SUSTAINABLE PRACTICES

Environmental Sustainability

Winbond has worked with the world to implement green sustainability measures, proactively reducing the impact that our business operations have on the environment. Apart from having no major violations of environmental laws, Winbond has also committed innovative new technologies and significant resources into adopting measures for reducing energy consumption and greenhouse gas emissions, improving resource utilization rates, and improving waste and emissions management, taking concrete action to implement our sustainable development blueprint.

2023 Performance Highlights

Introduced and implemented Energy Management System **ISO 50001**

Cumulative energy savings of 456 million kWh
From 2019 to 2023, a total of 456 million kWh of energy has been saved, approximately equivalent to the annual electricity consumption of 130,136 households.

98% Reduction rate of volatile organic compounds

4,000 megaliters of water saved
From 2019 to 2023, a cumulative water saving of 4,000 megaliters.

ISO 46001 & ISO 14046 Introduced
Implemented ISO 46001 Water Efficiency Management Systems and ISO 14046 Environmental Management - Water Footprint.

Cumulative reduction of 2.28 million tCO_2e
Since 2006, participating in the Taiwan and World Semiconductor Council's perfluorocarbon greenhouse gas emissions reduction program, along with company-wide emission reduction activities.

The Fab-wide water recovery rate reached 82.2%
Amount of water recycled reached 13.15 million cubic meters of all factories, reaching 82.2% of the water recovery rate.

90. 9% Recycling rate
12,361 metric tons waste recycled, with a recycling rate of 90.9%.

3.1 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.

3.1.1 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.

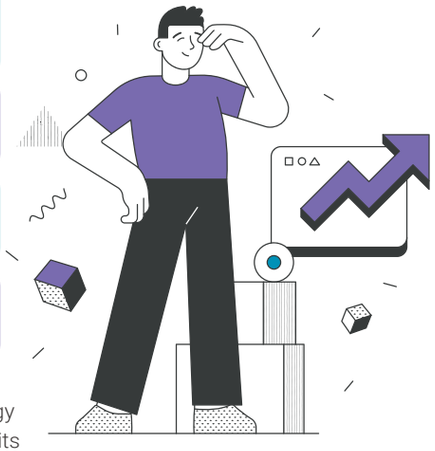
Wen-Hua Lu

Vice President, Memory IC Manufacturing Business Group

Risks are also opportunities. We provides abundant resources to stabilize the supply chain and continuously explore business models that create value for our customers. Through product and process innovation, Winbond hopes to establish long-term and sustainable win-win relationships with our customers.

Winbond adheres to the commitment of "environmental sustainability, and value creation" and focuses on four aspects of environmental sustainability: (1) Energy and greenhouse gas management, (2) Water resource management, (3) Waste management, and (4) Air pollution control. Through continuous improvement, we have achieved a series of positive outcomes and benefits in these areas.

1. **Energy and Greenhouse Gas Management：** Through technological innovation and efficiency improvement, we control energy consumption and actively participate in monitoring and reducing greenhouse gas emissions.
2. **Water Resource Management：** Measures such as water conservation and recycling are implemented to protect and utilize water resources sustainably.
3. **Waste Management：** Waste reduction, classification, and recycling measures are adopted to minimize the negative impact on the environment.
4. **Air Pollution Control：** Emissions are controlled, and process technologies are improved to minimize the impact on the atmospheric environment.



Winbond continues to invest in environmental stewardship, ensuring the implementation of the development strategy for sustainable environment. The Company, through specific environmental management indicators, demonstrates its commitment and efforts in promoting a sustainable environment. We look forward to working hand in hand with you to build a better future.

3.1.1.1 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.

Energy use and energy intensity for each product unit

Item	Unit	2021	2022	2023	
		Taiwan Region	Taiwan Region	Taiwan Region	Subsidiary
Purchased Electricity (Excluding Renewable Energy)	GJ	1,988,490	2,479,988	2,592,983	258,670
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	35
Total Energy Consumption	GJ	2,234,839	2,807,178	2,958,834	269,202

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 CO_2 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 calories = 4.184 joules.
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.
3. 2023 data includes consolidated financial information from subsidiary companies (Nuvoton).

3.1.1.2 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 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_2e)
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.
2. The CO_2 emissions coefficients for electricity is 0.495 KG CO_2e / kWh.

3.1.1.3 Energy Conservation Case Studies

Smart Energy Saving

Trilogy of Smart Chilled Water Systems Upgrade : The chilled water system equipment is equipped with variable frequency control; to expand and establish a temperature database, with additional temperature sensors; and introduce AI data prediction models to optimize the overall system operation. The energy-saving rate is approximately 8.4%, equivalent to saving approximately 9.96 million kWh of electricity per year.

Smart chillers

Intelligence Ice Machine: Optimized Installation

- Variable Frequency Control for Water Pump and Cooling Water Fan

Automated Flow Control

Adding frequency converters

Smart Air Conditioning

Smart Air Conditioning: Establishment of Data Database

- Adjust Water Temperature of Chillers With Data Feedback

Automated temperature control

Database Establishment with sensor feedback

AI Smart Air Conditioning

AI Smart Air Conditioning: Introduction of AI Data

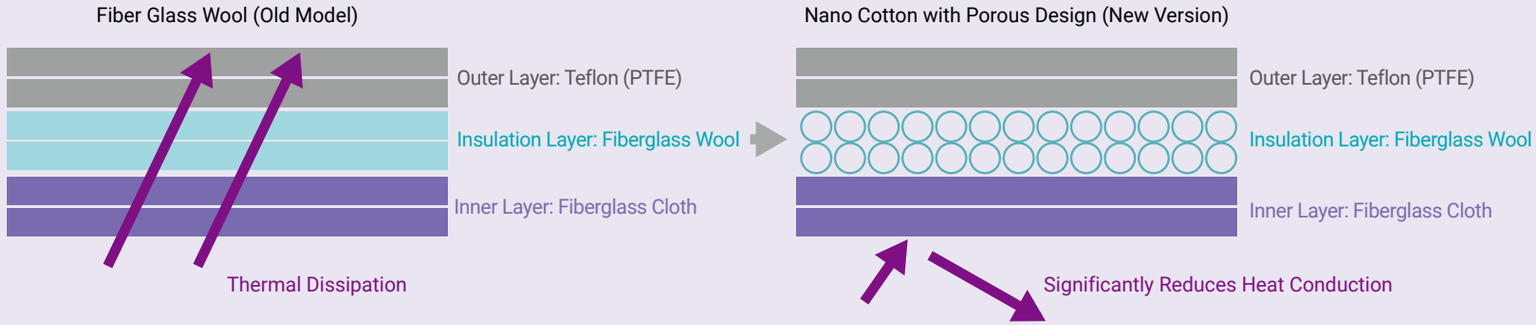
- Implemented AI Data Predictive Parameter Model to Smart Chillers Operation

AI model prediction

Data import for model training

Energy-saving Heating Equipment

In semiconductor manufacturing processes, it is common to operate in a vacuum environment. To maintain the cleanliness of vacuum pipelines and prevent the accumulation of contaminants on the pipe walls, heating tapes are used to maintain the temperature of the vacuum lines. Prolonged temperature maintenance can result in significant energy consumption. Winbond has recently adopted the latest nano-energy-saving heating tape, which modifies the insulation layer material to achieve better insulation efficiency. This change has substantially reduced energy consumption by 43%, equivalent to saving approximately 620,000 kWh annually.



3.1.2 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.

3.1.2.1 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_2e)			
	2020	2021	2022	2023
Carbon Dioxide (CO_2)	14,279	14,721	19,709	21,444
Methane (CH_4)	68	70	86	97
Nitrous Oxide (N_2O)	17,348	3,859	3,976	3,980
Hydrofluorocarbons (HFCs)	3,129	3,243	3,368	2,527
Perfluorocarbons (PFCs)	11,621	12,860	13,071	11,631
Sulfur Hexafluoride (SF_6)	3,919	964	1,252	1,269
Nitrogen Trifluoride (NF_3)	2,907	3,043	2,911	3,201

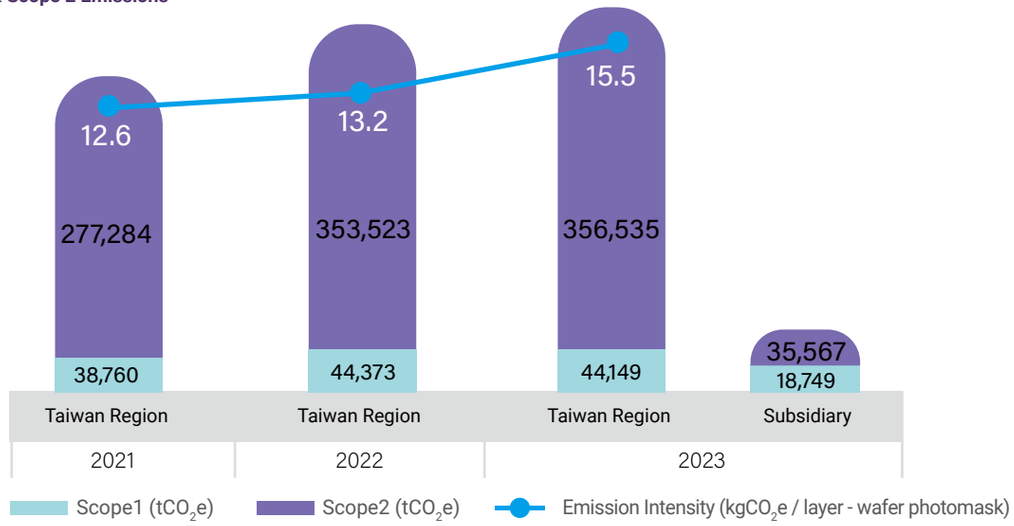
- **Scope 3 Emissions Source List**

Type	Item	Scope 3 Emissions (tCO_2e)
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 CO_2e, compared to 13.2 Kg CO_2e 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.

Scope 1 & Scope 2 Emissions



Note
1. In response to greenhouse gas reduction and control, the 2023 report boundary has been expanded to include the subsidiary (Nuvoton) in order to have more complete emission data. Therefore, the baseline year for the greenhouse gas inventory is tentatively set as 2023.
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).
3. Greenhouse gases include nitrous oxide (N_2O), methane (CH_4), carbon dioxide (CO_2), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), nitrogen trifluoride (NF_3), etc.
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.
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.
6. Values for 2023 are estimated values, as the emissions factor of electricity for 2023 has not yet been announced.
7. The data from the consolidated financial statements of subsidiaries (e.g., Nuvoton) was incorporated in 2032 data

3.1.2.2 Greenhouse Gas Reduction

- Greenhouse Gas Reduction Strategy

Winbond's primary greenhouse gas emissions come from fluorocarbons (FCs) used in processes and purchased electricity, which together account for over 90% of Scope 1 and Scope 2 greenhouse gas emissions. Therefore, Winbond's key greenhouse gas reduction strategies include direct reduction of FC emissions (process improvements, installation of exhaust treatment equipment), along with indirect reduction through energy efficiency and the use of renewable energy sources. In the future, Winbond intends to advance a range of carbon reduction initiatives and enhance energy efficiency. Additionally, Winbond aims to establish a Carbon Emission Information Platform to integrate and manage carbon emission data, achieving green and low-carbon production. Winbond also supports the Science Based Targets initiative and plans to use 90% renewable energy at CSTP and reduce greenhouse gas emissions by 60% by 2030. By 2050, Winbond aims to achieve net-zero emissions.

- Implementation Action Plan

Winbond is committed to the concept of green semiconductor manufacturing. It focuses on process improvements to reduce greenhouse gas usage, accelerating the replacement of energy-saving components in equipment, installing exhaust treatment equipment, implementing energy-saving projects for production equipment and facilities, using renewable energy, and reducing the consumption of gas and chemical raw materials. The additional projects implemented in 2023 cover Scope 1, Scope 2, and Scope 3 emissions, resulting in a further emissions reduction of 25,743 tCO_2e annually, equivalent to 67 times the annual carbon sequestration by the Da'an Forest Park.

Note Based on data from the Forestry and Nature Conservation Agency and the Taipei City Government's Department of Land Administration, Da'an Forest Park covers 25.93 hectares and has a carbon fixation rate of 14.9 tCO_2e per hectare per year. As a result, the park contributes to the annual absorption of approximately 386 tCO_2e.

- Reduction of Fluorinated Greenhouse Gases

Since 2000, Winbond has participated in the Perfluorocarbons (PFCs) greenhouse gas emission reduction program led by the Taiwan Semiconductor Industry Association (TSIA) and the World Semiconductor Council (WSC). Through process adjustments, alternative gas usage, and the installation of PFCs reduction equipment, Winbond has reduced greenhouse gas emissions by approximately 180,000 tCO_2e in 2023. This reduction helps mitigate climate risks, enhances Winbond's ability to adapt to climate change, improves industry competitiveness, and creates value.

- Indirect Greenhouse Gas Emission Reduction from Transportation

In order to reduce the number of times that our employees would need to drive from our Zhubei Building to our CTSP Fab (in Central Taiwan Science Park), Winbond has arranged for a public transport shuttle bus that makes 6 trips a day between the Zhubei Building and our CTSP Fab on working days. Winbond has encouraged our employees to use this shuttle bus as much as possible. Our CTSP Fab also provides shuttle bus services to our engineering assistants (with routes to the Taichung city center, and with routes heading both north and south), allowing our engineering assistants to use these shuttle buses for their work commute and reducing fuel consumption and air pollution.

- Indirect Greenhouse Gas Emission Reduction from Employee Lifestyle

To reduce emissions generated from employee activities, Winbond has replaced conventional rolled toilet paper with centrally dispensed toilet paper that is Forest Stewardship Council (FSC) certified. This change reduces pulp consumption by approximately 48%, not only lowering greenhouse gas emissions but also ensuring sustainable forest management and biodiversity preservation.

3.2 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 Withdrawl, Discharge, and Consumption (Unit: Megaliters / year)			2020	2021	2022	2023	
			Taiwan Region	Taiwan Region	Taiwan Region	Taiwan Region	Subsidiary
Water Withdrawal	By sources	Tap water (third-party)	3,633	3,293	4,131	4,356	396
	Total Water Withdrawl		3,633	3,293	4,131	4,356	396
Water Discharge	By end using	Wastewater treatment plant (third-party reprocessing)	2,417	2,318	3,172	2,924	317
	By treatment	Third treatment	2,417	2,318	3,172	2,924	-
		Secondary treatment	-	-	-	-	317
	Total Water Discharge		2,417	2,318	3,172	2,924	317
Water Consumption	Total Water Consumption		1,216	975	960	1,432	79
	Change in water storage		0	0	0	0	0

Note
1. Winbond's water withdrawl 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 withdrawl is calculated as the sum of surface water (total), groundwater (total), seawater (total), produced water (total), and third-party water (total).
2. 2023 inclusion of subsidiary statistics (Nuvoton) from consolidated financial statements.

- 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 megaliters in 2023.

3.2.1 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 megaliters, 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

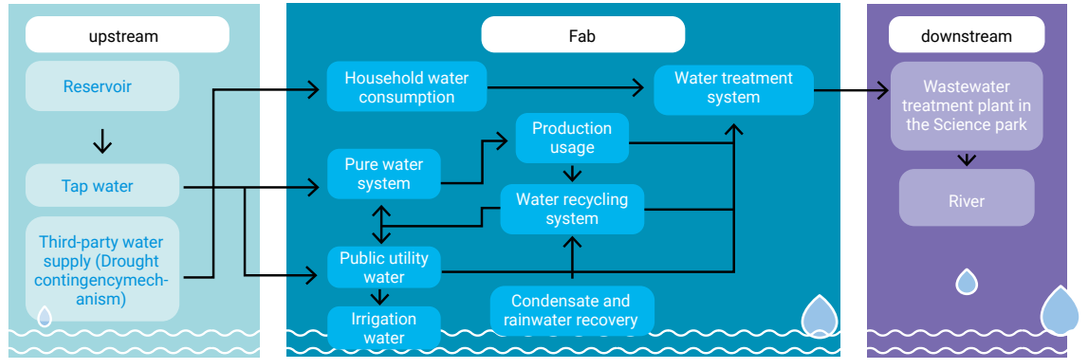
Winbond obtained ISO 14046 Environmental Management - Water Footprint certification in 2021, enhancing its water resource management system.

- **2023 Water Conservation Measures (Unit：megaliters/year)**

Item	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

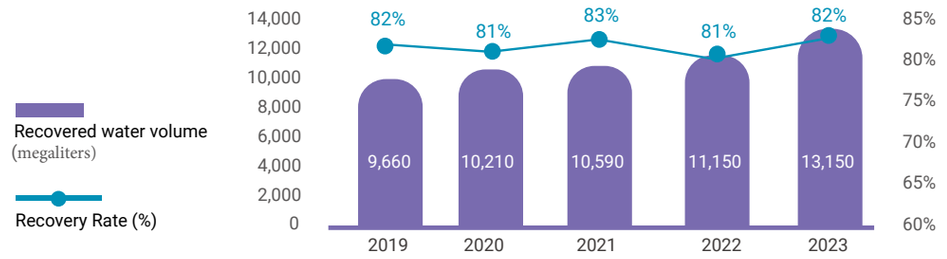
Note The scope of water-saving measures is limited to the Taiwan fab area.

Site Water Usage Process



Note Public utility water includes the following: cooling tower circulating water and central/local scrubber circulating water.

Annual Water Recovery Progress

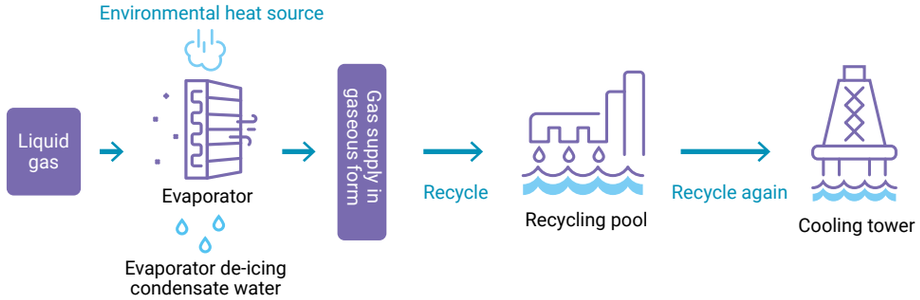


Note Fab water recovery rate= (Recycled Condensate + Recycled Process Water + Recycled Reclaimed Wastewater) / (Tap Water + Recycled Condensate + Recycled Process Water + Recycled Reclaimed Wastewater -Evaporation).

3.2.2 Water Conservation Case Study

Condensate Water Recycling Optimization

As semiconductor manufacturing processes evolve, the consumption of water resources during production gradually increases, making the rational management of water resources an urgent issue. Winbond is committed to achieving water conservation through various measures. By harnessing the characteristic of liquid gas to convert into gas through the heat absorption reaction in the evaporator, an evaporator gas-cooled de-icing system (pneumatic fan) is added to effectively recycle the ice-condensed water back to the cooling tower for reuse. This system can save 1,900 tons of tap water annually, significantly reducing the use of water resources.



Process Water Conservation

Winbond actively enhances water resource efficiency through "optimization." When process machines are idle, they continue to slowly drain water to maintain cleanliness. By optimizing machine parameters, the flow of drainage is reduced. During the manufacturing process, innovative approaches are employed to reduce cleaning time and adjust the flow of cleaning water. For continuous cleaning stations, cleaning procedures are simplified to reduce the overall amount of water used in cleaning. This results in an annual saving of 210,600 tons of tap water, reducing water resource consumption and wastewater discharge.

3.2.3 Water Pollution Prevention

- **Wastewater Treatment Facility**

During the initial design phase, operations wastewater is collected through up to 20 different pipelines to standardize water quality. Subsequently, 11 major wastewater treatment facilities are constructed based on the characteristics of the wastewater. To reduce environmental burden and chemical usage in the wastewater treatment facilities, plans are made for the treatment and recycling of wastewater from washing towers, cooling towers, process cooling, and process soft water. After treating the recycled wastewater, it is supplied for secondary water use within the plant.

- **Discharge Water Quality Testing**

In accordance with relevant regulations on water pollution prevention and control, as well as Soil and Groundwater Pollution Control Act, discharge permits are applied and operations are set up accordingly. This involves conducting tests twice a year at laboratories accredited by environmental inspection agencies to ensure that the discharged water quality meets the standards set by the industrial park management. Additionally, efforts are continuously made to improve related water pollution control facilities to reduce biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), and sludge reduction. The testing data for BOD, COD, and SS in 2023 were all superior to the water quality standards set by the Central Taiwan Science Park Bureau and the Southern Taiwan Science Park Bureau.

Winbond's 3 major principles for plant wastewater treatment

Reducing amount of wastewater produced in the production process

Separating and treating wastewater

Establish appropriate treatment facilities based on the nature of the wastewater produced.Properly treat wastewate through various treatment systems, until wastewater reaches CTSP Sewage System Water Quality Standards.

Wastewater is discharged into the CTSP Sewage Treatment Plant, where water is treated again until it reaches water quality standards for discharge.

Final discharge

- Water from the CTSP is released into the Dadu River.
- Water from the Kaohsiung Science Park is released into the Tuku Canal

Recycling and reuse

Wastewater produced by the wafer fabrication process: Trreat the acidic and alkaline wastewater, fluoridated wastewater, wafer planarization wastewater, ammonia nitrogen wastewater, tetramethylammonium hydroxide wastewater, copper wastewater, and hydrogen peroxide wastewater produced during the wafer manufacturing process.

Wastewater produced by employee day-to-day lifestyle activities: Treated through membrane bio-reactor (MBR)

- **Discharged Water Quality**

Influence Standard/Threshold Value (mg/L)		Chemical Oxygen Demand	Suspended Solids	Biochemical Oxygen Demand
CTSP Fab	CTSP Influent Standard (mg/L)	500	300	300
	Measured in first half of 2023	92.2	47.4	53.4
	Measured in second half of 2023	19.2	11.8	7.8
Kaohsiung Fab	Kaohsiung Science Park Influent Standards (mg/L)	450	250	250
	Measured in first half of 2023	317	64	1.0
	Measured in second half of 2023	365	32.4	1.0

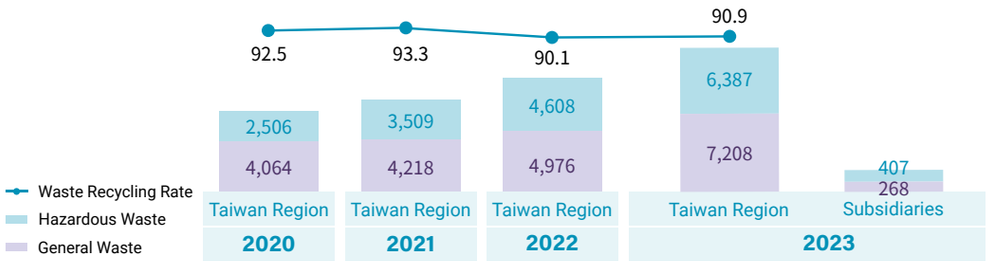
3.3 Waste Management

To ensure the proper and safe disposal of waste generated during operations, Winbond has established waste management procedures and conducts regular and irregular audits. By reducing or reusing waste and increasing recycling rates, Winbond aims to minimize the environmental impact caused by pollution. In 2023, Winbond's waste output was approximately 13,595 metric tons, with an average waste output of about 0.531 kilograms per layer mask for 12-inch wafers; all hazardous industrial waste is processed by qualified domestic waste treatment facilities.

▪ Waste Production, Disposal, and Transfer (Unit: Metric Tons)

Item		2020	2021	2022	2023	
		Taiwan Region	Taiwan Region	Taiwan Region	Taiwan Region	Subsidiary
General waste	Recycling	3,960	4,137	4,784	7,030	93
	Incineration	97	76	185	172	108
	Landfilling	0	0	0	0	67
	Chemical treatment	7	5	7	6	0
	Waste generated	4,064	4,218	4,976	7,208	268
	Recycling rate	97%	98%	96%	98%	35%
Hazard-ous waste	Recycling	2,119	3,074	3,849	5,331	387
	Incineration	384	432	756	1,054	19
	Landfilling	0	0	0	0	0
	Solidification	3	3	3	2	1
	Waste generated	2,506	3,509	4,608	6,387	407
	Recycling rate	85%	88%	84%	83%	95%
Total Recycling Rate		92.5%	93.3%	90.1%	90.9%	71%

▪ The long-term goal for waste management is by 2030 to achieve a waste recovery rate of 90% annually for the Taiwan Fabs. In 2023, the waste recovery volume amounted to 12,361 metric tons, resulting in a waste recovery rate of 90.9%.



Note
1.Waste output was reported according to waste cleaning regulations.
2.All waste produced within Winbond was directly handled by qualified external disposal facilities, without direct disposal on-site.
3.Waste recycling was aimed at material reuse.
4.2023 inclusion of subsidiary statistics (Nuvoton) from consolidated financial statements.

3.4 Air Pollution Control

▪ **Source Reduction and Efficient Treatment**

Winbond's air pollution prevention strategy starts with reducing emissions at the source. Process improvements are used to reduce the amount of pollutants generated to a reasonable level. Pollutants in the missions are then treated with high-performance control equipment to ensure that atmospheric emissions exceed government standards for pollutant content. All past measurements found that Winbond emissions were all lower than EPA emission standards.

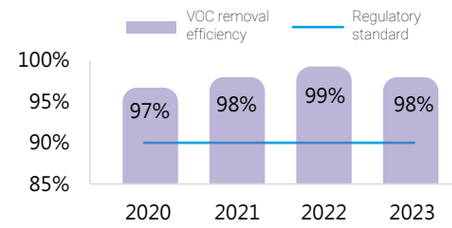
▪ **Proper Treatment, Exceeding Regulatory Standards**

Winbond has installed local scrubber equipment for certain hazardous, flammable, FCs and PFCs emissions from our production processes. These emissions go through absorption and incineration treatment processes before being delivered to the central scrubber to be washed and have their organic acids and alkaloids neutralized. Emissions that contain volatile organic compounds are sent directly to the zeolite rotor for absorption before being treated by vertical incinerators. In 2023, the average removal rate of VOC emissions reached 98%, exceeding regulatory requirements.

▪ **Real-time Monitoring, Stable Operation**

Our air pollution prevention system can be immediately switched to a backup system in an emergency or during maintenance. They are equipped with emergency power backup systems as well as an advanced real-time monitoring system that tracks changes in the system's operating parameters 24 hours a day. An alert is immediately sent if a pre-set threshold is exceeded for immediate action to ensure reliable and continuous operations 24 hours a day, 365 days a year. The effective treatment of air pollutants conforms with the relevant regulations of the "Air Pollution Control and Emissions Standards for Semiconductor Industry" and the "Standards for Air Pollutant Emissions from Stationary Pollution Source."

▪ Air Polluting Emissions (Unit: Metric Tons)



▪ Air Polluting Emissions (Unit: Metric Tons)

Item	2020	2021	2022	2023
NOx	12.06	10.89	12.18	13.65
SOx	0.45	0.42	0.47	0.54
VOCs	4.8	4.22	4.26	4.3

Note The emission volume of gases is reported according to local regulatory requirements.

3.5 Green Investment

▪ Environmental Protection Investment

Winbond adheres to the principle of green manufacturing, incorporating carbon emission reduction as an important goal. Starting from the research and development stage, Winbond aims to become an advocate for green products by optimizing processes and introducing zero-carbon emission technologies. With its core capabilities, Winbond strives to achieve a significant green impact. Each year, Winbond allocates environmental protection funds for investing in and maintaining hardware and software equipment related to the environment. Projects include improving and enhancing air pollution control, water pollution prevention, and waste management. In 2023, a total of NT$ 942 million were invested in environmental protection measures, accounting for approximately 2.51% of the annual revenue, to continuously reduce environmental impact.

▪ Environmental Investment (Unit: NT$ 1000)

Expense Type	Expenditure Items	2020	2021	2022	2023
New installation of pollution control/treatment equipment	Air pollution control equipment	95,355	3,500	388,432	315,616
	Water pollution control equipment	2,900	23,600	440,803	58,108
Operation and maintenance of pollution control equipment	Air pollution control equipment	93,889	98,582	129,979	127,846
	Water pollution control equipment	113,214	162,020	259,322	284,495
Waste disposal costs	General industrial waste	34,558	33,839	40,390	72,953
	Hazardous industrial waste	32,833	56,697	75,029	82,793
Total		372,749	378,238	1,333,955	941,811
Revenue (Individual)		39,649,875	57,532,802	51,139,171	37,561,043
Ratio to Revenue (Total Expenses / Revenue)		0.94%	0.66%	2.61%	2.51%

▪ Economic Benefits of Environmental Investment

The economic benefits derived from environmental protection investments are significant. In 2023, the economic benefits of investing in environmental protection amounted to approximately NT$ 439 million.

▪ Economic Benefits of Environmental Investment (Unit: NT$ 1000)

Cost Categories	Item	2020	2021	2022	2023
Revenue	Waste recycling	8,100	6,008	6,324	5,786
Saving	Energy-saving measures	170,500	189,780	329,639	419,553
	Water-saving measures	7,512	10,594	9,180	13,243
Total economic value creation		186,112	206,382	345,143	438,581