

03 Green Production

3.1 Environmental Management 3.2 Climate Change Mitigation and Adaptation 3.3 Product Stewardship 3.4 Circular Economy 3.5 Disclosure of Product Environmental Impact

Material Topics of This Chapter	Climate Strategy and Risk Management	Greenhouse Gas and Energy Management	Waste Management	Product Stewardship
Corresponding GRI/SASB Indicators	none	GRI 302-1, 302-3, 302-4, 305-1~5, 305-7	GRI 306 -2, 306-3, 306-4, 306-5	GRI 416, TC-HW-410a.1~a.4
Policy Commitment	<ul style="list-style-type: none"> Mitigate the impacts on corporate operations from the worsening climate change and promote effective climate-related management and adaptation measures. The "Corporate Social Responsibility Best Practice Principles" explicitly states that the senior management is authorized by the Board of Directors to handle all environmental issues generated by the Company's business activities. 	<ul style="list-style-type: none"> Promote the "333 Reduction Plan" and set annual and long-term reduction goals. Annual organizational GHG inventories have been conducted since 2010 and we will continue to ensure compliance with the relevant FSC regulations for listed companies in the future. 	<ul style="list-style-type: none"> The treatment of all wastes, exhaust gases, and sewage generated by GIGABYTE complies with local laws and regulations. 	<ul style="list-style-type: none"> The "GIGABYTE Hazardous Chemical Substance Regulations (HCSR)" specifies that all products and services purchased by the Company must reduce their use or content of environmentally sensitive substances. All suppliers must evaluate their operations for compliance with REACH, RoHS, WEEE, and other relevant regulations. Set a target to cease all use of disposable packaging for Group products and incoming materials by 2030.
Action	<ul style="list-style-type: none"> The GIGABYTE Green Sustainable Development Committee serves as the highest body responsible for climate-related management topics. Inter-BU, inter-plant and inter-subsidary meetings are convened every one to two months. Respond to CDP climate change, water security, and supplier engagement rating questionnaires. Follow the recommendations of the Taskforce on Climate-related Financial Disclosures framework to carry out identification of climate-related risks as well as analysis of climate scenarios and resilience. Partner with Plant-for-the-Planet Foundation to voluntarily retire 2,500 tonnes of CER carbon quota every year between 2023-2027. 	<ul style="list-style-type: none"> Promote the "Sustainability Fund" and "Reduction Reward Program" to encourage internal energy conservation proposals Introduce ISO14064 greenhouse gas emission inventory. Introduction of Science Based Targets initiative (SBTi) analytical tools, review carbon reduction plans, and connect to international temperature control targets. Introduce fully automated intelligent production processes. 	<ul style="list-style-type: none"> Disposal in accordance with the local waste disposal regulations of the plant. Conduct regular on-site audits at waste contractors to ensure proper disposal of waste. 	<ul style="list-style-type: none"> Introduce IECQ QC 080000 hazardous substance process management certification. Refer to international laws and regulations and keep updating the GIGABYTE "Harmful Chemical Substances Requirements (HCSR)". Release the "Product Environmental Reports" to disclose the potential environmental impacts of a product during its life cycle. Define Group product packaging and incoming packaging reduction plan with each BU responsible for setting their own progressive reduction targets and strategy Continue to promote green logistics within the Company; evaluate the inclusion of green logistics certifications for suppliers to reduce scope 3 GHG emissions.
Tracking Mechanism	<ul style="list-style-type: none"> Participate in CDP every year to examine governance outcomes and ensure strategic alignment with international trends. Update climate risk scenario analysis every year based on the latest real-world data, current operating conditions, and market forecasts. 	<ul style="list-style-type: none"> Conduct regular ISO 14064 GHG inventory and verification. 	<ul style="list-style-type: none"> Declare waste in accordance with regulations. Conduct regular waste inventory. 	<ul style="list-style-type: none"> Present trends and changes in international environmental legislation during the quarterly meetings of the Green Sustainable Development Committee, and launch inter-department response plans in a timely manner. Conduct life cycle assessment for all key product lines released to the market every year. Planning and provision of global logistics and warehousing services by the Global Operations and Risk Management Center.
Stakeholder Engagement Actions and Effectiveness	<ul style="list-style-type: none"> Participate in and respond to CDP climate change, water security, and supplier engagement rating questionnaires. Release of TCFD report, and regular reporting of management outcomes through Sustainability Reports and the official website. 	<ul style="list-style-type: none"> Reporting of related information to government agencies in accordance with regulations Regular disclosure of reduction outcomes through the Sustainability Report and corporate website 		<ul style="list-style-type: none"> Publication of product environmental reports for all main product lines on the CSR website for stakeholders' reference. Conduct green logistics surveys for logistics providers.
Medium and Long-term Goals	<ul style="list-style-type: none"> Continue participating in the CDP to keep improving and urging climate management performance. Continue to track the latest developments in SBTi, TCFD, and so on to ensure climate change response and carbon reduction plans are aligned with international targets. 	<ul style="list-style-type: none"> Reduce carbon emissions by 50% in 2025 compared to the 2009 base year. Expand the scope of GHG inventory in accordance with Taiwanese regulations so that it is consistent with the financial statement. Set carbon reduction targets and strategies beyond 2026 based on conformity with the 1.5°C carbon reduction pathway. 	<ul style="list-style-type: none"> Reduce carbon emissions by 50% in 2030 compared to the 2010 base year. 	<ul style="list-style-type: none"> Refer to international laws and regulations and publish GIGABYTE "Harmful Chemical Substances Requirements (HCSR)". Zero incidents involving excessive levels of hazardous substances. Publish product environmental reports of all main product lines. Stop using disposable packaging from 2030. Introduction of green logistics and warehouse management, devise standards on carbon emissions from logistics based on international guidelines, require suppliers to provide regular feedback on performance and disclosure of overall carbon emissions in logistics.
2023 Targets	<ul style="list-style-type: none"> CDP climate obtains a score above the Management Level. Publication of independent TCFD report, strengthen climate strategy and risk management. Voluntarily retire 2,500 tonnes of CERs. 	<ul style="list-style-type: none"> 3% carbon reduction compared to 2022, and reduce carbon emissions by 50% compared to the 2009 base year. 	<ul style="list-style-type: none"> 3% reduction in waste compared to 2022, and reduce waste by 50% compared to the 2010 base year. 	<ul style="list-style-type: none"> Revise the GIGABYTE HCSR every year according to the latest chemical substances laws and regulations. Excess levels of hazardous substances in 2023 are 0. Continue to publish product environmental reports for the 4 main product lines. Investigate the total mass of packaging materials in 2023 and calculate the ratio that can be recycled. Conduct a green logistics survey to serve as a reference for future supplier selection.
Progress towards Achieving 2023 Targets	<ul style="list-style-type: none"> Received A- (Leadership) for the 2023 CDP Climate, B (Management) for the Supplier Engagement Rating, and B (Management) for Water Security. Publicized an independent TCFD report on the CSR website and used 5 types of climate scenario analyses to strengthen climate strategy and risk management. Voluntarily retired 2,500 tonnes of CERs. 	<ul style="list-style-type: none"> Carbon emissions in 2023 were 1.69% lower than in 2022 and 43.95% lower than the base year. 	<ul style="list-style-type: none"> Waste production in 2023 was 13.43% lower than in 2022 and 0.18% lower than the base year. 	<ul style="list-style-type: none"> Updated HCSR to version 4.9. Excessive levels of hazardous substances were found in 0 samples in 2023. On the publication of product environmental reports for the 4 main product lines, 13 reports were published in 2023, and 90 serial product reports have been published to date. In 2023, the total weight of packaging materials was 5,552.7 metric tons and 61.98% lower than in 2011. 95.9% of the packaging was recyclable. Distributed green logistics survey covering 18 metrics in three aspects to 33 vendors with a total response rate of 78.79%.

3.1 Environmental Management

GIGABYTE's environmental management commits to reducing the environmental impact of operations and manufacturing processes as well as protecting the health and safety of our employees. Environmental and hazardous substances management systems such as ISO14001, ISO14064-1, and IECQ QC 080000 are introduced to ensure that all our routine operations and products comply with environmental standards and regulations.

Environmental Management Performance

In terms of environmental management, GIGABYTE sets a clear long-term goal drawn with an aggressive reduction timetable. The "333 Reduction Plan" was set as a short-term goal aiming at reducing carbon emissions, water use, and waste by 3% every year. At the same time, initiatives such as the reduction reward program and green challenges help employees cultivate the habit of energy and water conservation. It also provided motivation to get involved in the development of green and energy-saving products.

(For more information on certifications related to environmental and quality management systems, please visit the [GIGABYTE CSR Website](#))

▪ Environmental Resources Input and Output

Input	Output	Reduction Outcomes over the Past 2 Years
Energy^[1] [GJ] Purchased electricity: 149,077.54 Purchased steam: 4,025.16 Gasoline: 334.64 Diesel: 846.96 LPG: 27.13	Greenhouse Gas [t-CO ₂ e] Direct emissions (Scope 1): 832.8622 Indirect emissions associated with purchased energy (Scope 2): 26,606.4019	<ul style="list-style-type: none"> Decreased 2,026.50 t-CO₂e (-6.77%) in 2022 compared to the previous year Reduced by 42.99% compared to the base year 2009 Decreased 472.18 t-CO₂e (-1.69%) in 2023 compared to the previous year Reduced by 43.95% compared to the base year 2009
Water Resource [MT] Tap water: 249,770	Effluent [MT] Domestic sewage: 211,972	<ul style="list-style-type: none"> Decreased 6,270 MT (-2.42%) in 2022 compared to the previous year Reduced by 35.17% compared to the base year 2010 Decreased 3,194 MT (-1.26%) in 2023 compared to the previous year Reduced by 35.99% compared to the base year 2010
Resource^[2] [MT] Plastic: 2,731.25 Glass: 794.52 Metal: 9,032.22 Paper: 5,327.36 Other: 976.35	Waste [MT] General industrial waste: 2,184.35 Hazardous industrial waste: 327.91	<ul style="list-style-type: none"> Decreased 263.19 MT (-10.62%) in 2022 compared to the previous year Reduced by 11.99% compared to the base year 2010 Increased 297.44 MT (+13.43%) in 2023 compared to the previous year Reduced by 0.18% compared to the base year 2010

[Note 1] The energy conversion factors are based on the location of factories where the energy types were used. The factors of steam, LPG, and gasoline take reference from the data in China, while the factors of diesel and gasoline used in Taiwan bases refer to the Heat Content of Energy Commodities table published by the Bureau of Energy, MOEA.

[Note 2] Input resources include all product packaging as well as the materials used to produce ATX, Micro ATX, and Mini ITX motherboards.

[Note 3] General industrial waste includes domestic waste.

[Note 4] The data boundary of energy in this table encompassed Headquarters, Taoyuan Nanping Factory, China Dongguan and Ningbo Factories, as well as the Taipei Silicon Valley Park Offices where the subsidiaries Bestyield International, G-Style, GIGAI PC, and Selita Precision are located; the data boundary of water resources and resources were Headquarters, Taoyuan Nanping Factory, and China Dongguan and Ningbo Factories.

Sustainability Fund and Reduction Reward Program

In 2019, GIGABYTE officially launched the 6-year "Sustainability Fund". The Fund is based on the savings of energy fees every year and invests in 3 aspects: energy conservation at factories, development of resource reduction and low-carbon products, and green projects related to climate change and sustainable development. The program aims to stimulate comprehensively innovative thinking for manufacturing, operation, product strategies, and sustainable development plans to provide incentives and motivations for reduction and strengthen the internal competence of green designing that helps achieve the reduction purpose.

Incentives for Equipment Energy Efficiency and Reduction in Factories

GIGABYTE's gross emissions were reduced by 6.77% in 2022 compared to the previous year, reaching the target of 3% annual reductions. As a result, all three factories won the "Factory Equipment Energy-efficiency Reward" in 2023. The "Factory Reduction Reward" went to the Dongguan Factory after further analysis.

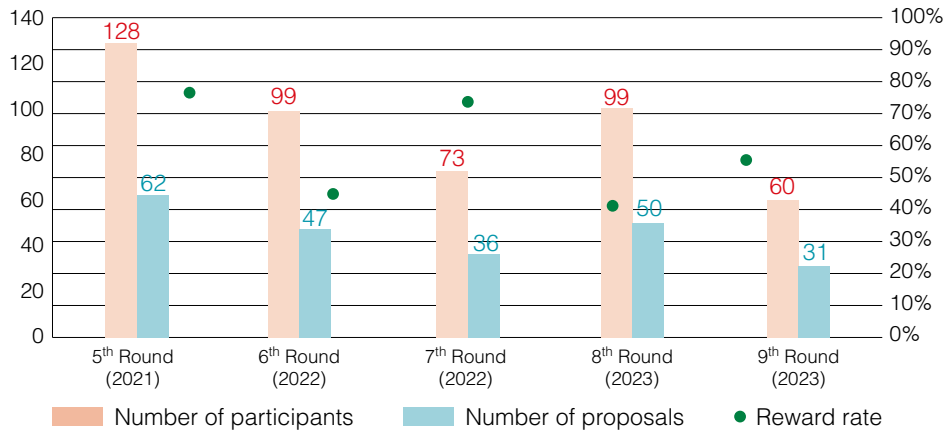
Results of Reduction and Low-carbon Product Proposals

Applications for reduction and low-carbon product proposal rewards are accepted twice a year. 9 rounds have been held as of the end of 2023. The review of incentive applications employs the "shadow pricing" concept for internal carbon pricing to quantify actual reduction performance. Carbon was priced at USD 50 per metric ton (currently equivalent to TWD 1,535)

Most of the proposals submitted by our employees this year focused on equipment energy efficiency, reducing the use of parts/consumables, and recycling of resources. Scope analysis of carbon reduction proposals found that GHG scope 1 and scope 2 reductions accounted for 54% of proposals. Many proposals were targeted at the energy efficiency of large equipment such as air-conditioning units, wave soldering furnaces, solar power, chambers, and burn-in rooms. The proposals for scope 3 emission reduction concentrated on savings in parts, packaging, or solder.

In 2023, 159 employees took part in the Sustainability Fund. 81 proposals were submitted with an average award rate of 45.7%. The average award rate since the proposal incentives were introduced was 65%. We will continue refining the reward scheme in the future. The transparent reward scheme and judging process are also used to provide advice and guidance on the optimization of action plans. We hope this will motivate employees to put environmental awareness into practice in their work and submit proposals as a team. They will not only be rewarded with prize money but will also receive additional learning opportunities.

Participation Outcomes of Reduction and Low-Carbon Product Proposals



Cumulative Reduction Performance of Proposals

Round	Electricity Savings (MWh per year)	Water Savings (MT per year)	Waste Reduction (MT per year)	Waste Liquid Reduction (KL per year)	Carbon Reduction (t-CO ₂ e per year)
8th Round Mar 2023	692.56	1,800	46.35	0	870.08
9th Round Sep 2023	956.15	2,234.63	5.47	0.86	542.09
2019-2023 Cumulative Total	7,859.07	32,656.83	433.55	59.35	7,214.13

3.1.1 Greenhouse Gas and Energy Management. Energy use

Electricity is the main type of energy used by GIGABYTE in our routine operations and production processes. The subsidiaries GIGAIPC and Selita Precision, located at the Taipei Silicon Valley Park Offices, were included in the boundary of the GIGABYTE energy inventory in 2022. Total electricity consumption in 2023 was 41,410.43 MWh, an increase of 0.85% compared to 2022 and 20.34% lower than 2009. Analysis of increase in electricity consumption

found that this was due to the increased production of AI servers and more energy-intensive production processes in recent years. Total energy consumption in 2023 from electricity and other sources amounted to 154,311.42GJ, a decrease of 40.54% compared to the base year of 2009. The intensity of total energy consumption per 1,000 pieces of production in 2023 was 15.55 GJ and per capita was 26.15 GJ.

Energy Consumption over the Past 4 Years

Unit: GigaJoule (GJ)

Energy Type	2009	2020	2021	2022	2023	2023 vs 2009 (%)
Purchased Electricity	187,131.89	150,442.25	155,550.38	147,820.19	149,077.54	-20.34%
Purchased Steam	63,925.40	2,917.05	5,453.65	5,409.32	4,025.16	-93.70%
Gasoline	1,684.65	314.26	254.49	232.27	334.64	-80.14%
Diesel	2,656.72	1,180.61	2,620.70	852.75	846.96	-68.12%
Liquefied Petroleum Gas	4,121.70	25.59	24.09	31.65	27.13	-99.34%
Total Usage	259,520.36	154,879.76	163,903.31	154,346.18	154,311.42	-40.54%

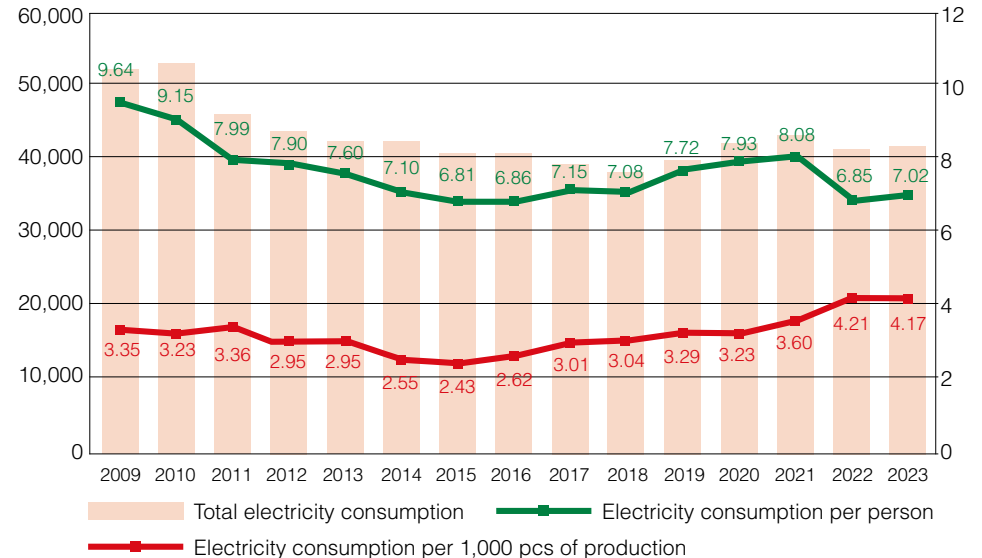
[Note 1] The unit used for energy conversion is based on the user plant for each energy type. Steam, LPG, and petrol are based on the values for China while diesel and petrol use the Heat Content of Energy Commodities table published by the MOEA Bureau of Energy.

[Note 2] The boundary of the above energy data is consistent with the boundary of the GHG inventory: Headquarters, Taoyuan Nanping Factory, Dongguan Factory and Ningbo Factory in China, and the Taipei Silicon Valley Park Offices where subsidiaries Bestyield International, G-Style, Selita Precision, and sub-subsidiary GIGAIPC are located.

[Note 3] The base year 2009 of the GHG reduction target was also used as the base year for calculating reduction in energy consumption.

Electricity Consumption and Intensity Over the Years

Unit: MWh



2023 Energy Conservation and Emission Reduction Projects

Operation Base	Number of Energy Conservation Project	Electricity Saving (Unit: kWh)	Energy Reduction (Unit: GJ)	Emission Reduction (Unit: t-CO ₂ e)
Headquarters	5	607,335	2,186.41	300.63
Nanping Factory	4	738,749	2,659.50	365.68
Dongguan Factory	1	107,500	387.00	83.01
Ningbo Factory	5	90,529	325.90	70.40
Total		1,544,114	5,558.81	819.73

[Note 1] The energy types of all energy conservation measures were electricity. The figures are estimated.
 [Note 2] The measures are different year by year. The estimated electricity savings were compared to the energy consumption of the equipment before improvement.
 [Note 3] The reduced emissions in Taiwan bases were calculated based on the 2022 electricity emission factor, 0.495 kg-CO₂e/kWh, announced by the Bureau of Energy, MOEA.
 [Note 4] Reduction in carbon emissions at the China Dongguan Factory was calculated using the 2021 Southern Region Grid Baseline Emission Factor of 0.7722 (kg-CO₂e/kWh); reduction in carbon emissions at the China-Ningbo Factory were calculated using the Eastern China Region Grid Baseline Emissions Factor of 0.7777 (kg-CO₂e/kWh).

Renewable Energy Usage

Purchased electricity accounted for around 95% of GHG emissions at GIGABYTE. The use of renewable energy will help with the achievement of the Group's carbon reduction targets. The "Large Electricity Users Clause" has now been implemented in Taiwan. Both Headquarters and Taoyuan Nanping have a contracted capacity below 5,000 kWh so are not subject to the statutory quota of using at least 10% renewable energy. Despite that, GIGABYTE is engaging in advance planning to meet domestic and overseas regulations and requirements on renewable energy development and carbon management for businesses. The North American branch is planning to build its own rooftop solar panels. German branch installed and began using renewable energy from solar panels in 2020. Its cumulative power generation as of 2023 was 171.397 MWh, equivalent to a reduction of 111.24 t-CO₂e according to the data supplied by local vendors.



Installation of Smart Electricity Tracking System in Laboratory

The SCADA system was introduced at the Headquarters in 2023. Key functions included real-time monitoring, data acquisition, data processing, and alarm management. The system can collect process data and provide a visualized user interface for remote monitoring and control of the production process. It can also use analysis of historical data, report generation and trends for troubleshooting or to optimize production decision, resulting in enhanced productivity, safety, and reliability.

To meet the demand for AI server production capacity in recent years, the production lines for server products at Taoyuan Nanping Factory were reconfigured as well. The AI server production line is characterized by small production volume but energy-intensive processes that led to frequent tripping of circuit breakers in the beginning. In addition to upgrading the power capacity, an automatic temperature-controlled laboratory and testing dashboard were also added to keep track of machines under test, monitor power consumption risks, and maintain the stability of production.



Greenhouse Gas Reduction Target and Performance

GIGABYTE has set a greenhouse gas reduction target of a 50% reduction in carbon emission by 2025 with 2009 as the base year. A separate short-term target was set in 2016 under the "333 Reduction Plan" with GIGABYTE promising to reduce carbon emissions, water consumption, and waste production by 3% each compared to the previous year. The concise targets help us track our carbon reduction progress and performance.

GIGABYTE began conducting annual organizational GHG inventories in accordance with ISO 14064 in 2010. The inventory originally encompassed scope 1 and scope 2 greenhouse gas emissions at the Headquarters, Taoyuan Nanping Factory, and Dongguan and Ningbo Factories in China. As of 2021, the reporting boundary was expanded in response to the latest standards and regulations to encompass the Taipei Silicon Valley Park Offices, where the subsidiaries Bestyield International, G-style, and Selita Precision, and sub-subsidiary GIGAIPC are located, as well as scope 3 greenhouse gas emissions. GIGABYTE's processes and products do not use substances that harm the ozone layer, nor do they emit nitrogen oxides (NO_x), sulfur oxides (SO_x), or other major gaseous emissions.

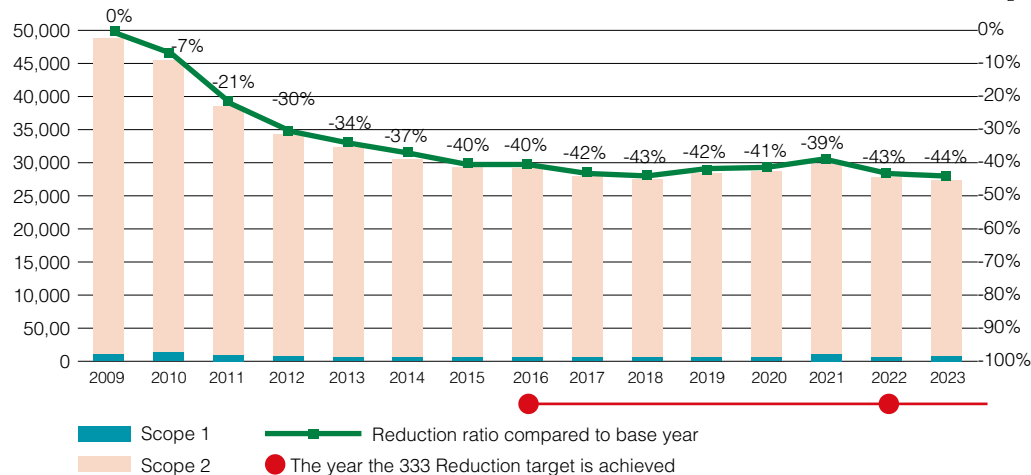
Scope 1 and 2 Greenhouse Gas Inventory over the Past 4 Years

Unit: t-CO₂e

(Unit: t-CO ₂ e)	2020	2021	2022	2023
Scope 1	648.09	1,063.52	627.81	832.86
Scope 2	28,123.84	28,874.43	27,283.64	26,606.40
A Sum of Scope 1 and Scope 2	28,771.93	29,937.95	27,911.44	27,439.26

Greenhouse Gas Emissions Reduction Target Progress

Unit: t-CO₂e

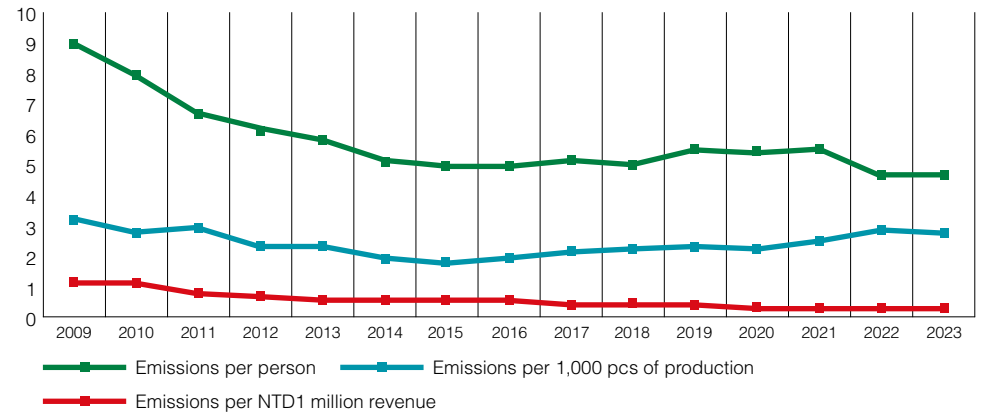


[Note] The GHG inventory applied IPCC 2021 AR6 GWP values. Types of GHG covered CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, and NF₃.

GIGABYTE has transformed our organizational strategy and diversified product portfolio in recent years in response to the popularization of cloud computing, digitization of industries, and automation of factories and supply chains in the post-pandemic era. We are focusing on working with our global partners to craft innovative solutions in manufacturing, healthcare, transportation, and communications, which has also led to drastic changes in our annual production output. Our absolute greenhouse gas emissions in 2023 were 43.95% lower than the base year and 1.69% lower than the previous year. In terms of emission intensity, emissions per unit of revenue were 82.53% lower than the base year, while emissions per unit of production were 12.41% lower than the base year.

Changes in Greenhouse Gas Emission Intensity (Scope 1 and Scope 2)

Unit: t-CO₂e



Scope 3 Greenhouse Gas Inventory for the Past 3 Years^[1]

Unit: t-CO₂e

Scope 3 GHG Emission Categories ^[2]		2021	2022	2023
Transport-related	Upstream Transportation and Distribution	234.74	58.32	617.35
	Downstream Transportation and Distribution	40,088.61	28,051.45	44,405.99
	Business Travel*	24.13	128.35	548.17
GIGABYTE's Use of Products	Employee Commuting*	1,201.65	1,867.53	1,028.98
	Purchased Goods*	1,515,136.60	892,256.60	1,213,983.28
	Capital Goods	739.74	776.94	580.91
	Fuel and Energy-related Activities	1,860.45	1,217.49	3,188.28
Use of GIGABYTE's Products	Waste Generated from Operation*	1,464.50	1,238.66	1,911.11
	Processing of Sold Product	1,722.91	2,312.99	1,541.80
	Use of Sold Products*	4,239,140.03	5,689,602.28	4,525,119.43
	End-of-Life Treatment of Sold Products*	10,931.82	8,089.73	8,757.16
Total Scope 3 Emissions		5,812,545.17	6,625,600.33	5,801,682.44

[Note 1] GIGABYTE adjusted the inventory methodology for scope 3 due to the reversion of ISO14064-1: 2018 standard. The results before 2020 were not shown in this table because of the differences in methodology.

[Note 2] Figures marked with * have been verified by an external party.

Voluntary Retirement of CERs

GIGABYTE partnered again with the Plant-for-the-Planet Foundation by committing to retiring 2,500 CERs from overseas renewable energy projects every year between 2023 and 2027. These CERs were issued from UN CDM programs. The voluntary retirement in carbon credits was not counted towards the Group's GHG inventory and carbon reduction target progress for 2023.



3.1.2 Water Resource Management

GIGABYTE production lines are main assembly-oriented processes that are not water-intensive. Basic factory facilities and domestic water consumption are all supplied by tap water. The medium and long-term goals of our water resource management strategy are a 20% reduction in water consumption by 2030 compared to the base year of 2010. The short-term target is annual reductions of 3% in water consumption. The promotion and enforcement of the water conservation policy, education, and performance reporting mechanisms produced a 35.99% reduction in water consumption in 2023 compared to the base year, and a reduction of 1.26% compared to the previous year.

Regarding wastewater discharge, all of GIGABYTE's wastewater is domestic sewage and is legally discharged into underground sewers per local laws and regulations. Thus, it has not caused impacts on the environment and ecology around the business locations. Besides, we build rainwater recycling systems on the G-HOME Sustainable Eco-Roof that can supply about half of the water for irrigation every year. In the future, we will continue to look for raw materials with lower water footprints to achieve the water-saving target of the overall product lifecycle.

Water Use in 2023

Unit: Megaliters

Water Resources	Total Water Withdrawal	Total Water Discharge	Total Water Consumption
Distinguish by Source of Water Withdrawal and Destination of Water Discharge			
Surface Water	-	-	37.80
Groundwater	-	-	
Seawater	-	-	
Produced Water	-	-	
Third-Party Water	249.77	211.97	
Distinguish by Water Category			
Fresh Water ^[1]	249.77	211.97	37.80
Other Water ^[2]	-	-	

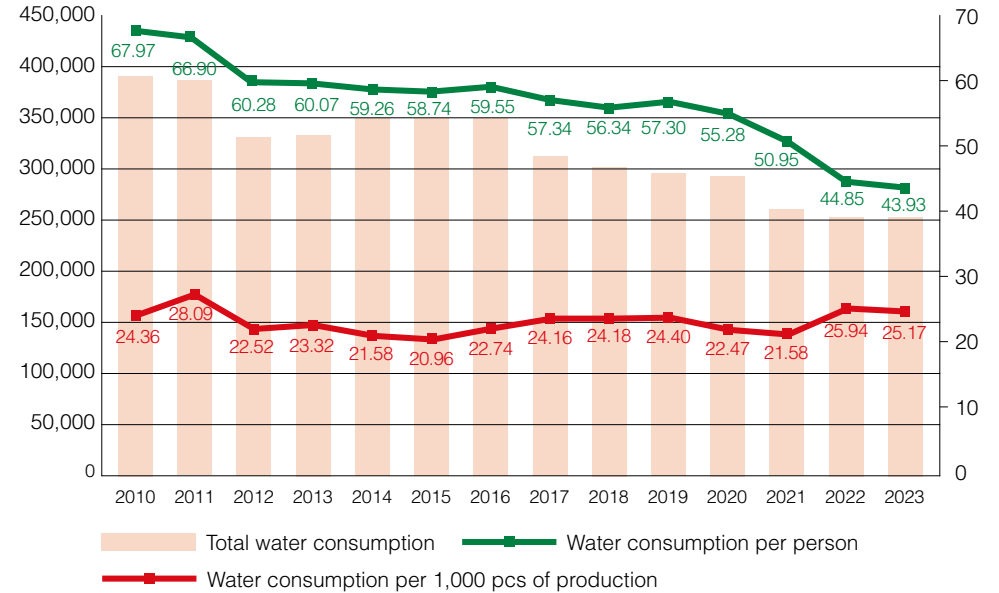
[Note 1] Freshwater: total dissolved solids ≤ 1,000 mg/L

[Note 2] Other Water: total dissolved solids > 1,000 mg/L

[Note 3] Water discharge: For Headquarters, Nanping Factory, and Ningbo Factory, the figures were estimated as water withdrawal * 0.8; for Dongguan Factory, it was estimated as water withdrawal * 0.9.

Water Consumption and Intensity Over the Years

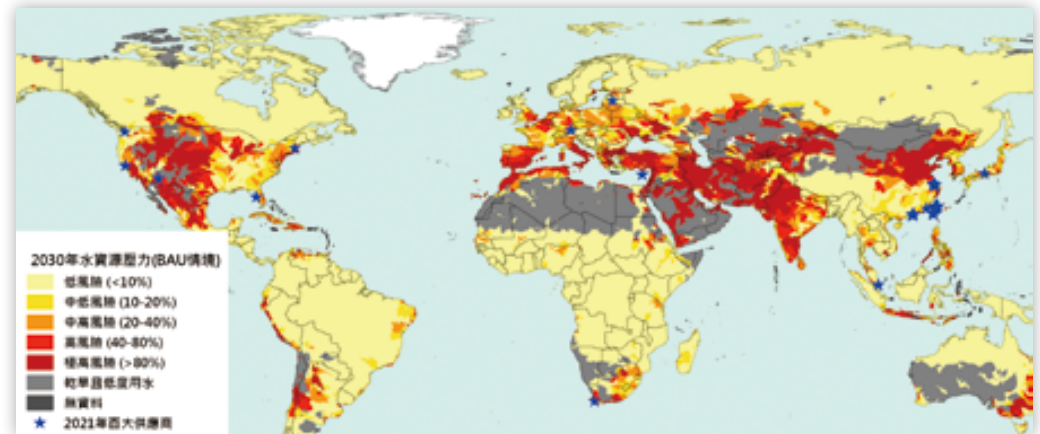
Unit: Metric ton



[Note] The boundary of water resource inventory included the Headquarters, Taoyuan Nanping Factory, China Dongguan Factory, and China Ningbo Factory. Also, 4F of Headquarters Building B has been added to the inventory boundary since 2022. Taipei Silicon Valley Park Offices are in a leased office building, so no independent water data is available.

Water Resource Risk Assessment

In response to the increased severity of drought and flood risks due to climate change, GIGABYTE employed GIS tools and the water risk assessment tool developed by the World Resource Institute (WRI) for the first time in 2019 to analyze the water stress and risk



exposure at our global operating locations and key suppliers. The most recent analysis was conducted in 2022, which found that under the BAU scenario, most of our top 100 suppliers will face moderate to high water stress by 2030 in the regions they base. Water shortages will also become a problem in the supply chain. GIGABYTE has responded by including water in our climate-related risks for management. We also communicate the potential risk in water resources to suppliers through our supplier conference.

3.1.3 Waste Management

The domestic waste, recyclable waste, and hazardous industrial waste generated by each GIGABYTE's operating base are entrusted to local qualified contractors for disposal. The contractors removed waste for disposal in accordance with local waste disposal regulations. The weight is measured for confirmation and a receipt is issued to facilitate declaration and management. Audits are also conducted regularly at waste disposal manufacturers to ensure proper waste disposal.

The "333 Reduction Plan" sets a short-term target to reduce waste by 3% every year, while a long and medium-term goal is a 50% reduction in waste by 2030 compared to the 2010 base year. We strive to reduce waste by improving the process and introducing circular resource

■ Total Waste Generation

Unit: Metric ton

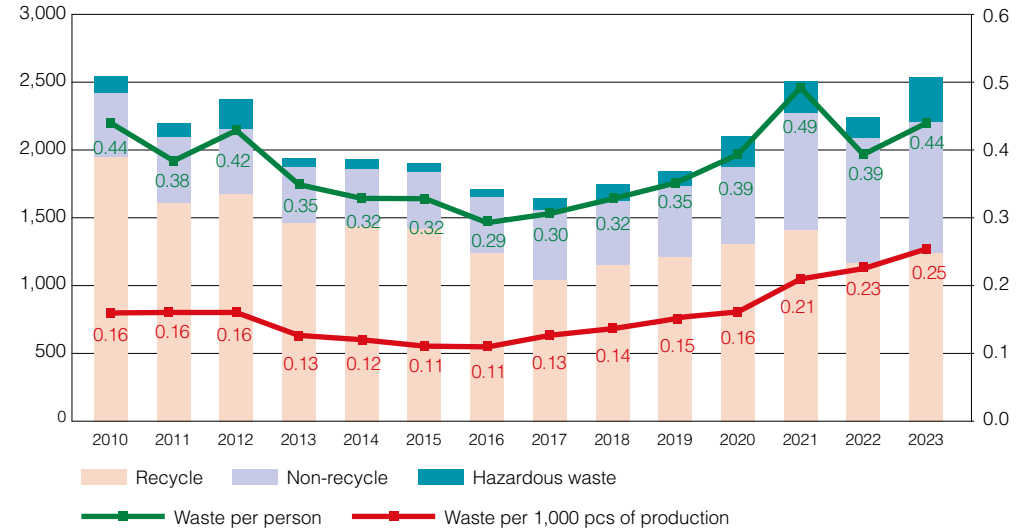
Type	Treatment Approach	2020	2021	2022	2023	
Non-Hazardous Industrial Waste	Recycled/Reuse	1,298.25	1,401.01	1,152.01	1,398.49	
	Landfill	337.57	498.57	431.21	453.99	
	Incineration with Energy Recovery	210.82	337.64	315.88	323.15	
	Incineration without Energy Recovery	0	0	0	0	
	Other (including compost)	6.91	7.37	174.15	8.72	
	Subtotal	1,853.55	2,244.59	2,073.25	2,184.35	
Hazardous Industrial Waste	Waste treated by legal disposal companies externally	Incineration with Energy Recovery	0	51.51	32.42	37.06
		Other recycle methods	217.53	141.37	76.80	242.17
		Other method: Physical Treatment	0	40.52	32.35	48.68
Total Waste		2,071.08	2,478.00	2,214.82	2,512.25	

[Note 1] Treatment method of waste disposal is based mainly on the information provided by the waste contractor.
 [Note 2] Incineration (with energy recovery): Recovery and use of heat energy generated during the waste incineration process.
 [Note 3] None of the hazardous industrial waste recovered in 2023 was reused or recycled.

modes. Our ultimate goal is to achieve "Zero Waste and Zero Pollution". Total waste production in 2023 amounted to 2,512.25 metric tons, a reduction of 0.18% compared to the base year and a 13.43% increase compared to the previous year.

■ Waste Generation and Intensity Over the Years

Unit: Metric ton



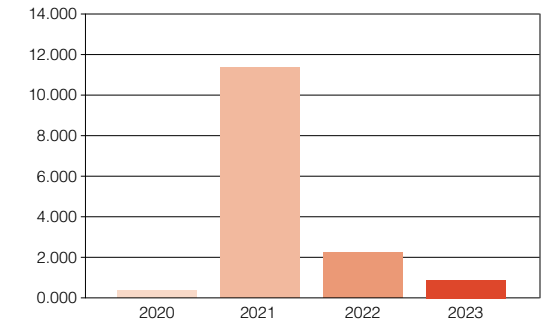
[Note] The boundary of waste calculations included the Headquarters, Taoyuan Nanping Factory, China Dongguan Factory, and China Ningbo Factory. Taipei Silison Valley Park Offices are in a leased office building with centralized waste disposal, so separate waste data is unavailable.

Volatile Organic Compounds (VOCs)

■ VOC Emissions in the Past 4 Years

Unit: Metric ton

Volatile Organic Compounds (VOCs) can easily react with other pollutants in the lower atmosphere, such as photochemical reactions with nitrogen oxides (NOx) to form ozone or smog, one of the main causes of poor air quality. GIGABYTE's air pollution control complies with Taiwan and mainland China regulations and standards. Taoyuan Nanping Factory is not subject to Taiwan's "Air Pollution Control Act" at present. Dongguan and Ningbo Factories have been inspecting VOCs every year since 2020 in order to properly solve the problem of xylene and non-methane total hydrocarbon emissions. The emissions comply with local regulations and standards.

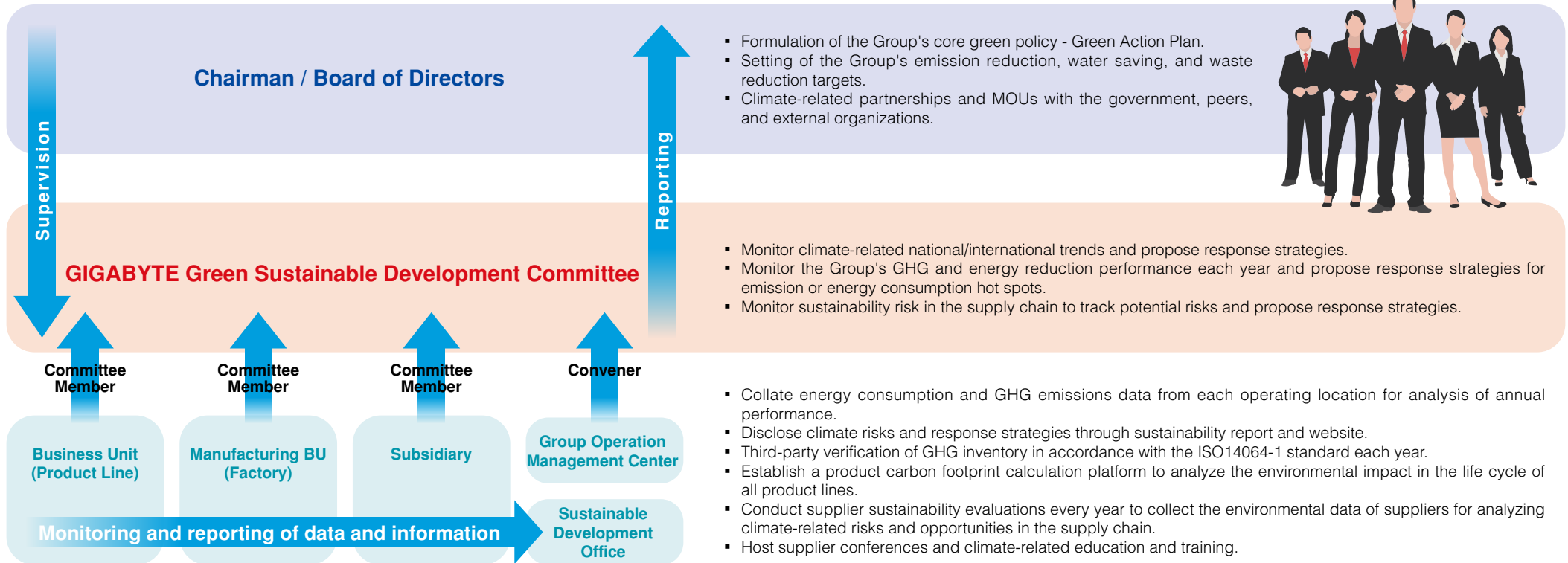


[Note] VOC emissions in factories are estimated as the product of the discharge rate from a fixed test point and duration of operations. Discharge rate is however affected by production conditions at the time. If the production lines are running at full capacity, partial capacity or idle, or the emissions treatment device runs on variable frequencies then the estimated annual VOC emissions may be sometimes high and sometimes low.

3.2 Climate Change Mitigation and Adaptation

GIGABYTE is committed to mitigating climate change caused by business operations. Visionary management policies and effective response plans are adopted for the effective promotion of climate-related management and adaptation measures. These not only improve our operational efficiency, boost the green competitiveness of our products, but also fulfill our environmental responsibility on climate change mitigation and adaptation. Climate-related information was disclosed by GIGABYTE in the Sustainability Report using the recommended framework of TCFD for the first time in 2020. The first TCFD Independent Report was then published in 2023. The first three core components of "governance", "strategy", and "risk management" of TCFD disclosure recommendations will be outlined in this section. For the last component "metrics and target", please refer to 3.1.1 GHG and Energy Management. For more information, please refer to the [GIGABYTE 2023 TCFD Report](#).

▪ GIGABYTE Climate Governance Supervision, Reporting and Functional Structure



3.2.1 Climate Governance Organization

GIGABYTE senior management is authorized by the Board of Directors to handle all economic, environmental, and social topics generated by the Company's business activities. The management should periodically report its handling of such topics to the Board of Directors. The GIGABYTE Green Sustainable Development Committee was formally established in 2009 to serve as the highest governance body for climate-related management topics. The Committee is chaired by the Company's chairperson.

The Sustainable Development Office, under the Group Operation Management Center, serves as the convener of the Committee. The Office reports to the CEO on the progress and outcomes of sustainability and climate-related tasks every week. Inter-BU, inter-plant, and inter-subsubsidiary meetings are convened by the Committee every 1 to 2 months during which organizational representatives report on regulations and trends in sustainability, environmental, and product regulations. Corporate response strategies are also proposed at the same time to ensure timely adjustment of internal policies in response to international developments. Resolutions are submitted to the chairperson every two weeks. Annual outcomes are reported to the Board of Directors so they can evaluate the overall performance of the company at the end of the year.

CDP Performance

Since 2010, GIGABYTE has responded to the CDP Climate Change Questionnaire because of customer requests. Besides responding to customers' requirements and international expectations, participating in CDP helps further self-examine the implementing processes of carbon management, adjusting the carbon management approaches according to the evaluative results and feedback to improve the overall management system.

In 2023, GIGABYTE's CDP rating was A- (Leadership). Our rating was better than the industry and regional average for Asia. Our Supplier Engagement Rating (SER) was B, while the Water Security was rated B. With the growing domestic and overseas importance of carbon management, we will continue to strengthen our carbon reduction initiatives and review the weaknesses in our performance in order to realize the goal of low-carbon technology.

GIGABYTE CDP Score in the Past 5 Years

	2019	2020	2021	2022	2023
Leadership					
Management					
Climate Change	A-	B	A-	A-	A-
Supplier Engagement Rating	A-	A	A-	A	B
Water Security	/	/	/	B	B

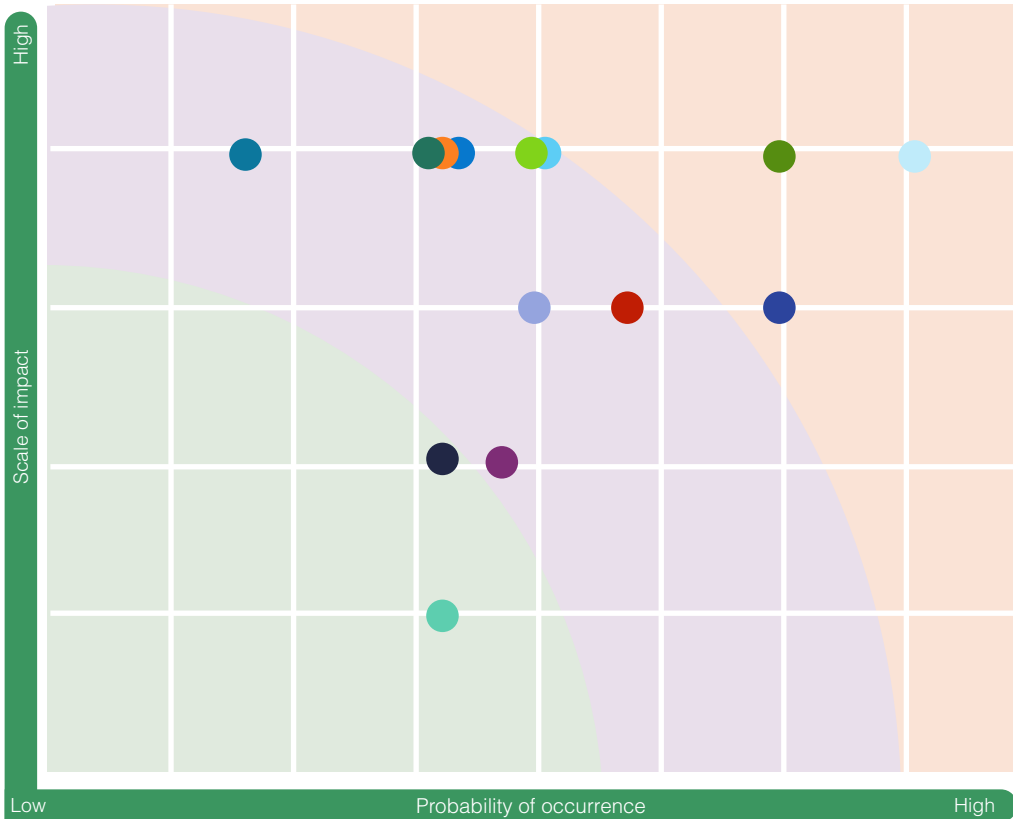
3.2.2 Climate Management Strategy

GIGABYTE has designated climate risk as a material operating risk. Climate change and global warming problems are affecting directly on the value chain as a whole from upstream suppliers to company operations and downstream demand. In addition, such sheer scope and scale of impact, there is also added urgency from the fact that human lifestyle, social culture, and economic activities around the world are already being impacted in tangible ways as well. To obtain a full picture of how climate risks may affect the Company's operations or the opportunities that those may create, GIGABYTE identifies climate-related risks and opportunities that will significantly affect finances, change business strategies or models, or pose impacts on the value chain. The planning of corresponding response strategies and management measures are then prioritized. Annual reviews and re-assessments are also conducted through climate scenario analysis.

Identification Process for Climate-Related Risks

Stage 1	Risk Information Collection and Identification and Classification of Issue	Potential international, regional, and local climate-related risks facing the electronics and technology industries are compiled and then sorted into climate-related risks and opportunities using the TCFD framework as the reference.					
Stage 2	Financial Impact Assessment	Evaluate the direct or indirect impacts of the risk topics identified in Stage 1 on GIGABYTE's operations or finances in the short, medium, or long term:					
		Scope of Operational Impact to Consider		Financial Impact Aspects to Consider		Definition of Risk Timeframe	
		Upstream Supply Chain	The topic has significant impacts on key components and tier-1 suppliers, including raw materials, production capacity, transportation, and personnel safety.	Revenue	<ul style="list-style-type: none"> Changes in demand for products and services Changes in market competitiveness 	Short-term	Immediate action must be taken as the topic is very likely to have a material impact on the Company's operations or business strategy within 1-3 years.
		Business Operation	The topic has significant impacts on GIGABYTE's routine operations, including office work, energy, production capacity, commuting, distribution and sales, and employee safety.	Cost	<ul style="list-style-type: none"> Increase in direct costs Increase in indirect costs R&D investment in low-carbon transformation technologies 	Medium-term	Planning of preventive measures are required as the topic is very likely to have a material impact on the Company's operations or business strategy within 3-5 years.
Stage 3	Risk Matrix Analysis	Downstream Value Chain	The topic has significant impacts on GIGABYTE's customers and consumers in terms of preferences, user experience, use costs, and waste disposal.	Capital Expenditure	<ul style="list-style-type: none"> Replacement and upgrade of energy-saving equipment Investment in low-carbon 	Long-term	Variables such as regulation and climate change must continue to be monitored as the topic is likely to have a material impact on the Company's operations or business strategy within 5-10 years.
		For climate-related topics identified in stage two, weighted analysis is performed using the three indicators of risk timeframe, risk likelihood, and scale of impact. A risk matrix is drawn up to identify the relative priorities of each topic. 10 climate-related risks and 4 climate-related opportunities were identified through the above process in 2023. The Risk and Opportunity Impact Matrix is shown below.					

2023 Climate-related Risk and Opportunity Matrix



[Note] The probability of occurrence for each type of risk in this graph is based on a weighted analysis of risk timeframe and risk likelihood.

Transition Risk	Existing Laws and Regulations	●	Taiwan carbon fee mechanism	
		●	Requirements for group GHG inventory	
		●	Requirements for renewable energy usage	
	Emerging Regulations	●	International carbon border adjustment mechanisms and carbon tariffs	
		●	Technology	Low-carbon transformation of production processes
		●	Reputation	Increasing awareness of sustainable consumption
		●	Market	Disclosures and compliance with sustainability-related requirements from customers
Physical Risk	Acute	●	Increasing extreme weather events	
	Chronic	●	Increase in average temperature	
		●	Change in precipitation pattern	
Opportunity	Resource Efficiency	●	Enhancement of resource productivity through improving process energy efficiency	
		●	Development and expansion of the low-carbon products market	
	Products/Services	●	Diversification of products and business models	
		●	Diversification of climate risk from materials and parts supply chain	

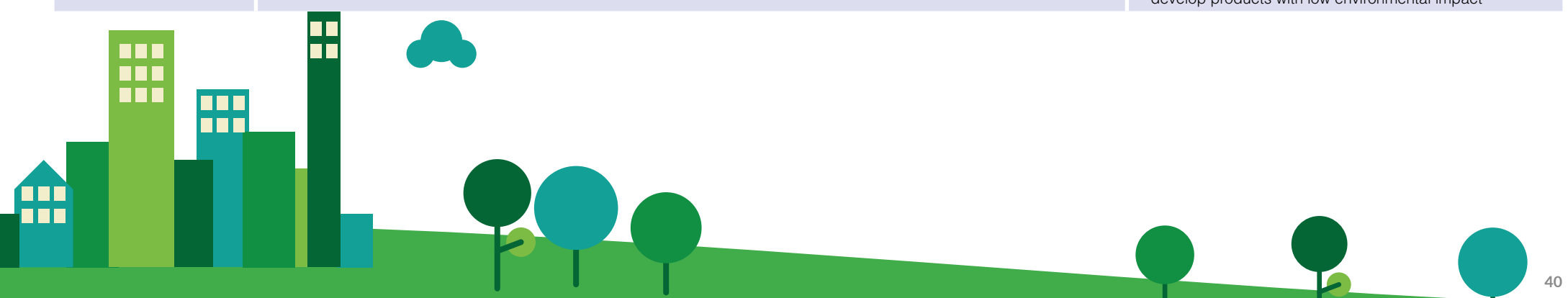




3.2.3 Description and Management of Climate-related Risks

Risk Type		Transition Risk			
		Existing laws and regulations			Emerging regulations
Risk Description		Taiwan carbon fee mechanism	Requirements for group GHG inventory (incl. overseas subsidiaries)	Requirements for renewable energy usage	International carbon border adjustment mechanisms and carbon tariffs
Impact Timeframe		Medium-term	Short-term	Medium-term	Long-term
		Become subject to carbon fees in 3 to 5 years.	GHG inventory boundary must be consistent with the boundary of consolidated financial statements by 2026.	GHG inventory boundary must be consistent with the boundary of consolidated financial statements by 2026.	Western markets expected to impose carbon-related taxes and fees on importers of electronic products, components, and parts in 5 to 10 years.
Impact and Scope	Upstream supply Chain	Higher production costs.			
	Business Operation	Higher purchasing costs.	Higher GHG management costs.	Higher energy expenditure and energy-efficiency management costs.	Higher product tax costs.
	Downstream Value Chain	Impact on product sale price or profits.			Impact on product sale price or profits.
Financial Impact on GIGABYTE		Moderate	Moderate-to-High	Moderate-to-High	High
		GIGABYTE carbon emissions are relatively low so the price level of carbon fees should not be too high.	Fines for non-compliance with inventory and disclosure regulations.	Payment of energy fees, purchase of certificates, or payment of charges for statutory compliance.	Payment of carbon tariffs when importing products or participation in the local emissions control and carbon credit trading mechanism in accordance with the regulations of the target market.
Main Risk Responding Management Measures		<ul style="list-style-type: none"> The GIGABYTE Green Sustainable Development Committee continues to enhance the environmental management system by developing and supervising the implementation of sustainability strategy. Conduct GHG inventory in accordance with the ISO14064-1 standard with third-party verification each year and continue to monitor emissions reduction performance. 			
		<ul style="list-style-type: none"> Actively track domestic and overseas climate regulations to facilitate timely adjustment of climate policy direction to ensure compliance. Replacement of outdated equipment and improvement of production efficiency at each operating location. 	<ul style="list-style-type: none"> Active tracking of FSC regulations to facilitate timely adjustment of GHG inventory operations and ensure compliance. 	<ul style="list-style-type: none"> Promote energy-efficiency proposals as well as replace old and energy-intensive equipment at each operating location, while also evaluating the potential for construction of in-house renewable energy supply. 	<ul style="list-style-type: none"> Actively track domestic and overseas climate legislations to facilitate timely adjustment of climate policy direction and reduce compliance costs. Use savings from energy efficiency to set up the "Sustainability Fund" and reward units for reduction performance in order to promote continued internal innovations in emissions reduction and improvements to resource utilization. Set up a life cycle assessment system for all products to analyze 16 environmental impact indicators including carbon footprint for all product series.

Risk Type		Transition Risk		
		Technology	Business Reputation	Market
Risk Description		Low-carbon transformation of production processes	Increasing awareness of sustainable consumption	Disclosures and compliance with sustainability-related requirements from customers
Impact Timeframe		Medium-term	Medium-term	Short-term
Impact Timeframe		Low-carbon product requirements of developed markets will become more specific and substantial in 3 to 5 years.	Sustainable consumption trends in developed markets are expected to have a more substantive impact on GIGABYTE products in 3 to 5 years.	Already increasingly required by customers along with demand for more detailed disclosures.
Impact and Scope	Upstream supply Chain	Higher purchasing management costs.		
	Business Operation	Higher equipment investment and production costs.	Failure to meet consumer expectations will affect product sales.	Failure to meet customer requirements will result in lost customers and orders.
	Downstream Value Chain		Impact on product sales and revenue.	Impact on product shipments and revenue.
Financial Impact on GIGABYTE		High	High	High
Financial Impact on GIGABYTE		EU/US markets have stricter requirements for environmentally friendly products, and they account for a relatively high proportion of GIGABYTE exports.	An increase in marketing costs to strengthen the Company's image as a green brand when EU/US markets where there is greater awareness of sustainable consumption are important export markets for GIGABYTE.	Stricter customer requirements on sustainable supply chain management when B2B products account for a growing proportion of GIGABYTE sales.
Main Risk Responding Management Measures		<ul style="list-style-type: none"> Allocate part of annual revenue to research and development to develop environmentally friendly products with high performance and low carbon footprint. Found the "Sustainability Fund" to reward the development of low-carbon products and cultivate the capability to develop products with low environmental impact. Implement and refine the scope 3 GHG inventory, voluntarily conduct product carbon footprints and life cycle assessment for all main product lines and publicize disclosure of product environmental information. Supply chain source management to lower the environmental impact of the value chain as a whole. 		





Risk Type		Physical Risk		
		Acute	Chronic	
Risk Description		Increasing extreme weather events	Change in precipitation pattern	Increase in average temperature
Impact Timeframe		Short-term	Medium-term	Medium-term
Impact Timeframe		The regions where our operating locations are located are now facing an increasing number of extreme weather events including heavy rainfall and unpredictable typhoon tracks.	Incidents of drought have already occurred and may become the norm in 3 to 5 years.	The number of high-temperature days during summer is expected to increase in the next 3 to 5 years along with an extension in summer.
Impact and scope	Upstream Supply Chain	Interruption to supply from suppliers of key parts due to extreme weather events.	The production of key components is affected by drought, resulting in higher purchasing costs or supply chain disruption.	An increase in overall energy consumption leads to higher production costs.
	Business Operation	Interruption to factory production due to extreme weather events.	Interruption to business due to flooding or drought.	Increase in electricity consumption from cooling of production equipment and office air-conditioning.
	Downstream Value Chain	Supplier delivery schedule is affected by extreme weather events resulting in increased transportation costs and late-delivery penalties.	River or sea freight routes are affected by drought resulting in higher transportation costs.	An increase in overall energy consumption leads to higher transportation costs.
Financial Impact on GIGABYTE		Moderate	High	Moderate-to-High
Financial Impact on GIGABYTE		Loss of production from production interruption due to extreme weather events and cost of post-disaster recovery.	Purchasing risk cost from an interruption in supply due to drought at critical suppliers located in regions with high water stress.	More energy costs from an increase in operating time and cooling intensity of air-conditioning equipment due to high temperatures.
Main Risk Responding Management Measures		<ul style="list-style-type: none"> Establishment of the "Risk and Emergency Management Guidelines" in accordance with ISO 14001 as well as the devising of management and response measures for typhoons and flooding. Water shortage drills are carried out in factories to prepare for water restrictions during the dry season Establish water recycling systems at the Dongguan and Ningbo Factories in China. Diversification and distribution of product sources in the supply chain to improve the stability of material supply and strengthen the risk resilience of the supply chain. 		<ul style="list-style-type: none"> Replace old and worn AC and cooling equipment and improve the energy efficiency of AC equipment. Optimize the power factor of electrical equipment to reduce power loss as well as stabilize and lower the load of the electrical system. Set up and maintain the G-HOME GIGABYTE Sustainability Eco-Roof to effectively reduce the indoor temperature of the top floor by 2.5° C and the surface temperature on the rooftop by 25° C.





3.2.4 Description and Management of Climate-related Opportunities

		Resource Efficiency	Products and Services		Resilience
Opportunity Description		Enhancement of resource productivity through improving process energy efficiency	Development and expansion of the low-carbon products market	Diversification of products and business model	Diversification of climate risk from materials and parts supply chain
Impact Timeframe		Medium-term	Immediate Future	Medium-term	Medium-term
Impact Timeframe		Greater penetration and acceptance of low-carbon products by developed markets are expected in 3 to 5 years.	Global developments in 5G applications and AI technology mean that the IT products delivering high performance and low power consumption now hold an overwhelming advantage.	Demand for high-performance servers and the development of the circular economy in the electronics industry is expected to grow even stronger in the next 3 to 5 years.	The increasing severity of climate problems will further highlight the importance of climate risk management for the supply chain in the next 3 to 5 years.
Impact and Scope	Upstream Supply Chain			Customized materials and technical support are provided by suppliers in support of solutions.	Increased rigor of supplier selection system and adjustment of order distribution.
	Business Operation	Higher equipment investment and production costs.	Increased production costs from investment in new equipment and R&D of low-carbon products.	Increased revenue by creating products and services with higher unit price levels through product diversification.	A risk diversification system ensures that the damage can be contained when a climate disaster occurs at critical suppliers.
	Downstream Value Chain	Reduction in product carbon cost reduces the costs borne by or passed onto consumers by importers.	Improvement in product energy efficiency reduces energy costs during use.	Reduction in energy costs during product use and waste disposal costs.	Reduce customer losses through punctual delivery.
Financial Impact on GIGABYTE		Moderate	High	High	High
Financial Impact on GIGABYTE		Annual savings in energy costs and avoidance of non-cost-effective investments required for achieving compliance with laws or customer requirements within a short time.	Revenue created by high-value and low-carbon products as well as energy efficiency benefits customers.	Revenue created by green and low-carbon products and services has high values and a recyclability ratio.	Reduction or diversification of purchasing costs from vendors located in the regions with high climate-related risks.
Main Opportunity Management Measures		<ul style="list-style-type: none"> Conduct GHG inventory in accordance with the ISO14064-1 standard with third-party verification each year and continue to monitor energy efficiency. Implement and refine the scope 3 GHG inventory, voluntarily conduct product carbon footprints and life cycle assessment, and publicize disclosure of product environmental information. Found the "Sustainability Fund" to reward units with reduction performance in order to promote continued internal innovations in reduction and improvements of resource utilization. Invest in management, personnel, and research resources for the analysis and reporting of science-based carbon reduction targets and performance assessments. 	<ul style="list-style-type: none"> Allocate part of annual revenue to research and development to develop environmentally friendly products with high performance and low carbon footprint. Analyze and calculate product carbon footprints, publish product environmental reports, provide public disclosures on the CSR website, and fulfill producer responsibility. The GIGABYTE Green Sustainable Development Committee develops and supervises the implementation of sustainability strategy. Meetings are periodically convened to monitor and supervise implementation progress. 	<ul style="list-style-type: none"> "Supplier Sustainability Assessment Questionnaire" is distributed to key suppliers every year to assess their sustainability risks in six aspects: environmental protection, corporate social responsibility, labor practices and human rights, supply chain responsibility, fair business practices, and social engagement. Recruit suppliers to support the GIGABYTE "333 Reduction Plan" of reducing carbon emissions, water use, and waste by 3% every year. 	

3.2.5 Climate Scenario Analysis

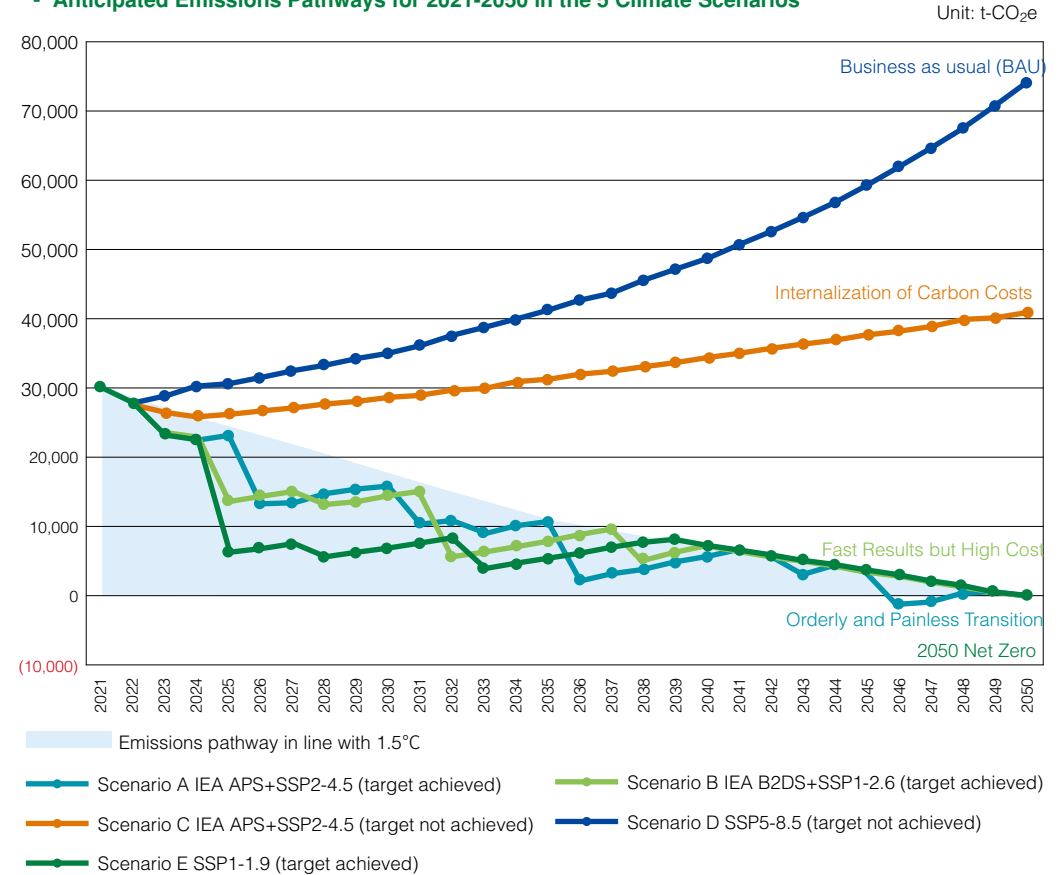
GIGABYTE refers to TCFD's "Guidance on Scenario Analysis for Non-Financial Companies" to analyze the transitional or physical effects of different future scenarios on its operations or the supply chain. The results are taken into consideration for strategic resilience. The choice of climate scenarios is based mainly on the latest scientific assessments conducted by the International Energy Agency (IEA) and UN Intergovernmental Panel on Climate Change (IPCC). GIGABYTE's own business developments, socio-economic changes in operating regions, as well as existing or planned carbon reduction plans are all taken into account to provide a more comprehensive analysis of the financial impacts and changes in timetable due to climate-related risks and opportunities.

With the baseline factors, differentiating factors, assumptions, and referenced parameters established in the previous section, GIGABYTE modeled the energy consumption, emission pathways, and financial impacts from transitional risks and physical risks towards 2050 for five scenarios, using 2021 as the base year. The scenarios "Orderly and Painless Transition", "Fast Results but High Cost", and "2050 Net Zero" represent a commitment to the 1.5°C target. In all these scenarios, emissions are reduced by 63% by 2030 and reach net zero by 2050. Their emissions pathways vary slightly owing to the different intensities and timings of the measures adopted. The scenarios "Internalization of Carbon Costs" and "Business as Usual" maintain the status quo, where global climate targets are not met. However, scenario C still shows a slight restraint on emissions since it intends to mitigate risks from climate-related regulations.

■ Description of Scenario Analysis and Selection of Climate Scenario

Scenario	Scenario Description	Be subject to International and Domestic Climate Regulations	Realize Efficient Management of Energy and Emission Reduction Targets	Adopted Climate Scenario
A. Orderly and Painless Transition	Accelerate the realization of carbon reduction targets through effective energy management and the use of renewable energy together with the investment of returns in carbon neutrality projects.	No	Yes	IEA APS SSP2-4.5
B. Fast Results but High Cost	The Company is forced to adopt less cost-effective energy conservation and carbon reduction measures to realize carbon reduction targets within a short period of time.	Yes	Yes	IEA B2DS SSP1-2.6
C. Internalization of Carbon Costs	A continued increase in carbon emissions due to the inadequate performance of energy conservation and carbon reduction projects, with the consequences reflected in compliance costs.	Yes	No	IEA APS SSP2-4.5
D. Business as Usual	A continued increase in carbon emissions due to stagnation in the Company's energy management methods with no emission reduction or carbon neutrality actions taken.	No	No	SSP5-8.5
E. 2050 Net Zero	The global community and the Company all strive to realize a net zero emissions target by 2050 through aggressive implementation of all effective mechanisms and measures.	Yes	Yes	SSP1-1.9

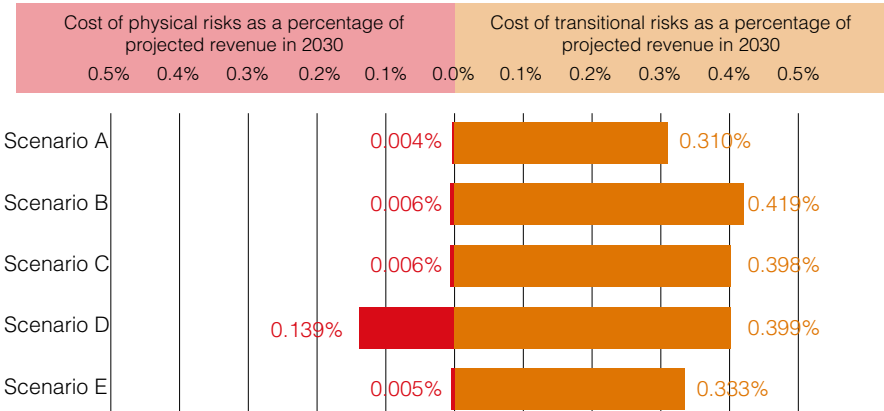
■ Anticipated Emissions Pathways for 2021-2050 in the 5 Climate Scenarios



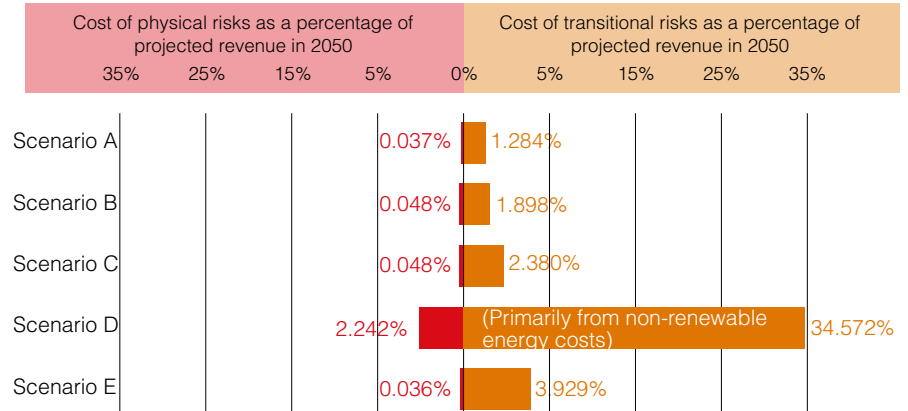
Analysis of all climate scenarios found that increased financial impact from transitional risk was unavoidable for GIGABYTE after taking into account all of the domestic climate-related regulatory controls that have been implemented or are currently under discussion, and the carbon pricing mechanisms being introduced by key markets to meet their regional climate targets. However, if we actively invest in carbon reduction measures that follow the 1.5°C emissions pathway, the cost of compliance and energy transitional risks will be lower than in the passive scenarios. Even if GIGABYTE is not subjected to any mandatory rules from climate-related regulations, if we do not invest in carbon reduction plans or bear any compliance costs under the Business as Usual (BAU) scenario then the energy crisis triggered by the depletion of global natural resources and skyrocketing fuel prices will lead to higher electricity costs. Moreover, under the BAU scenario, unchecked increases in global temperature will lead to frequent disasters and more intense regional conflicts over resources that impact on business developments in all industries. GIGABYTE will then suffer economic losses from physical risks as a result.



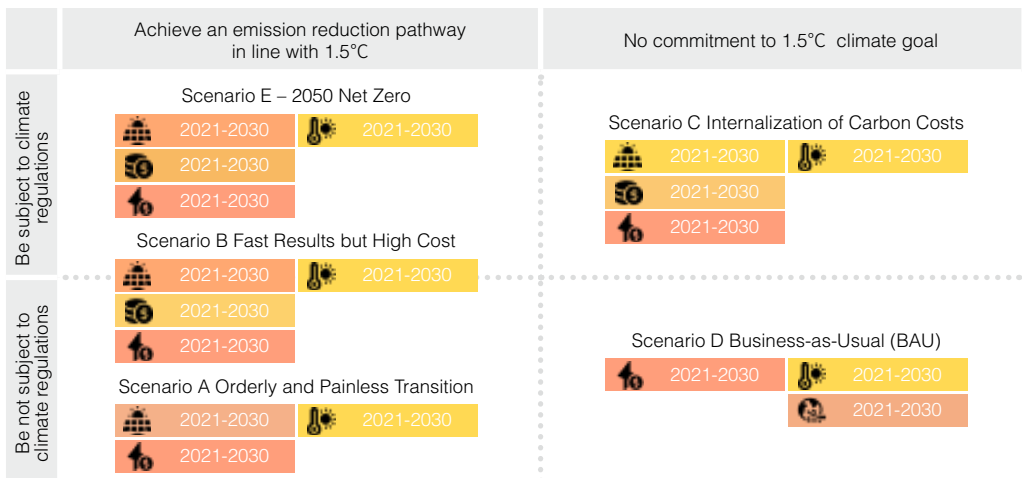
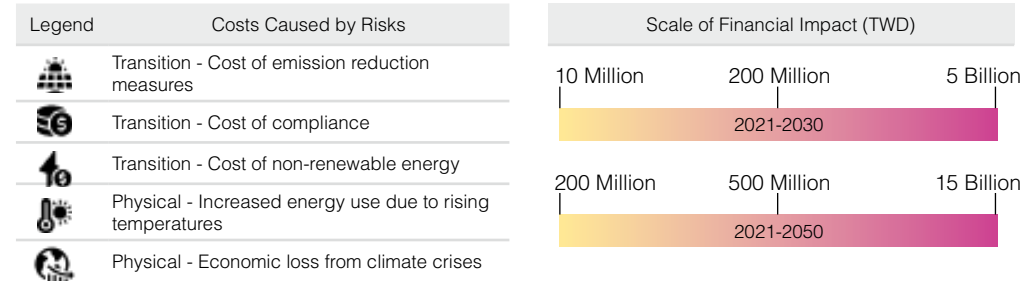
Financial Impact as a Percentage of Projected Annual Revenue in 2030 in Each Scenario



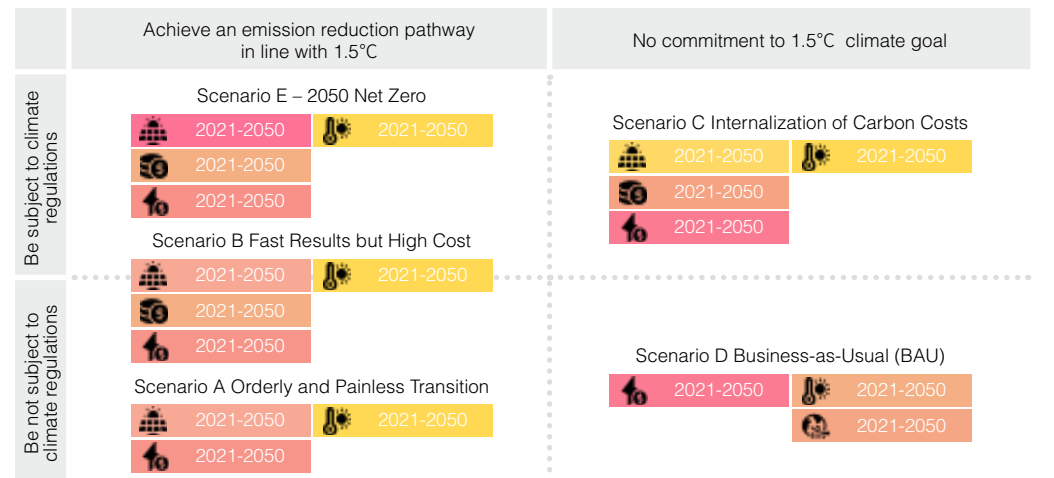
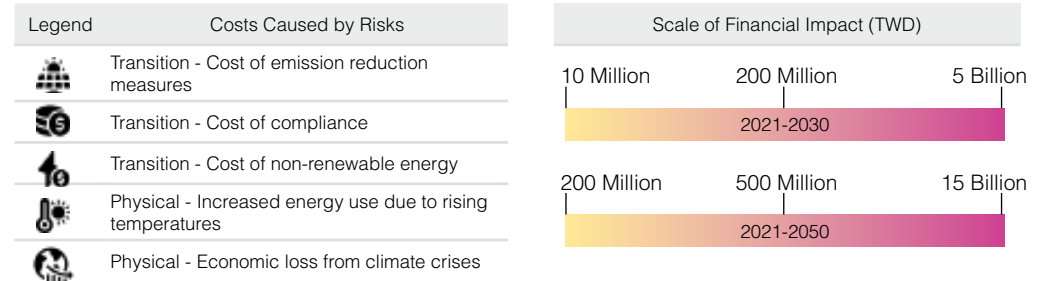
Financial Impact as a Percentage of Projected Annual Revenue in 2050 in Each Scenario



Scale of Cumulative Financial Impact between 2021 and 2030 in Each Scenario



Scale of Cumulative Financial Impact between 2021 and 2050 in Each Scenario



3.3 Product Stewardship

GIGABYTE incorporates lifecycle thinking into product research, development, and assembly and considers material recycling and environmental friendliness from the design stage. The selection of raw materials strictly follows the hazardous substances control rules. After the products are sold, we provide a longer warranty period and repair services. Furthermore, the customer service center provides electronic equipment recycling services regardless of brand. It develops a circular business model based on returned logistic services that strive to achieve resource recycling and reduce the overall environmental impacts of products.

3.3.1 Hazardous Substance Management

GIGABYTE became the first original-brand system manufacturer in the world to pass IECQ QC 080000 certification in 2005. To GIGABYTE, ensuring our products are safe for consumers and friendly to the environment is the basic principle as a manufacturer. The trends and changes in international hazardous substances management standards are reported quarterly at the Green Sustainable Development Committee meetings. A cross-department response plan will be started when it is necessary. The plan will set a response time target to ensure that GIGABYTE's products comply with the latest laws and regulations in time.

To ensure all products and services purchased by the Company reduce their content of environmentally hazardous substances, GIGABYTE defines the "Harmful Chemical Substances Requirements (HCSR)", which classifies the substances into three levels: Level A prohibited substances, Level B prohibited substances with time limits, and Level C potentially prohibited substances in the future. We can quickly eliminate prohibited substances through systematically managing the list of high-risk substances and forming respective response plans according to the hazardous levels. In 2023, 1,206 parts, products, auxiliary materials, and solder pots were tested and no excessive levels of harmful substances were found. (For more information please refer to the [GIGABYTE CSR Website](#))

▪ Harmful Substance Management Process




3.3.2 Environmentally Friendly Design

Product Design with High Efficiency and Low Energy Consumption


GIGABYTE has introduced various innovative materials, technologies, and meticulous management mechanisms at various stages of the product life cycle in order to facilitate the product's outstanding performance with high efficiency and stable durability. Moreover, the design stage takes circular economy as its core so that we will move towards the zero-waste goal. After launching the Ultra Durable Motherboard in 2007, GIGABYTE progressively introduced innovative technologies such as energy-saving switches, 2X copper PCBs, and high current capable components that boosted motherboard stability and extended product service life.

(For more information on friendly product designs from previous years, please refer to the [GIGABYTE CSR Website](#))

GIGABYTE improved the heat dissipation and energy efficiency for many products in 2023. In response to the proliferation of high-speed AI computing applications, cooling solutions for data centers were also upgraded to optimize their processor density and cooling efficiency within a limited space, improve their power use efficiency (PUE), and meet their diverse workloads. We also helped customers reduce costs and realize sustainability targets. (For more information on system cooling solutions for data centers, please refer to the [GIGABYTE Solution Website](#))




Diverse Cooling and Low-energy Design




GIGABYTE Windforce Cooling System

The system consists of three 10.8cm fans with a novel blade design, forward/reverse function, 9 high-performance pure copper heat pipes, a vapor chamber attached directly to the GPU for heat transfer, fan shutdown, and screen cooling for greatly improved cooling performance.



Nano Carbon Backplate

A nano carbon-coated backplate with a high heat transfer coefficient is fitted under the mainboard. Waste heat from PWM components is transferred via heat pipes to the cooling backplate where it can be rapidly dissipated by the nano carbon coating. Enhancing overall cooling performance at the back effectively reduces the temperature of PWM components on the back of the PCB by 10%.



Ultra Durable PCIE 5.0 Power Supply Unit

The UD850GM/PCIE 5.0 White PSU can power a PCIe Gen 5 graphics card over a single 16-pin cable to reduce clutter inside the case and improve air flow. In line with the Ultra Durable design philosophy, the product features enhanced cooling with 12cm HYB smart ultra-quiet fans. Other features include 80 PLUS® Gold power conversion efficiency, fully modular design, and compact footprint.

Friendly Packaging Materials

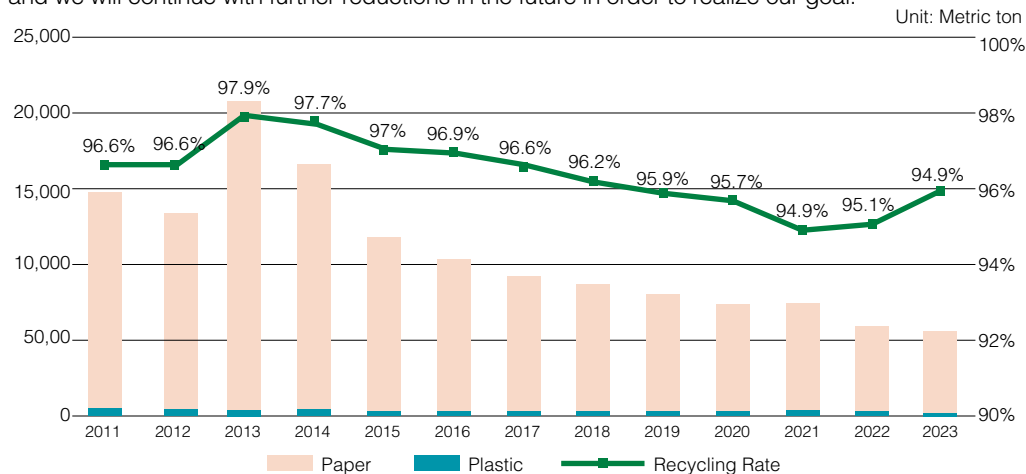
GIGABYTE product packaging complies with the EU Packaging and Packaging Waste Directive (PPWD). Emphasis is on source reduction supplemented by increasing the ratio of recyclable packaging. Measures taken included using the minimum amount of packaging, use of recyclable materials, non-use of polystyrene in padding, restrict the use of harmful substances as packaging material, and marking packaging with recycling symbols. We began analyzing our packaging recovery rate and composition in 2011 with reduction progress reviewed yearly. In 2021, GIGABYTE launched the Product Packaging and Incoming Packaging Reduction Plan. Non-use of disposable packaging materials from 2030 onwards was set as the ultimate goal.

▪ Status of Product Packaging in 2023

- Outer Transport Carton**
 - Use of 100% recycled wood pulp for e-sports graphics cards, peripherals, parts and components.
 - Use of FSC-certified virgin pulp for all Giga Computing products.
- Product Box**
 - Use of FSC-certified virgin pulp for memory and solid-state disk drives.
- Padding**
 - Introduction of recycled EPE for the AORUS notebook series.
 - Introduction of FSC-certified recycled and virgin pulp for corner protectors of Giga Computing.
- Accessories Box**
 - Introduction of recycled pulp for the AERO and AORUS notebook series.

Recycling Rate of Packaging Materials

GIGABYTE makes every effort to avoid excessive packaging while maintaining a certain level of protection. The total weight of packaging used by products in recent years has been declining. In 2023, GIGABYTE used 5,327.4 metric tons of paper and 225.3 metric tons of plastic in packaging materials, a reduction of 61.98% compared to 2011. The recycling ratio for packaging was 95.9%, and we will continue with further reductions in the future in order to realize our goal.



[Note] The recycling ratio for packaging materials was calculated using the percentage of paper in all packaging materials (plastic plus paper).

3.3.3 Product Transportation

The cost of international logistics in recent years has been affected by an increase in the number of extreme weather events and geopolitical conflicts around the world, and also the EU's inclusion of sea freight and the airline industries into its ETS. 95% of GIGABYTE's products are exported, so introducing "green logistics" can play a crucial role in supply chain sustainability management, cost control, and maintaining product competitiveness in the market.

Green Logistics

GIGABYTE is working actively to reduce scope 3 GHG emissions through green logistics. In 2022, we used the DHL GoGreen Plus service to invest in sustainable fuels. In 2023, we conducted a "green logistics survey" to partner freight forwarding agents. 18 indicators in 3 aspects were used to establish the state of sustainable logistics at freight forwarding partners. 33 ground freight, air freight, sea freight, and courier service providers were surveyed, and the overall response rate was 78.79%. We will analyze the data from vendors' responses to estimate the relevant fees and costs. A carbon emission standard for logistics will then be assessed and formulated by GIGABYTE. Suppliers will be required to provide periodical carbon emission reports to determine their completion rate.



Aspect	Indicators	The proportion of partner agents that have implemented this measure (n=26)	Aspect	Indicators	The proportion of partner agents that have implemented this measure (n=26)
Business Strategy	Implement the ESG sustainability policy	84.62%	Carbon Transparency	Carbon reports	57.69%
	Green transportation plan	76.92%		Route optimization	96.15%
	GHG emissions reduction targets	76.92%		Multimodal transport	88.46%
	ISO specification	73.08%		Biofuel solution	57.69%
	Green specialists	69.23%		Electric vehicles	73.08%
	Join the green logistic organization	46.15%		Using recyclable plastic pallets	53.85%
				Environment reverse logistics	73.08%
Carbon Transparency	Carbon offsetting plan	61.54%	Warehouse	Reducing paper processes	92.31%
	Carbon emission estimation	76.92%		Green warehousing	69.23%
	Online carbon emissions calculator	42.31%			

3.4 Circular Economy

In 2018, GIGABYTE drew on more than 20 years of professional PCB repairs and customer service expertise to set up the subsidiary Bestyfield International ("Bestyfield"). A sustainable circular economy business model was established based on a core philosophy of Mottainai^[1]. In 2020, Bestyfield obtained the highest level of "Optimizing" certification under the BS 8001 circular economy standard for business model maturity. Bestyfield is now a member of the Taiwan Circular Economy 100 (TCE100) and won 3rd place in the sustainability category of the Longterm Smile Award in 2023

[Note 1] Mottainai is a Japanese phrase used to sigh for something that is no longer what it should be. It was later used to convey regret over wasting materials, efforts, or actions.

Popularize the Value of Responsible Consumption

Bestyfield converted 6 existing repair centers in Taiwan into G+ 3C Outlet retail outlets. In 2021, some of the rapid service centers were also converted into hybrid sales and service centers. The stores' bright and minimalist design provides consumers with the same pleasant shopping experience as shopping for brand-new merchandise. The repair area was designed to educate consumers on the Mottainai spirit, and sculptures made from the powder of ground-up waste motherboards were displayed inside the store to highlight the innovative reuse of substances.

The G+ 3C Outlet sells refurbished and off-season GIGABYTE products as well as products sold on consignment by other maintenance clients. It also continues providing customer support services.



Desktop as a Service (DaaS)

Bestyfield has been focusing on corporate leasing services for notebooks, services, and office smart solutions in recent years. The DaaS business model meant that consumers now purchase a "service" instead of "merchandise." Bestyfield's DaaS model is targeted at IT equipment commonly used by institutions, groups, and businesses. A four-loop circulation plan was designed to optimize resource reuse and minimize electronic waste. Reverse logistic services ensure a "closed loop" for recycling of all products within a company and put the "closed circulation" philosophy for 100% factory maintenance into practice.



At the same time, Bestyfield actively reached out to government agencies, businesses, and school organizations through social networks in order to promote the concept and benefits of circular economy to the general public through a variety of channels. It participated in 2 public exhibitions and received 5 student visiting tours during 2023.



Strengthen Credibility of Second-hand Market

Bestyfield introduced the "Refurbished Product Certification" (RPC) to diminish consumers' doubts and distrust of second-hand products. The product that has been repaired, tested, and meets the quality standards would receive an RPC certificate and a resume showing the complete traceability of the product. The certification aims to solve the "lemon's market", which is full of cheap and defective products due to the information disparity between buyers and sellers. Also, to increase consumer trust and willingness to purchase, Bestyfield introduces "Manufacturer Approved" and "100% Tested" certificates and offers a 0-6 months warranty depending on the product type.



Recycle and Reuse Electronic Waste

Bestyfield refers to the 9R circular economy values defined by the PBL Netherlands Environmental Assessment Agency and develops an action strategy in response to "SDG 12.5: by 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse" to seek tangible environmental benefits for the electronic waste topic.

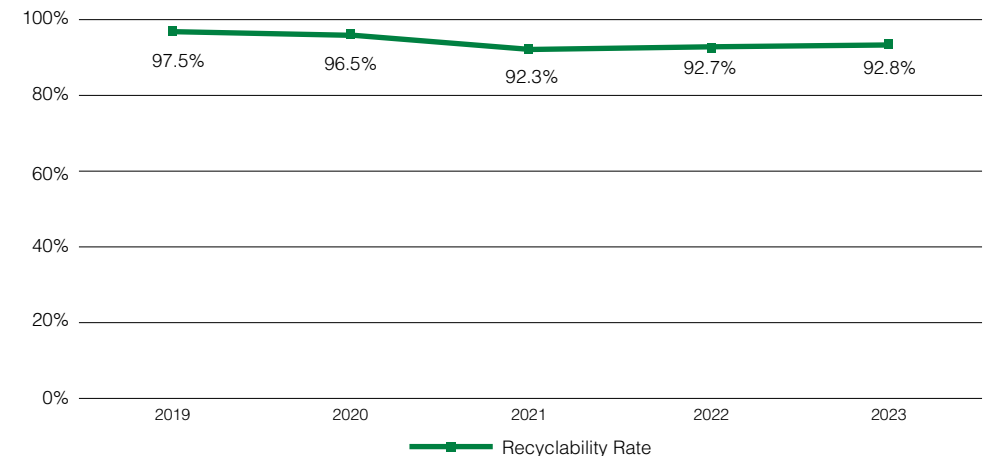
Value Proposition		Action Direction
Innovative design in the use and manufacture of products	R0 Refuse	Product maintenance quality analyses provide feedback to the manufacturing and design sides, and hopefully, the need for manufacturing can be reduced by improving serviceability at the process or design levels.
	R1 Rethink	
	R2 Reduce	
Extend the life cycle of products and parts	R3 Re-use	Use techniques such as repair, refurbishment, leasing services, as well as extension into the preowned market to ensure the resources are effectively recovered and repaired. The goal of maximizing utility and extending product life cycle can then be achieved.
	R4 Repair	
	R5 Refurbish	
	R6 Remanufacture	
	R7 Repurpose	
Material applications	R8 Recycle	The recovery and re-manufacturing of resources make materials usable by factories or repair centers again.
	R9 Recover	

In 2023, Bestyfield extended the life of 567,415 products through repair and refurbishment regardless of brand, equivalent to removing 794.8 metric tons of electronic waste. The EPA product carbon footprint database estimated emissions from solidification and disposal of hazardous industrial waste to be 130 kg-CO₂e per metric ton, so that means we reduced carbon emissions by 103,324 kg.

Action Plan	Outcome
Repair	537,107 pieces were sent for repairs and 531,590 pieces were picked up after being repaired. The repair rate was 98.97%, with 762.9 metric tons of e-waste avoided.
Refurbishment	A total of 30,308 pieces of products were refurbished and 11,421 pieces were sold after refurbishment. Unsold products were returned to the distributor's refurbished goods warehouse after refurbishment and testing for continued use. E-waste was avoided by a total of 31.9 metric tons.
Recycling and Reuse	Consumers turned in 17,464 pieces of products for scrapping while Bestyfield purchased 11,572 pieces of waste products and recovered 332 pieces of B2B leased devices. These were refurbished, remanufactured, or recycled in some other manner for reuse.

Product Recycling Rate and Environmental Impact

In addition to promoting the circular economy business model and reinforcing terminal recovery, GIGABYTE is working on increasing the proportion of reusable materials in our products to reduce the environmental burden at their disposal stage. Motherboards manufactured by GIGABYTE are mostly made of metal and plastics. In 2023, 9,032.22 tonnes of metal, 2,505.95 tonnes of plastic, 794.52 tonnes of glass, and 953.23 tonnes of other raw materials were used to produce motherboards. The average recyclability rate of raw materials was above 92.8%.



[Note] The motherboard form factors and model analyzed in 2023 included ATX (B650 AORUS ELITE AX V2), Micro ATX (B650M AORUS ELITE), and Mini ITX (B650I AORUS ULTRA).

3.5 Disclosure of Product Environmental Impact

Transparency on the environmental impact data of products is the manufacturer's duty to consumers. GIGABYTE started by building a product carbon footprint accounting system in 2016. Product characteristics and the International Reference Life Cycle Data System (ILCD) methodology were used as a guide to gradually expand the scope of disclosure to encompass product impact on terrestrial/ocean acidification and air quality (PM 2.5). As of 2022, the system is now able to issue product reports covering 16 aspects of environmental impacts. (For more information on our product environmental reports and their actual implementation, please visit [GIGABYTE CSR Website](#))

▪ Product Environmental Report

Version	Year Adopted	Number of Released Reports	Disclosed Environmental Impact (based on EU Product Environmental Footprint (PEF))	Other Information
Version 1	2018	21	3 impacts: greenhouse gases; suspended particles; terrestrial/aquatic acidification	
Version 2	2019	37	12 impacts: climate change; ionizing radiation; particulate matter; ozone depletion; photocatalytic ozone formation; mineral, fossil, and raw resource depletion; acidification; freshwater eutrophication; terrestrial eutrophication; freshwater ecotoxicity; human toxicity (cancer effects); human toxicity (non-cancer effects).	
Version 3	2020	32	16 impacts: climate change; particulate matter; ozone depletion; water use; freshwater eutrophication, marine eutrophication; resource use (energy carriers); resource use (minerals and metals); land use; terrestrial eutrophication; photochemical ozone formation; acidification; freshwater ecotoxicity; human toxicity (cancer effect), human toxicity (non-cancer effect); ionizing radiation.	Composition and recycling ratios of the materials used in the product and packaging.

▪ Product Carbon Footprint Example - G593-SD2 Server



Raw Material	2,847.5	6.3%
Manufacturing	243	0.5%
Distribution	69.6	0.2%
Use	42,109.5	92.9%
+ Disposal	35.5	0.1%
Total	45,305.1	

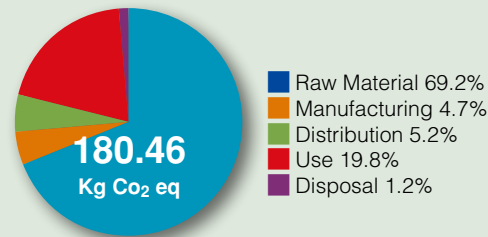
Unit: kg-CO₂e

▪ Product Environmental Report Example - AERO 16 Notebook Computer



Referring to CNS 14040 Environmental Management Life Cycle Assessment Principles and Framework and the system boundary stipulated by the Taiwan Product Category Regulation (PCR), the environmental impacts in this report are calculated based on the Screening LCA methodology. CO₂ and PM_{2.5} emission ratios are given priority to reveal as these impacts are currently the most concern by society. The rest of the 14 categories can be found in Table 1 of each report.

Climate Change



Particulate matter/Respiratory inorganics



Other 14 Environmental Impacts

The disclosure of the data in the table below is indescending order (from major to minor) according to the current public concern to the issue.

Environmental Impact	Total amount and unit	Ratio of each product life stage				
		Raw Material	Manufacturing	Distribution	Use	Disposal
Ozone depletion	2x10 ⁻⁶ kg CFC-11 eq	72.0%	2.5%	11.6%	12.8%	1.1%
Water use	44.82 m ³ deprived	79.0%	2.5%	1.3%	16.0%	1.2%
Freshwater eutrophication	0.22 kg P eq	84.5%	3.2%	0.5%	11.5%	0.3%
Marine eutrophication	0.30 kg N eq	77.9%	2.4%	5.2%	13.7%	0.8%
Resource use (energy carriers)	2342.40 MJ	68.6%	4.7%	5.5%	20.5%	0.6%
Resource use (minerals and metals)	0.06 kg SB eq	93.7%	<0.1%	0.7%	5.4%	0.1%
Land use	8087.94 Pt	89.1%	0.5%	1.6%	8.3%	0.5%
Terrestrial eutrophication	2.69 mol N eq	76.4%	2.3%	6.4%	14.3%	0.7%
Photochemical ozone formation (human health)	0.74 kg NMVOC eq	74.5%	2.4%	6.9%	15.5%	0.7%
Acidification	1.55 mol H ⁺ eq	79.7%	2.3%	4.2%	13.2%	0.6%
Freshwater ecotoxicity	15030.04 CTUe	86.6%	0.5%	0.9%	8.4%	3.6%
Human toxicity (cancer effect)	1x10 ⁻⁶ CTUh	82.6%	0.6%	0.9%	6.9%	9.0%
Human toxicity (non-cancer effect)	3x10 ⁻⁷ CTUh	69.8%	0.7%	1.6%	18.4%	9.6%
Ionizing radiation, (human health)	23.65 KBq U235 eq	67.6%	6.5%	2.7%	22.6%	0.5%

[Note] Motherboards and graphics cards are computer components. The environmental impact of these two products during the use phase cycle varies, depending on the specifications of other computer components and user habits. Therefore, the product environmental reports of these two product types released on the CSR website do not include environmental impact data during the usage stage.