2. Environmental Sustainability

Winbond has worked alongside countries and companies from around 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 carbon emissions, improving resource utilization rates, and improving waste and emissions management, taking concrete action to implement our sustainable development blueprint.

2022 Performance Highlights

- Cumulative electricity savings of **380 GWh** from 2018 to 2022
- The power generation capacity of the rooftop renewable energy equipment in CTSP Fab reached **660,000 kWh**
- GHG emissions per layer of wafer photomask was **13.2** (kg CO_2e/ layer- wafer photomask)
- Electricity consumption per layer of wafer photomask was **82** (MJ/ layer - wafer photomask)
- Water withdrawal per layer of wafer photomask was **134** (liter/ layer - wafer photomask)
- Cumulative water saving of **3,530** megaliters from 2018 to 2022
- The water recovery rate of the whole plant reached **80.5%**
- Waste recycling rate reached **90.1%**
- Removal rate for VOCs in 2022 reached **99%**

2.1 Energy and Greenhouse Gas Management

2.1.1 Energy Management

Our use of raw materials/fuel has increased in recent years due to the building of new facilities and the addition of new equipment. In 2022, Winbond consumed approximately 2,807,178 GJ of energy. In view of these figures, Winbond has continued to implement energy conservation measures in 2022, changing 21 pieces of equipment in order to conserve more energy, including: Utilizing smart air conditioning, and optimizing the Make-up Air Unit (MAU) air washer system. In 2022, our Central Taiwan Science Park (CTSP) Facility obtained ISO 50001 energy management systems certification, effectively standardizing the facility's management processes and allowing it be managed by our engineering units. Our Kaohsiung Fab is also planned to undergo ISO 50001 certification, with the hopes of expanding the scope and benefits of our energy management operations. Amount of electricity saving increased about 129,229 GJ compared to 2021. In 2022, the average electricity consumption per layer of photomask for 12-inch wafers was 82 MJ. Compared to the 79.3 MJ consumed in 2021, electricity consumption per product unit increased by approximately 3.4% YoY (MJ/layer - wafer photomask). Compared to our target of 80.1 MJ for 2022, electricity consumption per product unit was higher by approximately 2.4% YoY (MJ/layer - wafer photomask). This was due to the global economic deterioration in 2022 leading to lower demand, in turn causing the average electricity consumed to produce one product unit to slightly overshoot our target levels. In the future, Winbond shall continue to promote energy conservation plans to reduce the burden on the environment.

From 2018 to 2022, a total of 1,366,906 GJ of electricity was conserved, equivalent to the annual electricity consumption of 108,361 households

Note This figure is based on the Taiwan Power Company's 2018 statistics, which showed that average annual electricity consumption for one household was 3,504 kWh, approximately12.6 GJ.

— Target Achievement Progress —

Indicators and Targets	2022 Targets	2022 Achievements
Electricity Intensity (MJ/layer - wafer photomask)	≦ 80.1	82
Electricity Intensity (kWh/layer - wafer photomask)	≦ 22.26	22.76

— Energy conserved in previous years —

Total energy conderved/Year	2018	2019	2020	2021	2022
Accumulated electricity-conserving measures (individual sets)	201	208	219	227	248
Total electric ity saved each year (GJ)	227,556	234,244	243,201	266,338	395,567
Total electricity saved each year (million kWh)	63.2	65.1	67.6	74.0	109.9

— 2022 Energy-Conserving Measures and Outcomes —

Type	Energy-saving/Carbon Reduction Project	Energy Savings (kWh)	Energy Savings (GJ)	GHG Emission Reduction (tCO_2e)
Lighting	Replacement of LED lighting equipment in mechanical areas of the facility	49,801	179	25
	Replacement of LED lighting equipment in the office areas	17,928	65	9
Facility Equipment	Smart air conditioning	2,270,518	8,174	1,156
	Optimization of the MAU air washer system	499,084	1,797	254
	Enhanced the plate heat exchanger efficiency of UPW (Ultra-Pure Water) and PCW (Process Cooling Water) system	589,641	2,123	300
	Replacing heating units of machinery in fab	516,932	1,861	263
	Energy-saving improvements for exhaust systems	623,506	2,245	317
	Optimization of VOC system operation	83,665	301	43
	Optimization of bulk gas purifier regeneration	53,586	193	27
	Optimized the loading of PCW(Process Cooling Water) system	39,841	143	20
	Water and energy saving of UPW(Ultra-Pure Water) system	1,594	6	1
	Improved water production rate of RO system	79,681	287	41
	Optimization of compressor dryer units	896	3	0.5
	Reduction of exhaust emissions from VMB and gas cabinets	490,040	1,764	249
	Energy-saving for air conditioning in the cleanroom of testing production	81,673	294	42
	Motor upgrades for soft water system	730	3	0.4
Total		*5,399,116*	*19,438*	*2,748*

Note 1 2021 used as the base year.

— 2022 Results of Energy-Conserving Designs Implemented in Kaohsiung Fab —

Type	Name of energy-conservation/carbon reduction project	Energy Savings (kWh)	Energy Savings (GJ)	GHG Emission Reduction (tCO_2e)
Fab construction	Waste heat recovery from the hot purified water heat pump system	8,488,000	30,557	4,320
	Waste heat recovery for air compressor dryers	54,750	197	28
	High-efficiency boilers	9,855,000	35,478	3,230
	Increasing the outlet temperature of the chilled water system to save energy	10,444,110	37,599	5,316
	Energy-saving LED lighting	1,656,000	5,962	843
Total		***30,497,860***	***109,793***	***13,737***

Note

1.The energy-saving design of the new fab was based on the CTSP Fab as the reference.

2.The GHG reduction of the high-efficiency energy-saving boiler project was the comprehensive calculation result of electricity saving and natural gas usage.

— Energy use and energy intensity for each product unit —

Energy intensity/year	2020	2021	2022
Total energy consumption (GJ)	2,207,442	2,234,839	2,807,178
Energy consumption per unit (MJ/layer - wafer photomask)	90	89.1	92.2
Electricity usage (GWh)	546	552	689
Total electricity consumption (GJ)	1,966,533	1,988,490	2,479,988
Electricity consumption per unit (MJ/layer - wafer photomask)	80.1	79.3	82.0
Percentage of total electricity usage (%)	89.1	89.0	88.3
Natural gas usage (ten thousand cubic meters)	636	654	854
Total natural gas usage (GJ)	236,788	242,327	314,966
Natural gas usage per unit (MJ/layer - wafer photomask)	9.7	9.7	10.9
Percentage of total natural gas usage (%)	10.7	10.8	11.2
Diesel usage (cubic meters)	54	55	285
Total diesel usage (GJ)	1,899	1,934	10,023
Diesel usage per unit (MJ/layer - wafer photomask)	0.1	0.1	0.1
Percentage of total diesel usage (%)	0.1	0.1	0.4
Automotive gasoline/diesel usage (cubic meters)	68	64	67
Automotive gasoline/diesel usage (GJ)	2,221	2,088	2,200
Automotive gasoline/diesel usage per unit (MJ/layer - wafer photomask)	0.1	0.1	0.1
Automotive gasoline/diesel usage as percentage of total energy consumption (%)	0.1	0.1	0.1

Note

- Winbond has not used renewable energy.
- Energy usage has been converted into joules 1 kWh of electricity = 3,600 kJ, 1 cubic meter of natural gas = 8,809 kcal, 1 liter of diesel = 8,400 kcal, 1 liter of gasoline = 7,800 kcal, 1 calorie = 4.184 joules
- Standards, methodology, assumptions, and/or tools used: All energy usage information comes from meter readings, the natural gas monthly consumption statement and the requisition form/item number inventory change record checklist. These tables contain no estimates.
- Source of conversion factors: Apart from natural gas, which had been calculated using the caloric values provided by the supplier, all other conversion factors were based on the Environmental Protection Agency's Table of Greenhouse Gas Emissions Coefficients Version 6.0.4.
- Data for the Kaohsiung Fab was added in 2022. Additionally, as the Kaohsiung Fab is newly-established and just began operations, it has not been included in this year's calculation of energy consumption per product unit.

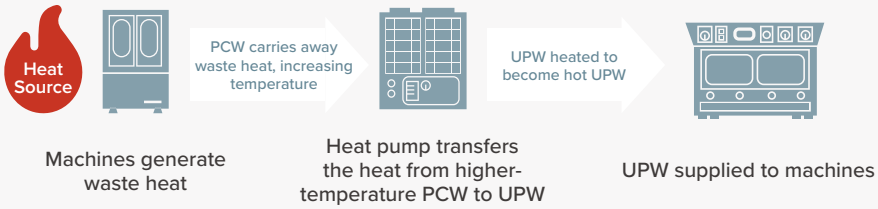
Investment into Renewable Energy

In response to local government renewable energy policies, Winbond has installed a 499 kW rooftop renewable energy generation system in 2019. **In 2022, the system generated 660,000 kWh of electricity**, and all electricity generated each year is sold to the Taiwan Power Company, contributing to Taiwan's push for renewable energy.

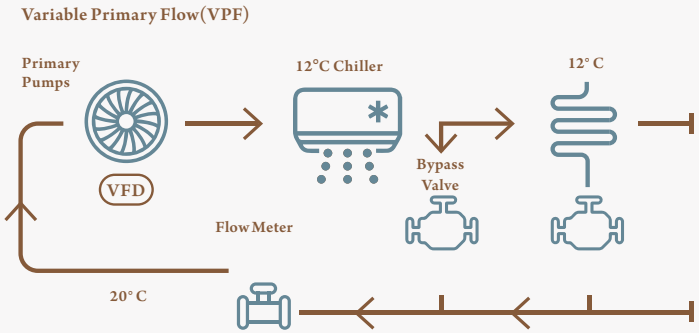
Energy-conserving Design of Kaohsiung Fab

1. Winbond Electronics' Kaohsiung Fab incorporated numerous energy-conserving designs in its initial design. The facility is able to conserve large amounts of energy through methods such as recycling waste heat, using LED lights instead of traditional light bulbs, and adopting energy-conserving chiller designs.

2. Waste heat recovery from hot ultra-pure water heat pump: Waste heat generated by the process cooling water (PCW) is recovered. A heat pump is used to heat the UPW, which is then supplied to the equipment.



3. Increased outlet water temperature of chilled water system: The temperature of water output by the chiller was increased to 12℃, increasing power-saving efficiency compared to the previous temperature of 9℃.



2.1.2 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 plant 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 carbon reduction targets, looked for opportunities to reduce emissions, and proposed improvement plans. In 2022, Winbond conducted ISO 14067 carbon footprint inventory of a portion of our IC products in 2022, gradually improving our greenhouse gas reduction results.

In 2022, Winbond completed ISO 14067 carbon footprint inventory and verification of a portion of our IC products.

— 3 Major Components of Winbond's Greenhouse Gas Emissions —

Scope 1 **Direct GHG emissions**	Includes the greenhouse gases emitted during the production process (hydrofluorocarbons, perfluorocarbons, perfluorochemicals, nitrogen trifluoride, nitrous oxide, methane, and carbon dioxide), and greenhouse gases produced from burning fuels (such as: natural gas, petrol, and diesel), and the fugitive emissions from treated organic waste gases, septic tanks, high and medium-voltage panels, and firefighting equipment.
Scope 2 **Energy indirect GHG emissions**	From electricity purchased indirectly.
Scope 3 **Other indirect emissions**	Scope 3 includes other indirect greenhouse gas emissions, including emissions from production of the raw materials used, IC outsourcing package measurement service, and from transporting goods.

Additionally, Winbond has from 2000 onwards participated in the perfluorocarbons (hereinafter referred to as PFCs) emissions reduction projects organized by the Taiwan Semiconductor Industry Association and the World Semiconductor Council. Through adjustments to our manufacturing process, using other gases as a substitute, installing fluorocarbons (hereinafter referred to as FCs), reducing equipment, and obtaining 285,771 tCO_2e of the EPA's preliminary carbon reduction credits, Winbond has reduced our greenhouse gas emissions and lowered the risk of the impact of climate changes on Winbond. This has improved our ability to adapt to climate change and our competitiveness in the industry, creating new opportunities and allowing us reduce

our energy consumed per product unit by approximately 4.8% YoY (MJ/Layer - wafer photomask) in advance before total caps on carbon emissions are introduced.

Progress on Our Greenhouse Gas Emissions Strategies and Targets

Most of Winbond Electronics greenhouse gas emissions are derived from the FCs and purchased electricity used in our manufacturing process, making up over 94% of our total Scope 1 and Scope 2 greenhouse gas emissions. Therefore, our main targets are to reduce direct emissions of FCs (including by increasing utilization rates in our manufacturing process and installing exhaust gas treatment equipment) and reduce indirect emissions by conserving electricity. Winbond use the amount of average greenhouse gases emitted to produce one 12-inch wafer photomask layer as a metric for measuring our greenhouse gas intensity per product unit. In 2022, Winbond emitted 13.2 kilograms of carbon dioxide equivalents per layer, which is approximately a 4.8% YoY increase (kilogram of carbon dioxide equivalent/Layer - wafer photomask) in carbon emissions per product unit compared to the 12.6 kilograms of carbon dioxide equivalents emitted in 2021. This is due to the global economic downturn in 2022 leading to lower total production capacity, which in turn had caused carbon emission per product unit to rise. Compared to our target of 13.3 kilograms of emitted carbon dioxide equivalents for 2022, the actual amount emitted was lower by 0.8 YoY.

— Target Achievement Progress —

Indicators and Targets	2022 Targets	2022 Achievements
Intensity of greenhouse gas emissions for each product unit (One kilogram of carbon dioxide equivalent/Layer - wafer photomask)	≦ 13.3	13.2

Note

- Carbon reduction targets are split into those for Scope 1 and Scope 2.
- Tier 2b calculation methods have been used to calculate the direct emissions produced by the manufacturing process in the greenhouse gas inventory report.
- The Kaohsiung Fab was newly-established and began operations in 2022, so it has not been included in this year's calculations of greenhouse gas emissions intensity per product unit.

— GHG Emissions Overview (Unit:metric tons of carbon dioxide equivalent, tCO_2e) —

Indicators and Targets	2020	2021	2022
Scope 1	53,271	38,760	44,373
Scope 2	278,046	277,284	353,523
Scope 3	-	-	443,204
Total Emissions	331,317	316,044	841,100
Emission Intensity (Scope 1 and Scope 2) (kilogram of carbon dioxide equivalent/ Layer - wafer photomask)	13.5	12.6	13.2

Note

- In order to reduce and manage greenhouse gas emissions, Winbond has in 2020 adopted the PFCs tracking system for production process gases, using this system to differentiate between the gases used by each production process. Winbond also changed our greenhouse gas emissions calculation method from Tier 2a to Tier 2b, with the hope of being able to produce more precise emissions information. The baseline year for greenhouse gas inventory is temporarily set as 2020, where carbon emissions were 331,317 metric tons of CO_2e.
- The Global Warming Potential (GWP) used in this table comes from the "IPCC Fourth Assessment Report (2007)".
- The types of greenhouse gases include N_2O, CH_4, CO_2, HFCs, PFCs, SF_6, NF_3, etc.
- Standards, methodology, assumptions and tools used: 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.
- The emission factors used are mainly based on the recommendations in the EPA's latest version of GHG emission factors, and the uncertainty data for emission factors were used as reference. To assess the uncertainty in activity data, Winbond used the technical specifications of the measuring instrument as the basis for our assessment.
- Values for 2022 are estimated values, as the emissions factor of electricity for 2022 has not yet been announced.
- New data for the Kaohsiung Fab was added in 2022. Additionally, as the Kaohsiung Fab is newly-established and only began operations in 2022, it has not been included in this year's calculations of greenhouse gas emissions intensity per product unit.

— List of Scope 1 Emissions Sources (Unit:metric tons of carbon dioxide equivalent, tCO_2e) —

Types	Scope 1 emissions
Carbon Dioxide (CO_2)	19,709
Methane (CH_4)	86
Nitrous Oxide (N_2O)	3,976
Hydrofluorocarbons (HFCs)	3,368
Perfluorocarbons (PFCs)	13,071
Sulfur Hexafluoride (SF_6)	1,252
Nitrogen Trifluoride (NF_3)	2,911

— List of Scope 3 Emissions Sources List (Unit:metric tons of carbon dioxide equivalent, tCO_2e) —

Types	Scope 3 emissions
Greenhouse gas emissions indirectly derived from transportation	4,494
Greenhouse gas emissions indirectly derived from product usage	438,710

Winbond continues to promote various carbon reduction plans and increase resource utilization rates. In 2022, Winbond reduced our emissions by 260,898 tCO_2e, equivalent to 676 times the annual carbon reductions achieved by the Da'an Forest Park. (Based on data published by the Forestry Bureau of the Council of Agriculture Executive Yuan and the Department of Land Administration of the Taipei City Government: 25.93 hectares, when calculated based on a carbon fixation rate of 14.9 tCO_2e /hectare/year, Da'an Forest Park absorbs 386 metric tons of carbon dioxide a year). Additionally, in order to reduce the number of times that our employees would need to drive from our Zhubei Building to our Central Taiwan South Park facility, Winbond has arranged for a public transport shuttle bus that makes 6 trips a day between the Zhubei Building and our Central Taiwan Science Park Facility on working days. Winbond has encouraged our employees to use this shuttle bus as much as possible. Our Central Taiwan Science Park Facility 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.

In 2022, total greenhouse gas reductions were equivalent to 260,898 metric tons of carbon dioxide equivalent (tCO_2e)

— Greenhouse Gas reduction achievements (Unit:metric tons of carbon dioxide equivalent, tCO_2e) —

Reduction in greenhouse gas emissions/year	2020	2021	2022
Direct reductions in greenhouse gas emissions (Scope 1)	173,089	192,106	194,302
Indirect greenhouse gas emissions reductions from energy consumption (Scope 2)	34,386	37,139	55,928
Other Indirect greenhouse gas emissions (Scope 3)	-	-	10,668
Total reductions in greenhouse gas emissions	207,475	229,245	260,898

Note

- Greenhouse gas reductions have been calculated by comparing the differences between greenhouse gas emissions before and after carbon reduction programs for the year were implemented
- Carbon reduction measures adopted in past years helped us reduce carbon dioxide equivalent emissions by 260,898 tCO_2e in 2022
- Values for 2022 are estimated values, as the emissions factor of electricity for 2022 has not yet been announced
- Scope 3 emissions have been disclosed starting from 2022

2030 goal：Achieve 90% of electricity consumption as renewable energy in CTSP Fab.

Winbond's goal is to have the Central Taiwan Science Park (CTSP) Facility using 90% renewable energy by 2030, displaying our determination to work together alongside the rest of the world to achieve net zero carbon emissions. Currently, our CTSP Fab has already been installed with solar power generation, while evaluations for our Kaohsiung Fab are underway. In the future, Winbond shall make plans to collaborate with other companies to build new solar power projects and purchase T-RECs.

2.2 Resource Management

Winbond has maintained the principle of optimizing material/fuel use to reduce consumption, waste output, and greenhouse gas emissions. At the same time, production costs can be reduced, allowing us to reap both environmental protection and economic benefits.

2.2.1 Raw material management

Winbond regularly reviews the overall performance of Winbond's material reduction measures, and constantly adjusts the operating parameters of raw materials in order to optimize and minimize demand for raw materials. Apart from reducing pollution and the amount of waste produced, Winbond is also able to reduce our operating costs, creating a win-win situation. Due to the continuous addition of new plant equipment in the past three years, there has been a gradual increase in all raw materials usage, but Winbond has also continued to invest in improving the efficiency of raw material usage and making good use of every resource.

— Raw material usage —

Raw Materials/Energy	2020	2021	2022
12-inch wafers (Metric Tons)	84	86	80
Process Gas Usage (Metric Tons)	407	423	420
Process Chemical Usage (Metric Tons)	11,877	12,560	11,535
Plant Gas Usage (Million Cubic Meters)	217	222	219
Plant Chemical Usage (Metric Tons)	19,093	21,019	21,073

Note Recycled materials cannot be used due to the nature of Winbond products.

2.2.2 Water Usage

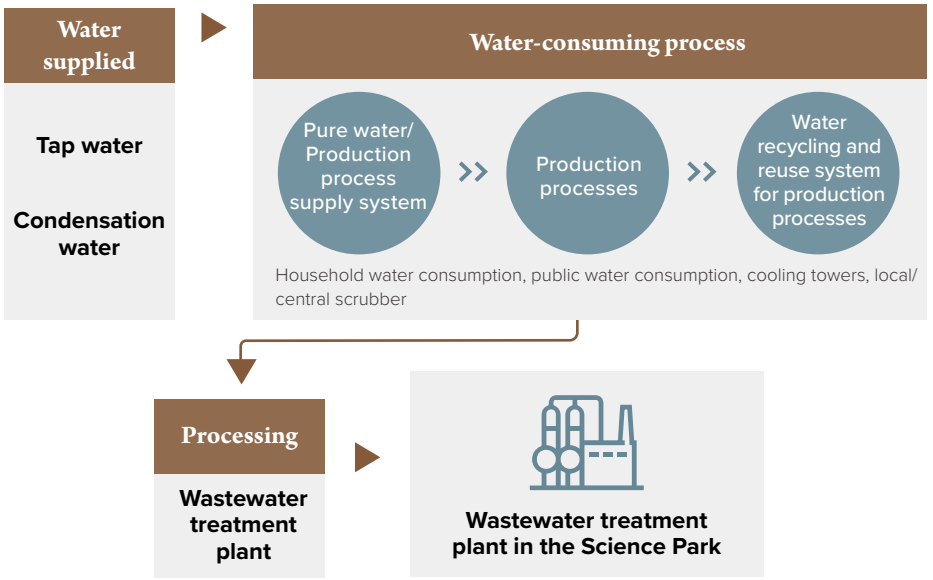
Water Risk Assessment

Winbond has employed the water risk assessment tool developed by the Water Resources Institute (WRI) and the Aqueduct Water Risk Atlas on the Aqueduct website to analyze Taiwan's water resource distribution. The analysis found that all of our operating locations in Taiwan are located in regions with low water resource risk.

Winbond's main source of water is tap water supplied by the Taiwan Water Corporation. Most of this water is supplied by the Liyutan, Deji, and A Gong Dian reservoirs, with a small part coming from rainwater and air-conditioning condensation. After the 2021 drought issues, Winbond has already developed other stable natural water sources. A 75,000 cubic meter underground reservoir has been built on-site at our plant, sufficient for supplying water to our plant operations in times of drought or water restrictions. In 2022, our total water consumption amounted to 4,130,000 cubic meters. Looking at our metric for measuring water intensity per product unit, Winbond averaged 134 liters of water usage to produce one 12-inch wafer photomask layer, meeting our target for 2022 (≤ 145 Liters/Layer - wafer photomask). In 2022, Winbond implemented 3 new water conservation measures that increased total water saved by approximately 64 megaliters.

In 2022, Winbond recycled 11.15 million cubic meters of water, achieving an **80.5%** recycling rate for all water used by our plant

— Site Water Usage Process —



Note Local Scrubber: Exhaust gas treatment equipment, Central Scrubber: Central waste gas scrubber

— 2022 Target Achievement —

Indicators and Targets	2022 Targets	2022 Achievements
Water consumption per product unit (liter/layer - wafer photomask)	≦ 145	134
Fab Water Recycling Rate (%)	≧ 80	80.5

Note Data for the Kaohsiung Fab was added in 2022. Additionally, as the Kaohsiung Fab is newly-established and just began operations, it has not been included in this year's calculation of water consumption per product unit.

— 2022 Water-Saving Measures (Unit: megaliters /year) —

Item	Water Conservation Measures	Explanation of Water Conservation Measures	Water Saving
1	**Water-saving measures for UPW used in production process**	Water consumption parameters adjusted for production machines	17.2
2	**Increased recycling rate for ROR systems**	Increase recycling rate for RO water production equipment	11.8
3	**Improve RO water production rates for UPW system**	Adjust system operation times, reducing amount of concentrated water discharged	35.3

— Water Withdrawal (Unit: megaliters) —

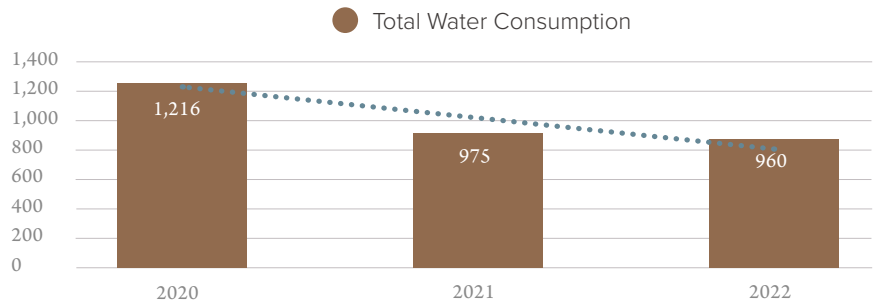
Water Resources Types		2020	2021	2022
Water withdrawal by source	**Third-party water**	3,633	3,293	4,131
	Total water withdrawal	3,633	3,293	4,131

Note Winbond uses tap water provided by a third-party. Winbond do not use surface water, ground water, seawater or discharge water. Our third-party water suppliers source water from surface water (fresh water with≤1,000 mg/L total dissolved solids). Total water withdrawal is calculated as the sum of surface water (total), ground water (total), seawater (total), discharge water (total), and third-party water (total) withdrawn.

— Water Consumption (Unit: megaliters) —

Water Resources Types	2020	2021	2022
Total Water Consumption	1,216	975	960
Change in water storage	0	0	0

Note Changes in water storage is calculated as the difference in total water storage between the start and end of the reporting period. The water storage tanks at our sites have a fixed capacity so there was no change.



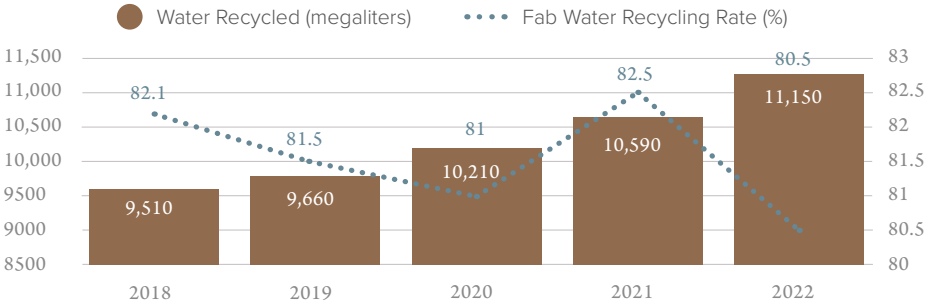
2.2.3 Water Recycling

Winbond continues to increase water recycling rates. In 2022, the overall plant recycled approximately 80.5% of its water and 89.3% of its process water (meeting the science park's commitment under the environmental impact assessment to recycle more than 77% of all water used, and more than 85% of all process water used). Winbond implemented 3 new water conservation measures in 2022 that increased total water saved by 64,000 cubic meters. Accumulated water savings between 2018 and 2022 has reached 3,530 megaliters, equivalent to 0.7 times the Baoshan Reservoir's capacity.

— Water Recycling Performance in Past Years —

Water Recycling Rate/ Year	2018	2019	2020	2021	2022
Water Recycled (megaliters)	9,510	9,660	10,210	10,590	11,150
Fab Water Recycling Rate (%)	82.1	81.5	81.0	82.5	80.5

Note Fab Water Recycling Rate= (Recycled Condensate + Recycled Process Water + Recycled Reclaimed Wastewater) / (Tap Water + Recycled Condensate + Recycled Process Water + Recycled Reclaimed Wastewater -Evaporation).



2.2.4 Wastewater Management

— Winbond's 3 major principles for plant wastewater treatment —

Reducing amount of wastewater produced in the production process ▶ **Separating and treating wastewater** ▶ **Recycling and reuse**

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

Wastewater produced by the wafer fabrication process:
Treat 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)

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.

Winbond's wastewater treatment facilities are designed to collect up to 20 types of waste liquids through separate pipelines standardizing wastewater quality. Each wastewater type is then treated through 11 distinct wastewater treatment facilities. Operating and discharge permits are applied for pursuant to the Water Pollution Control Act and the Soil and Groundwater Pollution Remediation Act. Testing is conducted by a laboratory accredited by the Environmental Analysis Laboratory twice a year to confirm that the discharge water quality satisfies CTSP's influent standards. Additionally, in order to reduce the environmental burden of the wastewater treatment facility, and to reduce the use of chemical products, Winbond also collect and treat waste liquids from the washing towers, cooling towers, process cooling water, and recycled soft water from production processes, reusing this treated waste liquid in secondary water applications throughout the site Apart from these measures, Winbond has continued to promote improvements to our water pollution prevention facilities, reduced our pollutant biochemical oxygen demand (BOD), chemical oxygen demand (COD), and the amount of suspended solids (SS) and sludge. Measured COD, SS and BOD values for 2022 were far below the CTSP influent standards.

— Discharged Water Quality (Unit: mg/liter) —

Influent Standard/ Threshold Value	Chemical Oxygen Demand	Suspended Solids	Biochemical Oxygen Demand
CTSP Influent Standard	500 mg/L	300 mg/L	300 mg/L
Measured in first half of 2022	33.8	29.2	33.8
Measured in second half of 2022	19.2	4.4	19.2
Kaohsiung Science Park Influent Standards	450 mg/L	250 mg/L	250 mg/L
Measured in first half of 2022	21.6	2.5	21.6
Measured in second half of 2022	46.8	59.2	46.8

— Amount of Water Discharged (Unit: megaliters) —

Item	Type	2020	2021	2022
Emissions by Destination	Total Surface Water Emissions	2,417	2,318	3,172
Emissions by Treatment Level	Total Emissions after Level 3 Treatment	2,417	2,318	3,172

Note Categorized by discharge destination, wastewater from Winbond was mainly discharged into surface water (fresh water ≤ 1,000 mg/L total dissolved solids).

2.3 Waste Management

Winbond ensures that waste generated during business operations is properly and safely disposed of pursuant to our Waste Disposal Management Procedures. Waste reduction, reuse and recycling are used to reduce the amount of waste generated by our plant in order to minimize pollution and environmental impact.

— Waste Management Process —

Waste sorting and collection > Storage management /control > Contractor removal /disposal > Waste recording and compilation > Reporting

Winbond generated approximately 9,584 metric tons of waste in 2022. Waste generated per layer of 12" wafer photomask averaged 0.000317 metric tons. 100% of hazardous industrial waste was disposed of through licensed domestic waste disposal organizations.

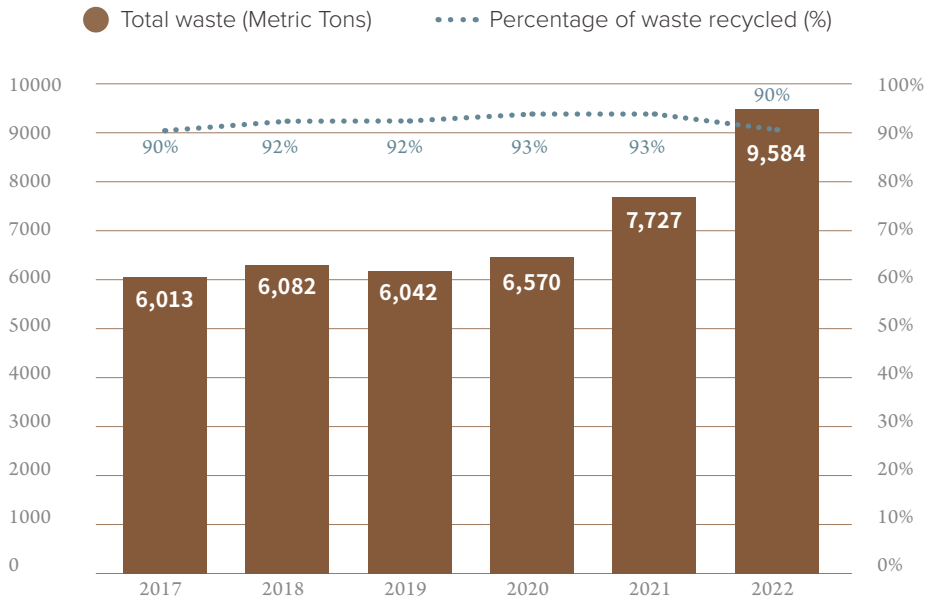
Winbond achieved a recycling rate of 90.1% with 8,633 metric tons of waste recycled, meeting our annual target of achieving a recycling rate above 90%.

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

Waste Composition		2020	2021	2022
General waste	Waste generated	4,064	4,218	4,976
	Recycling	3,960	4,137	4,784
	Incineration	97	76	185
	Landfilling	0	0	0
	Chemical treatment	7	5	7
Hazardous waste	Waste generated	2,506	3,509	4,608
	Recycling	2,119	3,074	3,849
	Incineration	384	432	756
	Landfilling	0	0	0
	Solidification	3	3	3
	Waste Recycling	6,079	7,212	8,633
Percentage of Hazardous Waste		38%	45%	48%

— Waste Recycling Rate (Unit: %) —

Year	2020	2021	2022
Total Waste Recycling Rate	92.5	93.3	90.1



Note

- The amount of waste generated is the value reported under waste disposal regulations.
- All waste generated by Winbond sites is removed for processing by qualified disposal organizations and none is processed directly on-site.
- Waste recycling refers to the recycling of waste materials for reuse.
- Data on waste materials produced by the Kaohsiung Fab was added in 2022, resulting in an increase to total waste materials. Additionally, as the Kaohsiung Fab is newly-established and just began operations, it has not been included in this year's calculation of waste materials produced per 12-inch wafer photomask layer produced.

2.4 Air Pollution Control

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.

Our average removal rate for VOCs in 2022 reached 99% and exceeded the relevant EPA regulations.

Emissions produced during Winbond's production process	Measures for preventing air pollution
General exhaust	General Exhaust is from machine cooling, does not cause air pollution
Acidic exhaust	Appropriate air pollution control equipment is installed to process each type of emission based on their characteristics.
Alkaline exhaust	
Volatile organic compounds	

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.

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 "Air Pollutant Emissions Standards for Stationary Pollution Source."

— Air Polluting Emissions (Unit: Metric Tons) **—**

Item	2020	2021	2022
NOx	12.06	10.89	12.18
SOx	0.45	0.42	0.47
VOC	4.80	4.22	4.26

2.5 Hazardous Substance Management

Winbond adheres strictly to international guidelines and standards such as the QC 080000 (Hazardous Substance Process Management System Requirements), RoHS Directive (EU Restriction of Hazardous Substances in Electrical and Electronic Equipment), REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), California Proposition 65, TSCA (Toxic Substances Control Act) and the Canada Convention. This ensures that the hazardous substance content of wafer, chip, and package IC products manufactured by Winbond satisfy international environmental regulations and the green product requirements of our customers, preventing environmental pollution and posing a threat to human health. Winbond has also drawn up the Hazardous Substances Control Regulations and set up a cross-department hazardous substance management team to oversee all product-related design, purchasing, production, and sales processes. Suppliers and subcontractors are additionally required to adopt green product requirements. Our ultimate goal is to supply customers with Hazardous Substance Free (HSF) products that meet their requirements. Winbond also focuses on fostering an awareness of environmental protection concepts in our employees. All employees (including new employees) have received Hazardous Substance Identification and Pollution Prevention Training, and the following principles are followed during research and development, purchasing, production, operations, and service provision to reduce the impact of our company operations on the natural environment and human beings:

1. **Reduce the resource and energy consumption of products and services.**
2. **Reduce emissions of pollutants, toxic substances and wastes; and properly dispose of the waste.**
3. **Improve the recyclability and reusability of raw materials or products.**
4. **Optimize the sustainable use of renewable resources.**
5. **Extend the durability of products.**

6. Enhance the effectiveness of products and services.

Winbond's HSF Policy commits us to the design, purchase, manufacture, and sale of hazardous substance-free products. Every effort is made to fulfill the Company's responsibilities as a corporate citizen through complying with international regulations, satisfying customers' requirements, and protecting the environment. Winbond has also separately established the Hazardous Substance Process Management System (HSPM), where management representatives convene a management review meeting every year to review and discuss policies, targets, regulations, audit outcomes and management performance in order to continuously improve the effectiveness of our hazardous substance management system.

Targets achieved in 2022

- No non-compliance issues related to hazardous substances monitoring have occurred
- 100% of Winbond personnel have completed hazardous substance training
- No non-compliance detected by customers' hazardous substance audits