

RTX 4090 Gaming Product Environmental Report

GIGABYTE endeavors to provide quality products with excellent performance and hopes to protect the Earth together with you. All brand products of GIGABYTE adhere to the principle of environmental friendliness and seek to achieve low-carbon, non-pollutant, and zero-waste. We sincerely expect you to act as a supervisor and practitioner, understanding the environmental characteristics of the product in your hands, and putting responsible recycling into effect.

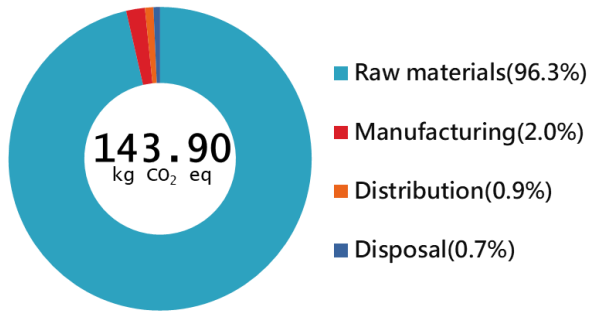


Environmental Impact of the Product

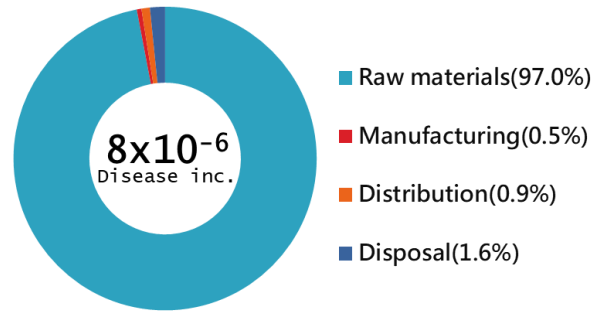
Referring to CNS 14040 (Environmental Management Life Cycle Assessment Principles and Framework) and the system boundary stipulated by the Taiwan Product Category Regulation (PCR), the environmental impacts in this report are calculated based on the Screening LCA methodology. CO₂ and PM_{2.5} emission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

¹ This unit indicates the incidence of human respiratory diseases caused by inhaling PM_{2.5} emitted from the product's life cycle.

Climate Change



Particulate matter/Respiratory inorganics



Product/Packaging Materials and Recyclability

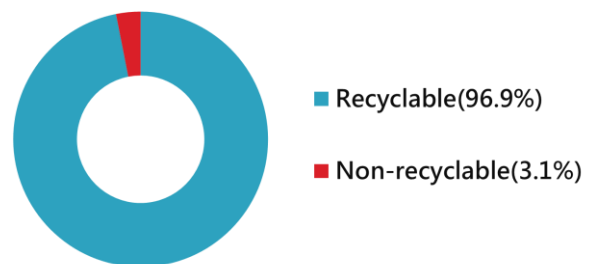
GIGABYTE actively discloses information about the composition and recycling rate of the product and its packaging materials to provide consumers with a standard to evaluate the environmental friendliness of the product they purchased. It reveals GIGABYTE’s determination to develop greener products. We will attentively choose the materials that are highly recyclable and less harmful to the environment and keep developing epoch-making technology products that can achieve environmental prosperity.

Product Composition

※ Product composition and recycling rate are calculated by weight (kg)

Metal	85.9%
Plastic	6.4%
Battery	0.0%
Glass	3.0%
Others	4.7%

Product Recycling Rate



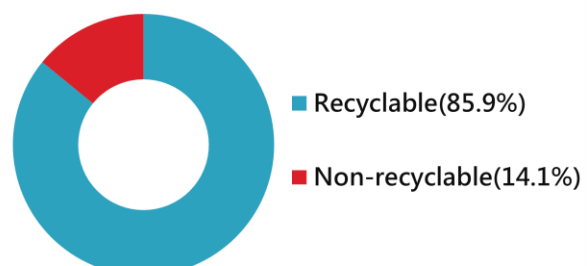
Package Composition

※ Product recycling rate are calculated by weight (kg)

Materials

Carton, corrugated paper, foam buffer, plastic

Package Recycling Rate



GIGABYTE Product Stewardship throughout Lifecycle

Do you know how large the environmental impact this product has from stages of material extraction, manufacturing, usage, and waste disposal?

GIGABYTE's product stewardship starts with a comprehensively environmental management system and eco-friendly design. We strive to eliminate harmful substances, reduce energy and resource consumption, increase the recycling rate of materials, and cut down greenhouse gas emissions at every stage of the product's life cycle. The supervision of environmental impacts with conscientiousness is to ensure reaching clean manufacturing. GIGABYTE also carefully selects the origin of raw materials to fulfill the responsibility of protecting ecology and the soundness of local communities.



Material

Source Traceability and Human Rights Protection

Tin, tungsten, tantalum, gold, and cobalt minerals are indispensable for electronic products. However, the mining processes may involve human rights violations such as forced or child labor. Moreover, the revenue from mining may be used to finance local armed forces. Using minerals from conflict areas is as same as indirectly oppressing and harming local human rights and living conditions.

GIGABYTE monitors the use of conflict minerals in our supply chain in accordance with the Responsible Minerals Initiative (RMI) under the RBA and traces the source of raw material through the Conflict Minerals Reporting Template. GIGABYTE refuses to use conflict minerals in order to safeguard the universal declaration of human rights. (For details, please refer to "[Conflict Minerals and Human Rights Management](#)")



Manufacturing

Hazardous Materials Management

GIGABYTE cares about the environmental and human health impacts our products could cause. We strictly abide by the international laws and regulations on hazardous substances and establish GIGABYTE Hazardous Substances Control Standards (HCSR) to systematically manage high-risk hazardous substances and progressively eliminate the substances which may be banned in the future.

Our products are certified by international regulations, including:

- ✓ GIGABYTE is the first system product brand in the world to obtain IECQ QC 080000 Hazardous Substance Process Management System Standard Certification
- ✓ EU Directive on Restriction of Hazardous Substances in Electrical and Electronic Products (RoHS) 2011/65/EU
- ✓ EU Regulation on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006
- ✓ EU Packaging and Packaging Waste Directive 94/62/EC
- ✓ EU Battery Directive 2006/66/EC

Production Process and Supplier Management

As an internationally leading manufacturer of computer equipment, GIGABYTE strictly complies with pollution prevention regulations and laws, adopts lead-free soldering processes, and endeavors to reduce environmental pollution from manufacturing processes. We also require suppliers to follow the same standards in order to jointly achieve the goal of clean processes. Suppliers shall carry out environmental and quality control, undergo hazardous substance investigation and report the results initiatively, and sign the "Certificate of Non-use for Hazardous Substances" as well as "REACH Declaration Guarantee". (For details, please refer to GIGABYTE's [Sustainable Procurement Guidelines](#) (Chinese version only).



Packaging/ Distribution

Package Reduction

GIGABYTE attaches importance to compact design, recyclability of packaging, and substituting paper for plastic to lower environmental impacts. The recycling rate of packaging materials keeps above 95% over the years. In recent years, GIGABYTE has shifted to strengthening the capability of R&D and design to minimize packaging waste and will progressively expand the management scope to value chain partners.



Recycling and Disposal

Extended Product Responsibility

Adhering to the spirit of extended producer responsibility, GIGABYTE launched the "3C Product (computer/communications/consumer electronics) Recycling Program" in Taiwan and set up recycling spots in Europe, North America, and India according to the Waste Electrical and Electronic Equipment Directive (WEEE). (For details of product recycling service, please refer to ["Recycling Information"](#))

GIGABYTE also founded [Bestyfield International Co., Ltd.](#) to offer repair and sales services for refurbished products of all brands. We gain consumer trust by providing quality assurance certificates and a warranty period longer than general second-hand markets give and aim to realize product returns and recycling in the long run. The products that are heavily damaged or no longer meet recycling standards will be scrapped and disposed of by legal waste treatment companies to avoid pollution.

Table 1

Other 14 Environmental Impacts

The disclosure of the data in the table below is in descending 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	Disposal
Ozone depletion	1x10⁻⁵ kg CFC-11 eq	96.9%	0.9%	1.8%	0.4%
Water use	38.02 m ₃ deprived	98.3%	1.0%	0.2%	0.5%
Freshwater eutrophication	0.23 kg P eq	98.5%	1.1%	<0.1%	0.3%
Marine eutrophication	0.21 kg N eq	97.6%	1.1%	0.7%	0.6%
Resource use (energy carriers)	1864.70 MJ	96.6%	2.0%	1.0%	0.3%
Resource Use (minerals and metals)	0.07 kg SB eq	99.9%	<0.1%	<0.1%	<0.1%
Land use	8133.7 Pt	99.2%	0.2%	0.2%	0.4%
Terrestrial eutrophication	2.34 mol N eq	98.0%	0.9%	0.7%	0.5%
Photochemical ozone formation (human health)	0.64 kg NMVOC eq	97.9%	0.9%	0.8%	0.5%
Acidification	1.34 mol H ⁺ eq	98.3%	0.9%	0.4%	0.4%
Freshwater ecotoxicity	16200.98 CTUe	94.5%	0.2%	0.1%	5.2%
Human toxicity (cancer effect)	9x10⁻⁶ CTUh	94.4%	0.3%	0.2%	5.1%
Human toxicity (non-cancer effect)	2x10⁻⁷ CTUh	94.7%	0.4%	0.3%	4.7%
Ionizing radiation, (human health)	18.97 KBq U ²³⁵ eq	96.5%	2.7%	0.5%	0.3%

Glossary

- **Product carbon footprint:** The total greenhouse gas emissions a product emits directly and indirectly through its lifetime from raw materials processing, manufacture, distribution, use, and disposal or recycling. The more energy and resources consumed, the more greenhouse gas emissions, and the larger its carbon footprint.
- **Climate change:** Excessive greenhouse gases lead to global climate abnormality. The greenhouse gases controlled by the UNFCCC include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).
- **Particulate matter/Respiratory inorganics:** It indicates the assessment of the possibility of respiratory disease caused by the ingress of inorganic dust, which diameter is less than or equal to 2.5 microns, into human bodies. Inorganic dust refers to metal, asbestos, coal, or cement dust.
- **Ozone depletion:** The ozone layer protects life on Earth from highly hazardous ultraviolet radiation (UVR). Before the implementation of the Montreal Protocol, the massive use of certain substances had led to ozone depletion, also known as the ozone hole, which subsequently posed threats to life and human health.
- **Water use:** Water is a vital substance to sustain life. According to statistics, 1 out of 3 people in the world lacks access to clean water. That makes them suffer from diarrhea or face death because of touching or drinking unclean water and poor sanitation.
- **Eutrophication:** The input of specific nutrients, including synthetic fertilizers, feces, wastewater, and sludge produced by human activities, causes algae to proliferate in the waters. The overgrowing algae deplete water's oxygen, without which the water stinks and makes creatures unable to survive. As for terrestrial eutrophication, it will affect the growth of native plants and the development of animal communities.
- **Mineral, metal, and fossil fuels (resource depletion):** Mineral, metal, and fossil fuels are non-renewable resources. According to the Statistical Review of World Energy, the deposits of crude oil, natural gas, and cobalt will run out in around 50 years.
- **Land use:** To meet the security of food supplies and the requirements of economic growth, people turn forests and fields into farms and pastures, leading to less biodiversity and more greenhouse gas emissions.
- **Photochemical ozone formation:** Photochemical ozone is a near-ground haze formed as a result of pollutants from factories and automobiles reacting with sunlight. They can cause human respiratory diseases, reduce crop yields, and accelerate the deterioration of building materials.
- **Acidification:** Substances such as carbon dioxide, nitrogen oxides, and sulfides in the atmosphere fall onto the ground with rain or snow and acidify the soil. Acidified soil is favorable for the fecundity of agricultural pests. Also, it causes more losses of minerals and thus results in more use of pesticides and chemical fertilizers.
- **Ecotoxicity:** It indicates the physiological and biochemical responses triggered by aquatic life interacting with poisonous and hazardous materials.
- **Human toxicity:** It indicates the assessment of the possibility of human disease caused by chemical ingress into human bodies through inhalation, food/water ingestion, and skin contact.
- **Ionizing radiation:** The energy of ionizing radiation is greater than that of non-ionizing radiation. Ionizing radiation radiates outwardly at 360 degrees, and its penetrability, depending on the exposure dose, can damage human cells or lead to cancer, even death.