Targets, O-rings, FOSBs, mixed metals, laptops, screens, iron, and tray pallets. Looking ahead, Winbond will continue to seek products that can be repaired, reused, or recycled in the procurement process, emphasizing resource efficiency through circular procurement to achieve sustainable development goals.

2023 Circular Procurement Performance



Internal Green Logistics

In recent years, the demand for carbon-neutral products from international customers has been growing. In 2023, Winbond actively responded to this demand by incorporating plans for low-carbon production into its internal logistics system, based on considerations within the company's value chain. This includes continuously improving production forecasting capabilities during the input stage of production to optimize the usage of raw materials and avoid unnecessary waste. At the stage of completing the manufacturing of DRAM and NOR Flash finished products, efforts were made to reduce greenhouse gas emissions by improving transportation management. In 2023, these logistics and transportation operations saved 110.9 tCO₂e emissions. Suppliers were requested to prioritize the use of recycled materials for packaging while maintaining quality standards. In 2023, over 70% of waste pulp was used in packaging cardboard, and 100% of plastic pallets were manufactured from recycled materials.



Outsourcer' Low-carbon Technology Development Capability

In 2023, Winbond leveraged government subsidies and carbon reduction guidance resources from the Institute for Information Industry to motivate outsourcer to eliminate high-energy-consuming or inefficient machinery and equipment. They were also encouraged to identify carbon emission hotspots and significant energy uses through GHG emission verification and by implementing the ISO 50001 energy management system. From the analysis of product carbon footprints, outsourcers were encouraged to rethink process improvements from the source. In summary, the low-carbon technology development among outsourcers in 2023 focused on three aspects: Firstly, monitoring the input of energy and resources in each stage of testing and packaging processes, and actively communicating with outsourcers to reduce energy usage; secondly, evaluating the development of green materials and prioritizing the use of raw materials that meet environmental and regulatory standards; collaborating with outsourcers to brainstorm ideas for low-carbon processes. Third, by optimizing upstream material inputs, waste generation during the outsourcing phase is minimized, effectively lowering overall waste disposal across Winbond's supply chain.



4.3 Energy and Greenhouse Gas Management

In recent years, Winbond has implemented data governance to quantitatively manage energy and greenhouse gases. Inventory work began in 2020 and was expanded to subsidiaries in 2023. Based on the inventory results, Winbond has taken various reduction actions and regularly tracks the data.

Energy Management

In 2022, the CTSP Fab obtained the ISO 50001 energy management system certification, effectively standardizing the facility’s management processes and allowing it be managed by our engineering units. The newly constructed Kaohsiung Fab also adopted ISO 50001 in 2023, expanding the scope and benefits of energy management, with verification expected in 2024.

The reduction target for energy and electricity consumption is by 2030 1% YOY reduction of electricity usage per unit product. In 2023, the energy consumption index per unit product was 100.7 megajoules in average to produce a 12-inch wafer photomask layer. Compared to the 82 megajoules consumed in 2022, electricity consumption per product unit increased by approximately 22.8% YoY (MJ/layer - wafer photomask). The challenge in meeting targets was linked to the global economic recession in 2023, resulting in decreased production capacity. Furthermore, the Kaohsiung Fab not yet attained economies of scale, contributing to elevated average electricity consumption and emissions per unit product. In the future, we will continually focus on implementing energy-conserving programs, including equipment replacement, consumption reduction, process optimization, and the advancement of energy efficiency through intelligent energy-saving measures, aiming to enhance environmental sustainability benefits.

Energy Usage

In recent years, due to the expansion of the Kaohsiung Fab and the addition of new equipment, the usage of various raw materials/fuel has increased. In 2023, the total energy consumption of Taiwan Fabs was approximately 2,958,834 GJ, while the total energy consumption of the subsidiaries was approximately 269,202 GJ.

Item	Unit	2021	2022	2023	
		Taiwan Region	Taiwan Region	Taiwan Region	Subsidiaries
Purchased Electricity (Excluding Renewable Energy)	GJ	1,988,490	2,479,988	2,592,983	258,692
Renewable Energy (Electricity)	GJ	-	-	7,571	447
Electricity Subtotal	(MJ/layer - wafer photomask)	79.3	82.0	100.7	-
Natural Gas	GJ	242,327	314,966	345,558	9,903
Diesel Fuel	GJ	1,934	10,023	10,899	148
Automotive Gasoline/Diesel	GJ	2,088	2,200	1,823	37
Total Energy Consumption	GJ	2,234,839	2,807,178	2,958,834	269,227

Note 1: Energy usage has been converted to joules. Except for natural gas, which is calculated based on the heat value provided by the supplier, all other conversions are based on the Environmental Protection Administration’s CO₂ emission factor. 1 kWh of electricity = 3,600 kJ, 1 cubic meter of natural gas = 8,793 kcal, 1 liter of diesel = 8,400 kcal, 1 liter of gasoline = 7,800 kcal, 1 calorie = 4.184 joules.
 Note 2: All energy consumption data were derived from measurements on billing receipts, monthly natural gas consumption statements and materials requisition/inventory movement verification sheets. No estimations are involved.
 Note 3: 2023 data includes consolidated financial information from subsidiary companies (NTC).

Energy Conservation Action Plan

The colleagues voluntarily proposed and continued to implement energy-saving measures in 2023, with a total of 108 items across 7 categories. These measures include equipment replacement, machine improvement, efficiency enhancement, usage reduction, process optimization, smart energy management, and new machine design. Among them are initiatives such as using smart air conditioning, optimizing Make-up Air Unit (MAU) air washer systems, and adopting energy-saving heating tape for machines. Compared to 2022, the electricity-saving amount increased by approximately 107,896 GJ, around 30 million kWh, approximately equivalent to the annual electricity consumption of 8,553 households.^{NOTE}

Note: The calculation is based on the average annual electricity consumption of 3,504 kWh per household in Taiwan in 2018, approximately 12.6 GJ.

Type	Action plan (Example)	Measures	Electricity Savings (10,000 kWh)	GJ	GHG Emission Reduction (tCO ₂ e)
Equipment Replacement	Replacement of energy-efficient motors Replacement of energy-efficiency heating/cooling equipment	10	1,200	43,187	5,938
Usage Reduction	Machine heating/cooling equipment settings Optimized machine exhaust reduction	61	493	17,739	2,439
Machine Improvement	Enhanced insulation of machine heating/cooling systems Replacement of energy-saving components in machines	8	98	3,512	483
Process Optimization	Switching machine cooling to PCW cooling water circulation Optimization of vacuum pumps and ovens usage time	19	481	17,312	2,380
Efficiency Enhancement	Enhanced MAU System Performance Enhanced the plate heat exchanger efficiency of PCW	7	432	15,561	2,140
Smart Energy Management	AI smart air-conditioning	1	273	9,820	1,350
New Machine Design	Use FRP fan for cooling tower Use vertical washer pumps for MAU	2	21	765	105

Note 1: The baseline year is 2021.

Note 2: The CO₂ emissions coefficients for electricity is 0.495 KG CO₂e / kWh



Greenhouse Gas Management

Winbond has proactively cooperated with the government in conducting inventory and verification of greenhouse gas emissions. Winbond has implemented greenhouse gas management systems within our fab facilities, adopted the operational control approach, and adopted ISO 14064-1 standards to carry out comprehensive greenhouse gas emissions inventory and verification. Winbond has also set emission reduction targets, looked for opportunities to reduce emissions, and proposed improvement plans.

Greenhouse Gas Inventory

Winbond continues to expand its scope of greenhouse gas management. At its Taiwan facilities, it has fully implemented ISO 14064-1, conducting regular inventories and verifications of greenhouse gas emissions across various factory areas. This practice allows Winbond to monitor greenhouse gas emissions and validate the effectiveness of its reduction efforts.

Scope 1 Emissions Source List

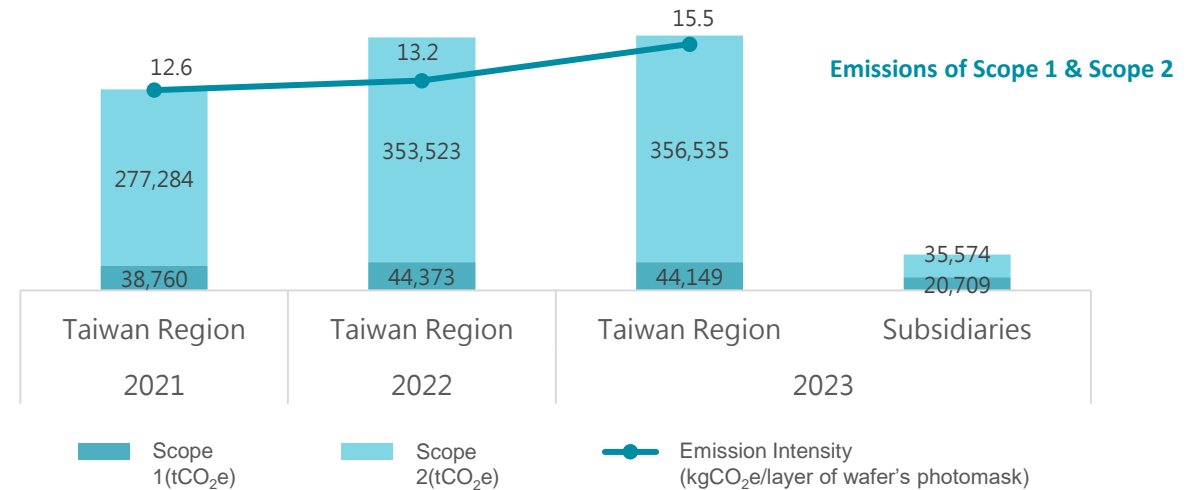
Type	Scope 1 Emissions (tCO ₂ e)
Carbon Dioxide (CO ₂)	21,444
Methane (CH ₄)	97
Nitrous Oxide (N ₂ O)	3,980
Hydrofluorocarbons (HFCs)	2,527
Perfluorocarbons (PFCs)	11,631
Sulfur Hexafluoride (SF ₆)	1,269
Nitrogen Trifluoride (NF ₃)	3,201

Scope 3 Emissions Source List

Type	Item	Scope 3 Emissions (tCO ₂ e)
Indirect emissions from transportation	Upstream transportation	1,181
	Employee commuting	3,784
	Business travel	340
Indirect emissions from product use	Purchased goods and services	206,836
	Waste generated	2,408
	Outsourced assembly and testing	239,672

The greenhouse gas emissions target is to achieve a yearly reduction of 5% in greenhouse gas emissions intensity YoY by 2030. In 2023, the unit greenhouse gas emissions intensity indicator, "average greenhouse gas emissions per layer of photomask for 12-inch wafer production," was 15.5 Kg CO₂e, compared to 13.2 Kg CO₂e in 2022, representing an approximately 17.4% YoY increase in product carbon emissions.

The challenge in meeting the target stemmed from various factors, including the global economic downturn in 2023, which resulted in reduced demand, and the Kaohsiung Fab not yet achieving economies of scale, leading to higher than anticipated average electricity consumption per unit of product. Moving forward, our focus will remain on promoting reductions in process gas FCs emissions (through process enhancement and the installation of exhaust gas treatment equipment), energy conservation (via program optimization, efficiency enhancements, smart energy-saving initiatives, etc.), and the adoption of renewable energy sources.



Note 1: In response to greenhouse gas reduction and control, the 2023 report boundary has been expanded to include the subsidiary (NTC) in order to have more complete emission data. Therefore, the baseline year for the greenhouse gas inventory is tentatively set as 2023.

Note 2: The Global Warming Potential (GWP) for 2021 and 2022 was sourced from the IPCC Fourth Assessment Report (2007), and the source for 2023 was the IPCC Fifth Assessment Report (2019).

Note 3: Greenhouse gases include nitrous oxide (N₂O), methane (CH₄), carbon dioxide (CO₂), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃), etc.

Note 4: All energy usage comes from meter readings, the natural gas monthly settlement form/requisition form, and the AS400/part number inventory change record check list. The table contains no estimates.

Note 5: The emission factor sources: Uncertainty data for emission factors are referenced from the latest version of the Climate Change Administration's greenhouse gas emission factors. Uncertainty assessment of activity data is referenced from the technical specifications of the measuring instrument.

Note 6: Values for 2023 are estimated values, as the emissions factor of electricity for 2023 has not yet been announced.

Note 7: The data from the consolidated financial statements of subsidiaries (e.g., NTC) was incorporated in 2023 data.



Greenhouse Gas Reduction

① Direct Emission Reduction

- Promoting a Net Zero Culture: We encourage all colleagues to collectively reduce carbon emissions. As of 2023, we have cumulatively reduced approximately 2.28 million tCO₂e emissions, which is equivalent to the annual carbon sequestration of 5,907 Daan Forest Parks.
- Extending this initiative to our subsidiaries and branches progressively.

To achieve our goal of reducing direct emissions, Winbond advocates breaking free from traditional linear thinking. We foster an innovative culture, harness collective wisdom, and encourage colleagues to rethink the entire product lifecycle from a cradle-to-cradle design perspective. By setting targets, implementing data governance, establishing carbon accounting systems, managing institutional processes, and allocating capital expenditures, we drive a net zero culture. We are gradually expanding this approach to our subsidiaries and branches. Since 2006, Winbond has actively participated in reducing greenhouse gas emissions of perfluorocarbons in collaboration with the Taiwan and World Semiconductor Associations. Our collective efforts have resulted in a reduction of approximately 2.28 million tCO₂e emissions, equivalent to the annual carbon sequestration of 5,907 Daan Forest Parks (Note). Simultaneously, we have established long-term mechanisms to ensure the achievement of sustainable development goals. These measures contribute significantly to our progress in reducing direct emissions.

Note: Based on data from the Forestry and Nature Conservation Agency, Ministry of Agriculture, and the Taipei City Government's Department of Land Administration, Daan Forest Park covers 25.93 hectares and has a carbon fixation rate of 14.9 tCO₂e per hectare per year. As a result, the park contributes to the annual absorption of approximately 386 tCO₂e.

② Renewable Energy Use

- Commitment to 90% Use of Renewable Energy at the CTSP fab by 2030
- Investment of NT\$955 Million in Green Energy
- Procurement of Green Energy: Onshore Wind Turbines 3.6MW, Solar Power 27MW

Winbond has committed to achieving 90% usage of renewable energy at the CTSP fab by 2030 and actively participated in renewable energy project planning with investments totaling NT\$955 million. Concurrently, the company actively engages in green energy procurement. The first procurement of 3.6MW onshore wind power was completed in September 2023, securing approximately 2.1 million kWh of green electricity (with an expected annual generation of about 8.5 million kWh). Starting from April 2024, an additional 27MW of solar power will be acquired.

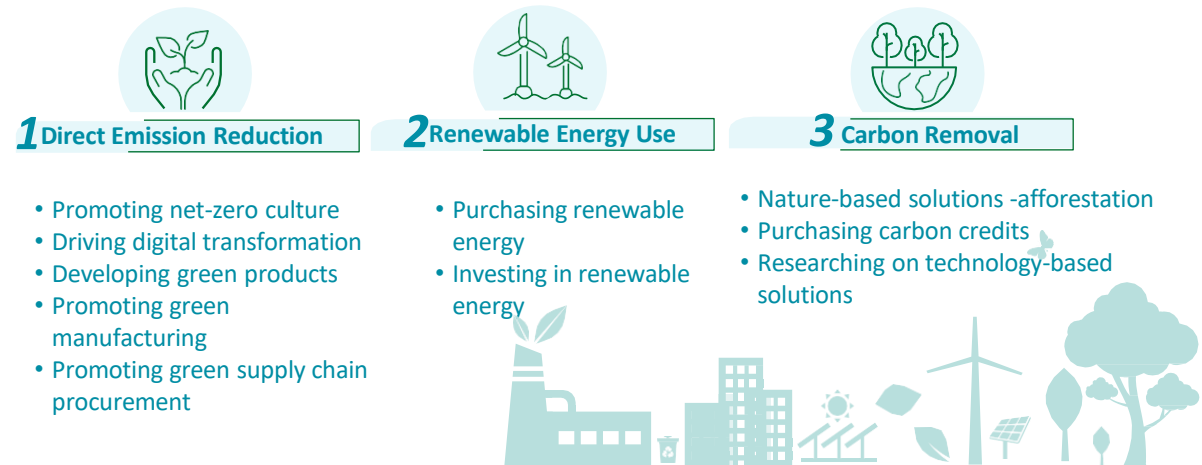
③ Carbon removal

Nature-based Solutions (see “Net-zero case study” for details)

- Green Carbon - 30-year Afforestation Carbon Reduction Plan Removing 1,380 tCO₂e
- Blue Carbon - Investing in the World's Largest Blue Carbon Project
- Seed Conservation and Breeding

To gradually achieve the net-zero target, Winbond has begun researching how to remove carbon from the atmosphere. Scientists have found that capturing and storing carbon dioxide from the atmosphere is an indispensable key element for the success of net-zero, which can be stored in land, oceans, and rock formations. Winbond explores nature-based solutions, starting with green carbon and blue carbon. Through industry-academia collaboration and tripartite cooperation among industry, government, and academia, afforestation and tree adoption are implemented. Additionally, investments in blue carbon and seed conservation and breeding are utilized to remove carbon from the atmosphere while promoting biodiversity benefits.

In 2023, Winbond was invited to participate in the launch ceremony of the Taiwan Carbon Solution Exchange (TCX)'s foreign emission reduction quota trading platform. This indicates the company's active participation in the international carbon trading market to address the carbon neutrality demands in corporate operations, creating diverse sustainable benefits. Such participation not only helps reduce carbon emissions but also contributes to climate change, biodiversity, and employment opportunities.



4.4 Water Resource Management

Winbond’s main source of water is tap water supplied by the Taiwan Water Corporation, sourced from the Liyutan, Deji and A Gong Dian Reservoir. A small portion of the water comes from rainwater and air conditioning condensate. Following the water shortage issue in 2021, Winbond has secured stable natural water sources. Moreover, the factory is equipped with a 75,000-cubic-meter underground water reservoir, sufficient to support factory operations during water scarcity or restriction crises. In 2022, Winbond received a "B" rating in water security assessment by CDP.

In 2023, Winbond's total water consumption was approximately 4,356,250 cubic meters. Metric for measuring water intensity per product unit, Winbond averaged 170 liters of water usage to produce one 12-inch wafer photomask layer. Compared to 134 liters per layer in 2022, there was a YoY increase of about 26.9% in water usage per product. This increase is primarily attributed global economic deterioration in 2023, leading to lower demand, and the water demand during the trial production phase of the new factor. As the new factory has not yet reached economic scale, there is still a need for a certain scale of water usage, resulting in an increase in water consumption. Winbond will continue to optimize the efficiency of its water recycling system and enhance water usage efficiency.

- Water Resource Risk Assessment:**

Winbond conducts water resource risk assessments using the Aqueduct Water Risk Atlas tool developed by the World Resources Institute (WRI). Through analysis using the Aqueduct website, Winbond incorporates Taiwan's water resource distribution to understand that all operational sites in Taiwan are located in areas with low water resource pressure risk.

- Rainwater and Condensate Water - Diverse Alternative Water Sources**

Rainwater and condensate water can serve as alternative water sources that can be effectively utilized to reduce environmental impact on water resources. Winbond primarily uses rainwater and condensate water for irrigation and secondary water usage, with a total consumption of 1.83 million cubic meters in 2023.

Water Withdrawal, Discharge, and Consumption (Unit: million cubic meters / year)			2021	2022	2023	
			Taiwan Region	Taiwan Region	Taiwan Region	Subsidiary
Water Withdrawal	By sources	Tap water (third-party)	3,293	4,131	4,356	396
		Total Water Withdrawal	3,293	4,131	4,356	396
Water Discharge	By end using	Wastewater treatment plant (third-party reprocessing)	2,318	3,172	2,924	317
		By treatment				
	Third treatment	2,318	3,172	2,924	-	
	Secondary treatment	-	-	-	317	
		Total Water Discharge	2,318	3,172	2,924	317
Water Consumption	Total Water Consumption		975	960	1,432	79
	Change in water storage		0	0	0	0

Note 1: Winbond's water withdrawal comes from tap water provided by third-party suppliers and does not include surface water, groundwater, seawater, or produced water. The third-party water source consists of surface water (freshwater with total dissolved solids ≤ 1,000 mg/L). The total water withdrawal is calculated as the sum of surface water (total), groundwater (total), seawater (total), produced water (total), and third-party water (total).

Note 2: 2023 inclusion of subsidiary statistics (Nuvoton) from consolidated financial statements



Water Resource Conservation and Reuse

The medium to long-term goal for water resource management is to achieve a water recycling rate of over 80% annually by 2030. In 2023, the total water recycling volume reached 13.15 million cubic meters, with a factory-wide water recycling rate of approximately 82.2% and a process water recycling rate of about 90.1%. These figures comply with the environmental assessment commitments of the Science Park (factory-wide water recycling rate exceeding 77% and process water recycling rate exceeding 85%).

Water Conservation Measures

Winbond continues to increase the reuse rate of recycled water, implementing 6 new water-saving measures in 2023, resulting in an increased water savings of approximately 390,000 cubic meters. The cumulative water savings from 2019 to 2023 amounted to about 4,000 million liters, equivalent to 0.8 times the effective capacity of the Baoshan Reservoir.

Implementation of ISO 46001

In 2023, Winbond adopted ISO 46001, with the CTSP Fab obtained certification in January 2024, and the Kaohsiung Fab expected to achieve certification in the latter half of 2024. Through the ISO 46001 Water Efficiency Management Systems, Winbond effectively manages the relevant risks associated with water resource supply, measures and monitors water resource usage, improves overall performance, and reduces water consumption to minimize environmental impact.

Implementation of ISO 14046

Winbond obtained ISO 14046 Environmental Management - Water Footprint certification in 2021, enhancing its water resource management system.

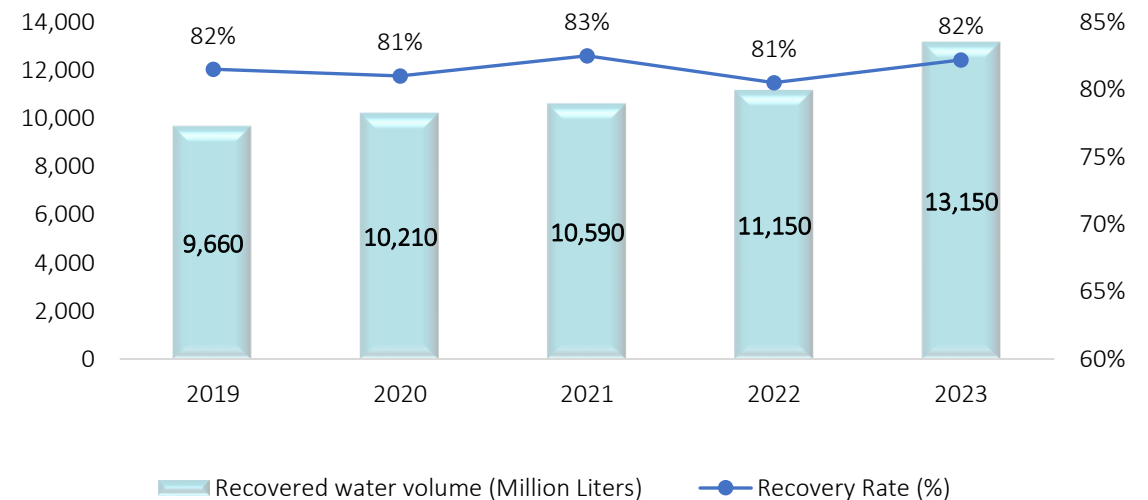


2023 Water Conservation Measures (Unit : megaliters/year)

	Water Conservation Measure	Explanation	Water Conserved
1	Water-saving of UPW (Ultra-Pure Water) System	Water consumption parameters adjusted for production machines	210.6
2	SW water saving for exhaust gas treatment equipment	Adjustment for exhaust gas treatment equipment	125.3
3	Water-saving and drought-resistant measures during water restriction periods	Reduction of cooling tower discharge water volume and increase in wastewater treatment system recovery capacity	31.9
4	Optimization of external air conditioning box water washing system	Installation of water-blocking plates to reduce splashing losses in washing equipment	20.4
5	Optimization and improvement of condensate water recovery in Gas Yard evaporator	Improvement of evaporator air-cooled de-icing system to enhance recovery of ice-condensed water	1.9
6	Optimization of fire system environmental pipeline leak prevention	Reduction of water leakage rate by improving environmental pipeline damage in fire system	0.3

Note: The scope of water-saving measures is limited to the Taiwan fab area.

Annual Water Recovery Progress



4.5 Green Investment & Financing

Green Investment & Sustainability-Linked Loan

The whole world is facing the impact of climate change. As one of Taiwan’s intensive electronics industry, we set up a green investment management unit to achieve the goal of green investment and create long-term value for investors and shareholders.



The Finance Department assesses and submits relevant proposals to the board of directors for resolution

Assess the environmental, social and governance risks of investment projects, ensure that projects meet sustainable development goals, and make sustainable investment decisions

In 2022, Winbond carried out a comprehensive renewable energy usage plan for the future electricity consumption of the enterprise itself, and had an in-depth understanding of the status of various types of renewable energy industries and whether they could be applied to Winbond’s electricity usage. Apart from establishing on-site solar photovoltaic systems to create a renewable energy source, Winbond has also invested in the renewable energy development company, CHIA-HO Green Energy Co., Ltd., in 2022, to participate in solar photovoltaic field development, marking a significant first step towards a net-zero emissions pathway.

Winbond successfully completed its first renewable energy procurement in 2023, with an estimated annual generation of nearly 10 million kwh of renewable energy. This surpasses the electricity consumption of Winbond non-production facilities within Taiwan service locations. By taking practical actions, Winbond contributes to mitigating climate change and simultaneously enhances the company’s operational resilience.

Green Energy Investment



NT\$9.55 billion renewable energy investment plan

Cumulative investments in renewable energy development from 2022 to 2023, continuing collaboration and communication with green industry suppliers.

In May 2022, Winbond acquired 15% equity in CHIA-HO Green Energy Corporation for NT\$555 million, whose main business is to develop solar energy fields. Considering that its parent company, Taiwan Cement Corporation, has valuable practical experience in the renewable energy industry. It will bring positive benefits to Winbond in fulfilling its corporate sustainable development goals, and help Winbond obtain part of the renewable energy electricity needed to move towards net-zero emissions goals.

In November 2023, Winbond announced its participation in the joint establishment of Kai-Hong Energy Co., Ltd., with an investment of NT\$400 million. Kai-Hong Energy’s primary business involves investing in solar power generation and wind power generation infrastructure projects in Taiwan. Winbond’s involvement in this joint venture not only aligns with the global and Taiwan 2050 net-zero goals, but also demonstrates its proactive engagement in green energy development. Apart from contributing to the company’s net-zero emissions target through renewable energy, Winbond is progressively fulfilling its commitment to sustainable development.

As of April 2024, the Board of Winbond has approved a cumulative NT\$955 million in renewable energy investment plan. Going forward, Winbond will continue to seek suitable targets for green energy investment, laying the foundation for achieving net-zero emissions goal.



International Voluntary Carbon Credits



A total of 13,500 tCO₂e carbon credits have been obtained since 2022 from voluntary carbon credit projects in 9 countries across Asia and Africa, creating diverse sustainable benefits

In response to the global carbon neutrality trend and the 2050 net-zero goal, Winbond not only joined Singapore's global carbon exchange Climate Impact X (CIX) in 2022 and continued to participate in international carbon trading, but also became one of the first international carbon credits purchasers on Taiwan Carbon Solution Exchange (TCX) in 2023. By the end of 2023, Winbond had cumulatively obtained 13,500 metric tons of voluntary carbon credits from 9 countries in Asia and Africa.

The carbon credits obtained by Winbond are issued by international independent organizations such as Verra or Gold Standard. These credits cover various areas, including nature conservation, high-efficiency stoves, clean water sources, solar power generation, and wind power generation. The goal is not only to offset the company's own carbon emissions through carbon trading but also to achieve diverse sustainable benefits, such as protecting terrestrial and marine ecosystems, restoring water-related ecosystems, promoting investment in energy infrastructure and clean energy technology, and respecting the rights of local residents. Winbond's carbon credit projects align with 16 out of the 17 United Nations Sustainable Development Goals (SDGs).

While focusing on the semiconductor industry, Winbond also dedicates continuous and stable resources to participating in global carbon reduction initiatives, contributing to the sustainable survival and development of our planet.

Sustainability-Linked Loan



Achieve sustainability indicator performance

Winbond signed a NT\$20 billion Sustainability-Linked Loan in April 2023, incorporating specific sustainability indicators such as carbon reduction, power saving, and corporate governance into condition assessments, regularly checking the performance of actual sustainability indicators, and connecting the performance to interest rate reduction. In June 2023, the bank confirmed that Winbond has achieved the annual sustainability indicator performance, and the interest reduction conditions would be applied to subsequent drawdowns until the next annual review time. Winbond also regularly tracks the achievement of various indicators within the company to ensure the implementation of sustainable actions and move towards the goal of sustainable finance together with the banking group.

Sustainability Fixed Deposits

In response to the international sustainability trend, Winbond has progressively engaged in sustainable development time deposits with banks since 2023, with a minimum deposit period of at least 3 months. The funds are lent by the bank to other companies for use in green financing projects that comply with regulations or to support green industries such as investments and financing for renewable energy or solar power plants. Winbond's participation in diverse channels of sustainable finance further demonstrates its commitment to sustainable development.



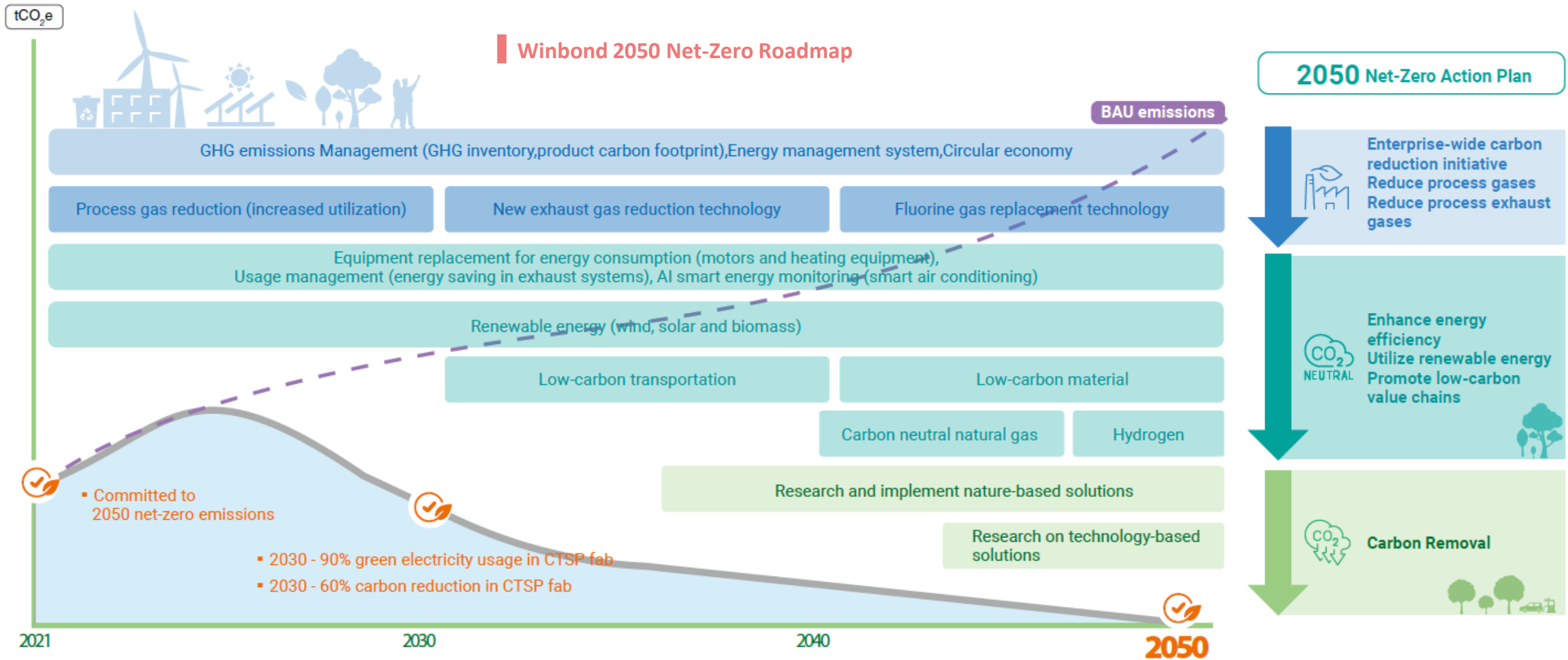
5. Metrics and Targets

5.1 Towards Net Zero Emissions



2050 Net-Zero Action Plan

To steadily advance towards sustainability, Winbond has combined its corporate sustainability strategy and ethos to establish short-term (by 2030), medium-term (by 2040), and long-term (by 2050) net-zero goals. Additionally, Winbond has developed a roadmap to achieve net-zero emissions by 2050 and is undertaking comprehensive actions towards achieving net-zero emissions by 2050



5.2 Climate-Related Management Metrics

The introduction of the TCFD management framework and publication of TCFD report allows Winbond to assess our operational resilience in the face of climate issues. In the future, we will continue to track and monitor our climate management metrics so that we can pursue corporate growth while also working to support and protect the environment and society so that we can realize our corporate vision of “Be a hidden champion in providing sustainable semiconductors to enrich human life”.

Category	Metric	2023	2024 Short-term Goal	2030 Mid- & Long-Term Goal
Green Products	mass production of 1.2V HyperRAM	Utilizing compact packaging such as 49BGA and WLCSP to mass production ^{NOTE 1}	Customer side’s energy-saving and carbon reduction >33% ^{NOTE 2}	Carbon emission of product life cycle reduced 20% ^{NOTE 3}
	mass production of 3V SpiNOR RV series	The RV series produced 34% less GHG emissions than the 90nm DV series	Carbon Reduction reaching 350K tCO ₂ e ^{NOTE 4}	Carbon reduction reaching 110K tCO ₂ e ^{NOTE 4}
Sustainable Supply Chain	Low Carbon Supply Chain	Cumulative emission reduction reaching 63,000tCO ₂ e	-	<ul style="list-style-type: none"> 10% (Based on 2021) 2050 Net-Zero
	Completion rate of the first phase of conducting supplier sustainable-related risk assessments	100%	100%	100%
	Completion and usage rate of establishing a carbon emission standard data exchange module	Completion rate 60%	Completion rate 100%	Utilization rate 100%
	Completion and usage rate of planning an internal green logistics system and green products manufacturing system	Completion rate 60%	Completion rate 100%	Utilization rate 100%
Environment Sustainability	Emission reduction of Greenhouse Gas	Increased 17.4% ^{NOTE 5}	YoY decrease ≥ 5%	YoY decrease ≥ 5%
	Total power saving	4.2%	2~3%	>2~3%
	Usage/proportion of renewable energy	2,100K kWh of electricity	-	The CTSP Fab use 90% renewable energy by 2030.
	Reduction of electricity usage per unit product	Increased 22.8% ^{NOTE 5}	YoY decrease ≥ 1%	YoY decrease ≥ 1%
	Water Recycling Rate throughout the sites.	82.2%	≥ 80%	≥ 80%
Climate Change Risk	Interruptions to business operations caused by climate disasters (day)	0 day	0 day	0 day

Note 1: The 128Mb~512Mb products were mass-produced in 49BGA package, and the 1.2V/128Mb products were mass-produced in WLCSP (Wafer-Level Chip-Scale Package).

Note 2: This calculation was based on 25nm 1.2V/128Mb HyperRAM product.

Note 3: Calculations were based on the entire range of dynamic random-access memory (DRAM) products including the process evolution.

Note 4: Calculations were based on the entire range of flash memory products including the process evolution.

Note 5: The challenge in meeting targets was linked to the global economic recession in 2023, resulting in decreased production capacity. Furthermore, the Kaohsiung Fab not yet attained economies of scale, contributing to elevated average electricity consumption and emissions per unit product.



Appendix

About this Report

Winbond Electronics Corporation has implemented Task Force on Climate-related Financial Disclosures (TCFD) framework as the foundation of Winbond's mitigation and adaptation measures to evaluate climate risk and opportunity, and to enhance the operational resilience.

Paperless operations are promoted by Winbond to save energy. This report therefore continues the tradition of being published in an electronic format on the Winbond website.

The scope of information of Winbond disclosed in this report covers from January 1, 2023, to December 31, 2023. The report boundary includes Taiwan headquarter's office and factory.



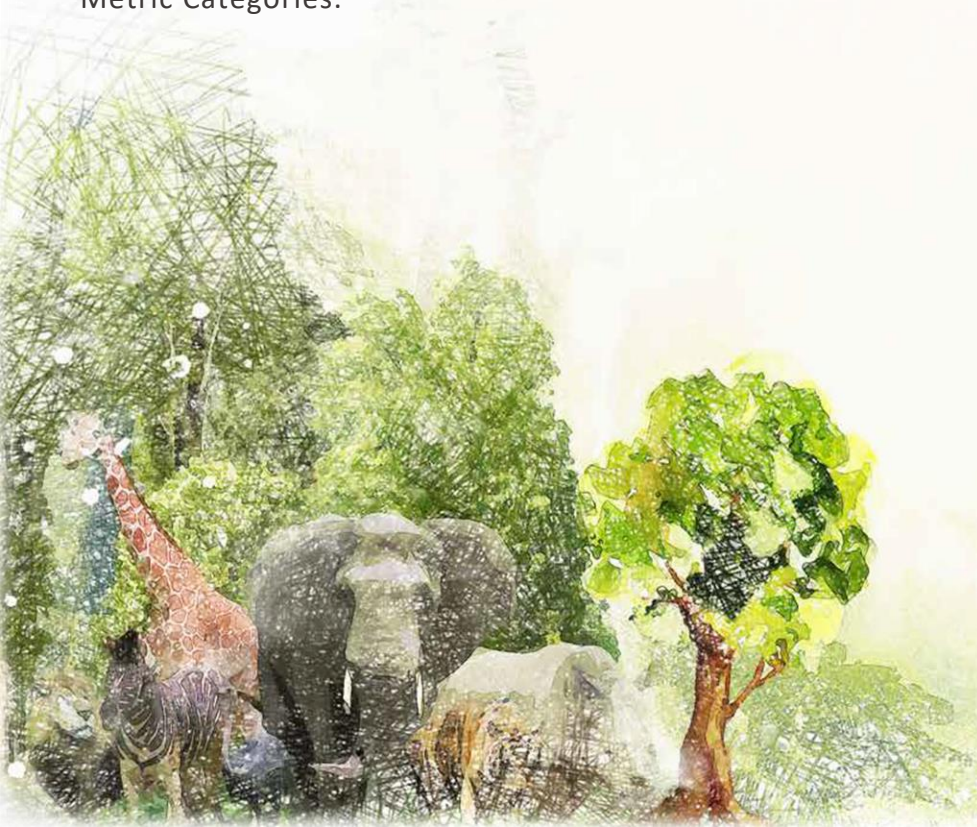
Appendix 1. TCFD Indicator Reference Table

Core Element	TCFD Recommended Disclosure	Corresponding Chapter <i>in this Report</i>	Page
Governance	Board of Directors' oversight of climate-related issues	1. Climate Governance	4~7
	Role of management in assessing and managing climate-related issues	1. Climate Governance	4~7
Strategy	Identification of short, medium, and long-term climate-related risks and opportunities	2.3 Climate Risk/Opportunity Matrix	11
	Impact of climate-related risks and opportunities on business, strategy, and financial planning	2.4 Impacts of Major Climate Change and Responses	12~14
	Scenario analysis, including a 2°C or more extreme scenario	3. Scenario Analysis	15~16
Risk Management	Process for identifying and assessing climate-related risks	2.1 Risk Management Framework 2.2 Procedures for Identifying Climate Change Risks and Opportunities	8~9 10
	Process for managing climate-related risks	2.1 Risk Management Framework 2.2 Procedures for Identifying Climate Change Risks and Opportunities	8~9 10
	Integration of identification, assessment, and management processes into overall risk management system	2.1 Risk Management Framework 2.2 Procedures for Identifying Climate Change Risks and Opportunities	8~9 10
Metrics and Targets	Metrics used to assess climate-related risks and opportunities within the framework of strategy and risk management processes	5. Metrics and Targets	30~31
	Disclosure of Scope 1, Scope 2, and Scope 3 (if applicable) greenhouse gas emissions and related risks	2.3 Climate Risk/Opportunity Matrix 4.3 Energy and Greenhouse Gas Management	11 23~24
	Management targets and associated performance metrics	4. Mitigation and Adaptation Measures 5. Metrics and Targets	17~29 30~31

IFRS S2 Climate-related Disclosures

In June 2023, the International Financial Reporting Standards (IFRS) officially launched the IFRS S1 and S2 to sets out the standards of sustainability-related financial information disclosures and climate-related disclosures, respectively. The Financial Supervisory Commission announced to adopt the standards directly in the same year and required the companies with capital of more than NT\$10 billion should disclose the information in the 2026 annual shareholder meeting published in 2027.

To be in line with international standards in advance, Winbond quoted the relevant standards in the 2023 TCFD report and disclosed seven cross-industry, climate-related Metric Categories.



APPENDIX 2 IFRS S2 Index on Cross-industry, Climate-related Metric Categories

Metric Category	Metrics	Page
Greenhouse Gas Emissions	Total Greenhouse gas emissions and reduction (tCO ₂ e)	24~25
	Unit Greenhouse gas emissions (average greenhouse gas emissions per layer of photomask for 12-inch wafer production)	24
Transition Risks	Percent of renewable energy electricity (%)	23、28
	Reduction of electricity usage per unit product (%)	23、31
Physical Risks	Number of production days interrupted by climate disasters	31
	water usage per product (average water usage per layer of photomask for 12-inch wafer production)	26
Climate-related Opportunities	Refer to the Chapter 2.4 : Impacts of Major Climate Change and Responses	11、14
Capital Deployment	The investments related to Mitigation and Adaptation Measures , including but not limited to:	18~19
	• Development of high-performance, compact, low-power, high quality and security green products	20~22
	• Low carbon supply chain management	23
	• continued to implement energy conservation measures, including equipment replacement, improving product efficiency and reducing product energy, usage reduction, process optimization, smart energy saving and new machine design	28~29
Remuneration	• Green energy investment and obtained international voluntary carbon credit	
Remuneration	Refer to the Chapter 1.1 : Climate Organizational Framework	5



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