# 4

# **Green Operations**

- 4.1 Eco Design and Product Liability
- 4.2 Climate Change Strategies
- 4.3 Greenhouse Gas Inventory and Energy Management Actions
- 4.4 Environmental Management
- 4.5 Appendix : Key Performance in Product Environmental Specification Compliance and Voluntary Environmental Labeling

80

# 4.1 Eco Design and Product Liability



## Vision and Commitment

In respect to the global Sustainable Development Goals, Advantech is responding to SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production). Starting from raw materials, product design and extending into manufacturing and environmental management, we are gradually setting goals and introducing each item of the standards. We thus are willing to do our best to improve the environment, reduce environmental impact, and produce environmentally friendly products.

## Management Guidelines for Major Topics/Management Structure

## ▲ Phased Achievements and Future Goals of Eco Design

		Item	2021 Results	2022 Goals	2025 Goals	
Major issues	Eco design and product liability		100% of raw	100% of raw	100% of raw	
Materiality	Advantech is committed to providing eco design, eco manufacturing, eco energy products, long- term operations, and building a sustainable supply chain. Starting from product design is the most critical task, carrying out Eco Design-In from raw materials/packaging materials/energy consumption/ recycling to fulfill the responsibility of eco product		materials continue to achieve compliance with mandatory international regulations and Advantech's standards for regulated substances.	materials continue to achieve compliance with mandatory international regulations and Advantech's standards for regulated substances.	achieve compliance with mandatory international regulations and Advantech's standards for regulated substances. standard models	
	management.	International Energy		Expanded the	Completed the	
	<ul> <li>Eco design guidelines are established and introduced into the product development process, based on international regulations and horizontal diffusion to energy apping standardized design</li> </ul>	Environmental Protection Labels Energy Star/ErP	Completion of trials for six specific models	energy consumption design to 15 new models	implementation of all standard models	
Management policy	•We have fully launched the eco design reward and process system.		Improve eco design standards and guidelines and introduce them into the product development process	<ul> <li>20% (Advantech's newly developed standard products</li> </ul>	<ul> <li>80% (Advantech's newly developed standard products</li> </ul>	
	<ul> <li>In terms of systematic management (dashboards), we have established a visual eco product dashboard to improve Advantech's eco product performance.</li> </ul>			meet the four requirements of eco design standards)	meet the four requirements of eco design standards)	
Goals and Effectiveness	In accordance with management policy objectives, every year we evaluate whether achievement of key performance indicators (KPIs) has improved in comparison with the previous year as a means of improving management.	Guidelines for Eco Design Standards		•Strengthen low- energy design and expand horizontally (introducing compliance with ErP European Energy- Related Products Directive)	• Strengthen low- energy design and expand horizontally (introducing compliance with Energy Stars/ErP European Energy- Related Products Directive)	

Company Management and Governance Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix

## M Highlighted Projects or Performance Figures

# 100%

Review the latest international environmental protection needs every year, formulate Advantech's Green Policy Hazardous Substance Reduction Program, and achieve 100% of the target

#### **100%** of raw materials continue to achieve compliance with mandatory international regulations and Advantech's standards for regulated substances.

# New

Plan the internal Design Quality Assurance verification mechanism, and introduce into the product development process while accumulating the product energy consumption database

# 4.1.1 Eco Design

## A Eco-Product Target setting

In the second half of 2020, we formulated an eco-product innovation design project to promote higher standard eco design guidelines to R&D units. We encouraged the adoption of eco design innovation processes and invited product department proposals to participate in the internal selection.

We introduced the innovative design process of eco-products in stages while setting short, medium and long-term goals. In 2021, we completed our formulation of four major design criteria (packaging, materials, recycling, and energy consumption) and established an inspection system. In 2022, our target is that 20% of newly developed standard products should comply with eco design with full implementation, while 50% in should be achieved in 2023, and 80% of new products should meet the requirements in 2025.



#### Figure 4.1.1 Eco Product Innovation Design Project

STEP01STEP02STEP03Image: StepImage: Step

#### Objective

• Design guidelines established, producing eco product standards

#### Action

- Design guidelines established by the PMO Integration Committee
- Establish an eco product standard grading system (gold/silver)
- Each BG pilots a total of 6 new product introduction processes

#### Objective

• Top-Down support is fully implemented in the NPI process

#### Action

- 2021/1~2021/3 Product Division opens DCP to promote internalization
- 2021/4~2021/6

Standard Top-Down thoroughly imple ments the eco design process

#### **Objective**

- Long-term establishment of eco quality management to check products
- Circular communication of product eco design optimization before the DCP process

#### Action

- Adjust each BG practice using adjustment flexibility according to implementation results
- Class A and A+ models fully introduced
- In 2022, 20% of new products to reach the silver level or above

82

Company Management and Governance Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix

## A Eco Product Design Management Mechanism

From the four product standpoints of (1) green materials, (2) green package materials, (3) product recycling, and (4) product energy saving, we design innovative eco products by formulating standards to evaluate product environmental impact from production and manufacturing to transportation, consumer use, recycling, disposal, and so on; and by complying comply with international regulations as well as customers' needs.



## Interdepartmental Committee

We set up an Eco Design Management Committee, with Advantech's Project Management Optimization (PMO) convening relevant departments to formulate standards and to oversee their implementation, management, and inspection.



Figure 4.1.4 Eco Product Management Committee

## Setting of Standards

Based on international environmental regulations or international assessment tools (such as the US Electronic Product Environmental Assessment Tool, or EPEAT) as well as our experience in serving brand customers, we have formulated and promoted eco design standard guidelines for energy efficiency, eco-design, and reduction of environmental toxic hazards, in the form of Advantech's Eco-Ecological Design Standard Guidelines. Furthermore, we provide tools for inspection standards that will offer certification when passed.

Company Management and Governance Innovation and Service Green Operations

Employee Care

Altruism Benefit

Altruism and Social

Appendix

#### Table 4.1.1: Examples of Eco Product Design Content Planning

Product type	Key points in environmental design	Design content
		Conformance with provisions of European Union RoHS Directive, China RoHS, Taiwan BSMI RoHS, IEC62474
		Conformance with substance restriction requirements of the European Union Battery Directive
		Reduction of Bromine and Chlorine content of plastic parts >25 grams
		Conformance with supply chain communication provisions of European Union REACH Regulation
	Improve energy efficiency. Eco design.	Elimination of added heavy metals in packaging
		Restriction on the use of elemental chlorine as a bleaching agent in paper-based packaging material
Industrial panel PCs, servers, IPCs, and motherboards		Enhancing recyclability of packaging materials
	Reduce hazardous	Recycled fiber in corrugated packaging
motherboards	waste.	Design for repair, reuse and recycling
		Design for plastics recycling
		Product recyclability calculation and minimum 90% recyclability rate
		Information and reporting in preparation for reuse and recycling
		Replacement components availability
		Energy efficiency



## A Examination of Product Development Stages

With management from the source, we set up relevant departments at each check point in the design and development stage to ensure quality and adherence to eco design goals.



Figure 4.1.5 Eco Product Innovation Design Projects

## ▲ Eco Design Award System

We offer rewards to encourage colleagues within the Company to design environmentally friendly eco products and produce eco benchmark products for Advantech

Figure 4.1.6 Outstanding Eco Product Awards



Company Management and Governance Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit

al Appendix

## Action Plan

1. The R&D Technical Committee has carried out horizontal high-efficiency and energy-saving design across business groups, introducing a high-efficiency power module strategy and choosing choose power modules with energy savings and high conversion efficiency for improvements at the source. Advantech plans to improve the replacement strategy for power modules in the next three years.



2.Developed a publicly-available version of standard energy-saving design circuit modularization: starting from material selection and from software and hardware design optimization. (This refers to the Erp & Energy Star international regulations on energy efficiency optimization to accelerate the internalization of energy-saving design.)

Figure 4.1.8 Internalization of Energy-Saving Design R&D



#### Product Energy-Saving Design (Hardware side / Software side)

Hardware design: Establish energy-saving IP to reduce component energy consumption
Software design:

Use energy saving mode



Improving Power Efficiency

Use high-efficiency power modules

#### Use and refer to existing instructions



ENERGY STAR US Energy

EU Energy-Related Products Directive (ErP)

US Energy Star

87

3.Established a mechanism for eco design situation room management: with direct management through the Eco Design Dashboard and the support of the Executive Top down, the import status of the four standpoints is regularly converted into carbon reduction effects and the status is checked monthly. The goal in 2022 is to introduce 20% high-efficiency eco products.

Figure 4.1.9: Eco Design Dashboard Inventory Implementation Plan

		2022 Q1 2022 Q2		2022 Q3			2022 Q4		Input cost/				
Index	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Estimated (kSNTD)
New products energy-saving design													
Number of cases eligible for Energy sta	r -	-	-	-	-	-	-	-	-	-	-	-	
SBT carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	6,140
Target carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	
New products use green packaging ma	New products use green packaging materials												
Used recycled pulp in package(ton)	-	-	-	-	-	-	-	-	-	-	-	-	
Carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	0
Target carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	
New products increase recycling rate													
Import type (type)	-	-	-	-	-	-	-	-	-	-	-	-	
Carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	38,054
Target carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	
New products use green materials													
Import type (type)	-	-	-	-	-	-	-	-	-	-	-	-	
Carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	38,054
Target carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	
Total													·
Actual total carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	29.054
Target total carbon reduction (ton)	-	-	-	-	-	-	-	-	-	-	-	-	30,034

Company Management and Governance

Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix

## A Performance Presentation

Advantech is expected to develop silver medal eco design product models in 2021~2022

Product Number	Product Type
TPC-107W-N31A	
UNO-127-E22BA / UNO-127-E23BA	
IPC-610 (AIMB-708) / IPC-320 (AIMB-308)	
PPC-415 / PPC-112W	Computers and computer servers
POC-621	
VEGA-7110-75R	
VEGA-6301M	



# 4.1.2 Product Liability

Advantech reviews the current status of hazardous substances management every year in accordance with international regulations, customer requirements and environmental trends, doing so in order to reduce environmental and ecological impact, fulfill corporate responsibility for environmental sustainability, meet the expectations of stakeholders, and continue to adhere to the requirements of international regulations. We have thus formulated Advantech's Green Policy (Hazardous Substance Reduction Program), and we regularly update Advantech's eco product rules for the management of hazardous substances. These in turn are managed through an green supply chain management platform.





Sustainability Vision and **Company Management** and Governance

Goals

Innovation and Service Green Operations

**Employee** Care

Altruism and Social Benefit

Information docking . Green data survey operatior  $\odot$ Green Mark (On going) Kunshan green data Green Material or component  $\bullet$  $\bullet$ Product risk assessment the supply chain Management Asses the usage of System substancesat Advantech Ensure components comply with new regulations regulations (E.g., RoHS Exemption)

Figure 4.1.11 Green Supply Chain Management Platform GPMS

#### Generate product reports . for clients

Assess announcements of  $\checkmark$ Advantech meeting **RoHS & REACH** 

Assess other regulations



Appendix

- Establish internal regulations
- Release, review, and confirm
- Upload supply chain green data

# Information delivery to

- Announce relevant information
- Update critical regulations or announcements regarding client

## **Conflict minerals survey** (expansion)

- Report conflict minerals in line with Responsible Business Alliance
- Update the list of smelters and perform surveys and product qualification reporting

Advantech established a Green Supply Chain management system in 2010. On this supply chain platform, suppliers must promise and guarantee that their products do not contain harmful substances listed by the Company, and provide supporting documents for future reference. We optimize this platform every year, activate the database, and form an effective green supply chain. Advantech has introduced its hazardous substance management system since 2010. We uphold the spirit of strict quality management, continuously controlling every aspect of product responsibility. From 2018 to 2021, the products were in compliance with relevant regulations.





Company Management and Governance

Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix



#### Case Focus: Sony Green Partner\*

Beginning in 2012, Advantech has become a Sony Green Partner. From component partners to OEM partners, we have challenged many levels. In recent years, only document review is required, and certificates can be directly extended. Becoming a Sony Green Partner shows that Advantech's green management performance is highly recognized by customers.

\*Note: Sony Green Partner certification ensures that all links from procurement to production and delivery are systematically controlled for the green product management system. It minimizes the risk of introducing any kind of non-environmentally friendly substance into products while enhancing customer products to continuously meet the requirements of environmental protection substance standards. It serves as the best partnership to maintain Advantech's environmental requirements and commitments to products, and offering product lines that meet more updated environmental concerns.

## A Product Recycling

In response to the specifications of WEEE and sustainable product design and development, we re-examined our cooperative product recyclers and start to replace those located in Europe at the end of 2020. (Recycling countries include Sweden, Denmark, Austria, Italy, Netherlands, Poland, Spain, the United Kingdom, France, and Germany.) We have made plans with a life cycle thinking approach and calculated the tonnage of product recycling based on the annual effective recycling data provided by the recyclers. It has been confirmed by Advantech Europe's Netherlands branch that recycling and processing data requires cross-year statistics. Full data is expected in 2023.

## Future Direction

Advantech has always adhered to the concept that products follow a life cycle. In the future, we anticipate using life cycle assessment (LCA) and product carbon footprints to quantify the impact of Advantech's products on the environment. The assessment project includes the carbon emissions from the extraction, manufacturing, distribution, use and final disposal of upstream raw materials, and will further set carbon reduction targets and take actions to implement the reduction, which will be incorporated into the Company's operational management goals.



## 4.2 Climate Change Strategies

Advantech has included climate change as one of the major risk projects of corporate sustainable management, and has managed it according to the two standpoints of "mitigation" and "adaptation." At the same time, we are also actively identifying risks, building adaptation capabilities, further researching and analyzing opportunities for climate change, and accumulating and deepening R&D momentum. We continue to invest in eco energy and in energy-saving products and solutions, and we are integrating them with the core business of energy management to promote energy conservation and sustainability.

Advantech set a Science-Based Target (SBT) for carbon reduction in 2021. Using 2019 as the base year, we proposed targets of reducing the carbon intensity of Scope 1 and Scope 2 products by 60% by 2030, and reducing that of Scope 3 products by 49%. Furthermore, we passed a compliance review organized by the Science-Based Targets Initiative (SBTi). This makes us the third technology industry company in Taiwan to pass such a review, and we continue to move forward in pursuit of these goals.



#### Figure 4.2.1 Advantech's SBT Targets

\*Note: Having set 2019 as the base year, Advantech applied for SBT targets in 2021; hence, 2021 marks the first year of carbon reductions and the period in which the relevant carbon reduction plans were drawn up. Therefore, relevant results will only be available from 2022. For the relevant product carbon reduction plan, please refer to the action plan given in 4.1.1.



Company Management and Governance Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit

Appendix

## **4.2.1 TCFD Governance Structure and Climate Management Strategy**

Businesses face potential operational shocks from the extreme climate events caused by climate change; from the low-carbon transition pressure brought about by the aggressive carbon reduction targets among a range of countries; and from the carbon reduction requirements imposed upon the upstream and downstream of the value chain. The world faces a need to gradually strengthen the connection between identifying climate risks on the one hand and financial impacts on the other. Under the impetus of our ESG Corporate Sustainability Committee ("the ESG Committee"), Advantech responded to this trend in 2021 by having the ESG Office integrate cross-departmental resources and introduce the Task Force on Climate-related Financial Disclosures ("the TCFD"). In accordance with the recommendations of the TCFD guidelines, we have taken a systematic approach in measuring the climate risks and opportunities faced by the Company, and have thoroughly evaluated the climate change risks that the existing risk management procedures that the Pan-Operational Risk Map focuses on. Evaluation results and response plans have also been reported to the senior management of the ESG Committee for confirmation. Furthermore, the ESG Committee regularly reports the progress of climate management to the Board of Directors, so as to enhance the Company's resilience in dealing with climate risks.

		Advantech's Climate Governance Fram	nework
	Board of Directors	<ul> <li>The highest supervisory unit for risk management (including climate risk)</li> <li>Review major climate-related goals and implement budgets</li> </ul>	<ul> <li>Oversee climate risk management and strategies to drive results</li> </ul>
	Chairman	• Chair the ESG Committee and leading the management mechanism for climate issues	Confirm climate-related KPI targets and action plans
کی Governance	ESG Corporate Sustainability Committee	<ul> <li>The main authority and decision-making unit of climate risk management</li> <li>Regular reporting to the Board on climate management progressmanagement progress</li> <li>Review climate-related risk and opportunity assessment results and response strategies</li> </ul>	<ul> <li>Approve climate risk disclosure report</li> <li>Monitor the implementation of climate issues and review KPIs</li> </ul>
	ESG Office	<ul> <li>Coordinate the execution of climate-related risk and opportunity analyses and integrated disclosure report</li> <li>Promote climate-related action programs and report progress to ESG Committee quarterly</li> </ul>	<ul> <li>Research and analyze climate policy and scientific research development trends; regularly monitor climate risk events</li> </ul>
	Board Oversight	• The ESG Committee regularly reports climate-related management plans and results to the Board of Directors, while the Board of Directors reviews relevant major goals and budgets	• In 2021, the Board of Directors decided to approve Advantech Taiwan's eco power target and renewable energy PPA procurement budget, and a project for cooperating with renewable energy companies to set up solar power plants
	High-Level Management Mechanism	<ul> <li>Led by the Chairperson, the ESG Committee holds meetings estrategic planning, and implementation progress. Meanwhile, climate-related risks and opportunities assessment results ar</li> </ul>	each quarter. The ESG Office reports on trends in climate-related issues, the ESG Committee monitors the performance of its goals and reviews nd response strategies

Advantech 2021 Sustainability Report

	Disclosed Aspects	Advantech's Implementation Status					
िर्गु Strategy	Short-, medium-, and long-term risks and opportunities	<ul> <li>Advantech has identified six risks and five opportunities that are of material importance to the Company in view of their impact levels. We have made these identifications with reference to the TCFD guidelines on risk and opportunity issues and their financial impacts, combined with operational bases and industry analysis.</li> <li>"Short," "medium," and "long-term" are respectively defined as three years, three to five year s, and more than five years in assessing when each issue is likely to occur</li> </ul>					
	Potential impacts and financial planning	• We qualitatively assess the possible financial impact of each major risk and opportunity. Based on this, we develop preventive and improvement measures and formulate KPI goals.					
	Situational Analysis	• We analyze carbon reduction amounts and the financial impact on the Company based on Beyond 2 Degrees Scenario (B2DS) and the 1.5 Degree Scenario (1.5DS) of the International Energy Agency (IEA). In addition, we also use the RCP8.5 high-warming scenario to analyze physical impacts on operations so that we might include them in the assessment of the resilience of the adaptation strategy.					

	Disclosed Aspects	Advantech's Implementation Status
∠Ì⊙ Risk Management	Evaluation and Management Process	• Every year, the ESG Office convenes its members across departments to collect and review the Company's climate risk and opportunity factors. Through their levels of impact and likelihood, it assesses major climate issues, monitors changes in risk levels, reviews and develops response strategies, and reports them to the ESG Committee for resolution. As well as reviewing relevant disclosures, the ESG Committee makes regular reports allowing the Board of Directors to monitor the progress of climate risk management and review major relevant decisions
	Overall Risk System Integration	<ul> <li>At the beginning of each year, the Risk Management Task Force evaluates the Company's overall operational risks according to risk management procedures, and it draws a pan-operational risk map in reporting the risk management process and planning to the Board of Directors. Climate change risk will be included in the assessment process from 2021. We identify its risk level in line with the main investigation of the Audit Office and cooperate with the ESG Office to evaluate and identify its risk level</li> <li>This year, the complete evaluation process of TCFD was introduced. The assessment practices and results will be applied to the climate change risk analysis in the above risk map, integrating it into the overall risk management process</li> </ul>

	Disclosed Aspects	Advantech's Implementation Status
Ĩ	Greenhouse Gas Scope 1, 2 and 3 Emissions and Targets	<ul> <li>Passed SBT Science-Based Target Carbon Reduction Review</li> <li>Each year, Advantech Taiwan and Advantech Kunshan each complete ISO 14064-1 greenhouse gas inventory, verification, and target tracking</li> </ul>
Metrics and Goals	Other climate-related management indicators and targets	<ul> <li>We have set targets for power saving, use of renewable energy, water saving, and eco products as percentages of revenue as well as energy efficiency improvement of product power supplies</li> <li>We are planning to introduce the ISO 50001 energy management system and LCA life cycle carbon footprint assessment of main products. In the future, management indicators and goals will be set for related strategies</li> </ul>

\*Note: The corresponding names of greenhouse gas categories under the new version of ISO14064-1 are divided into: Scope 1, corresponding to Category 1; Scope 2, corresponding to Category 2; and Scope 3, corresponding to Categories 3 to 6.

Company Management Inr and Governance

Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit

Appendix

## 4.2.2 Identification of Climate-Related Risks and Opportunities, and Financial Implications

Advantech's ESG Office convenes members across departments to define risks and opportunities in accordance with the TCFD guidelines. In addition, it undertakes multi-faceted topic collection, cross-departmental discussions, and external consultation to specifically identify Advantech's major risks and opportunities and the corresponding potential scenarios of occurrence and impact levels, and to analyze the possible financial impacts. Furthermore, we focus on industry characteristics and international contexts in three major aspects: operations (reductions and natural disasters), product and supply chains, and markets. We do so in order to facilitate the inventory of climate risks and opportunities at the Company's overall level, and to accurately propose relevant strategic countermeasures.



#### Climate Risk Climate Opportunity **Risk or** Impact Category **Risks or Opportunities Faced by Advantech** Level **Financial Impact** Advantech's Response Strategy **Opportunity Issue** Period Cap and carbon Regarding the implementation of greenhouse gastrading, carbon tax, Medium Increased operating related regulations, this may require the purchase Replace high energy-consuming Medium and carbon fee term costs of credits or mandatory carbon-related fees equipment and establish a Building system Energy Management System (BEMS) Increased Invest in eco energy equipment for Transformation factories and offices operating costs risk Taiwan's electricity diversion and China's electricity Regulations Increased capital Strengthen the maintenance and testing curtailment policy have caused interruptions related to energy Medium Short term expenditures of the uninterruptible power system, in water supply and power supply, increasing curtailment Causing business and establish contingency measures for equipment damage and UPS maintenance costs interruptions and power curtailment reduced revenues · Set carbon reduction KPIs for each department Emission reduction Emission reduction measures such as replacing Plan to import ISO 50001 energy measures to old equipment and adjusting the operation mode Save operating **Opportunities** Medium Short term management system improve production of reflow furnaces to improve energy and resource costs Operations efficiency utilization efficiency and operational resilience Establish a business continuity plan (BCP) and exception handling procedures, and conduct regular drills Increased capital · Strengthen the maintenance and testing expenditures of drainage facilities and anti-flooding Heavy rainfall/ Heavy rainfall exceeding the maximum capacity Reduced asset operations; evaluate the configuration of flooding from of the drainage system; operational interruptions Short term value Physical risk Medium power generation facilities and add energy such as power outages caused by flooding strong typhoons Causing business storage equipment interruptions and Plan to conduct risk assessment of reduced revenues operating bases based on external data and scenarios of climate flooding potential; develop warning levels and countermeasures Increased demand for low-carbon products. • Set up an eco-design management Low-carbon Additional costs such as design and development, committee, for four product aspects: technology Increased replacement of environmentally friendly materials, High Short term green materials, green package materials, introduction cost operating costs and safety certification fees for the introduction product recycling, and product energyof products of derived low-carbon technologies saving. Refer to international standards to formulate eco design standard guidelines Product / Transformation New product or material design to Supply Chain risk Customers' Increased incorporate energy efficiency standards Increased requests from customers to investigate requirements for operating costs and existing product design changes to Advantech's greenhouse gas emissions, carbon suppliers to save Effect on orders, High Short term achieve energy efficiency goals reduction targets, and measures; derived carbon energy and reduce and reduced Products strengthening environmental reduction pressures and associated costs carbon emissions revenues protection materials and service life extension design

## Climate Risks, Opportunities, and Strategic Countermeasures

98

Company Management Ini and Governance

Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix

Category		Risk or Opportunity Issue	Risks or Opportunities Faced by Advantech	Level	Impact Period	Financial Impact	Advantech's Response Strategy	
Product/ Supply Chain	Transformation risk	Low carbon products or product energy efficiency requirements	The EU ErP Energy Efficiency Directive expands the scope of control, and those who do not meet the energy efficiency requirements may face a decline in sales. In response to the demand for low-carbon products, we have voluntarily introduced the US Energy Star standard to expand our competitive advantage	Medium	Short term	<ul> <li>Increased operating costs</li> <li>Effect on shipments, and reduced revenues</li> </ul>	<ul> <li>Adjust the weight and size of the packaging materials to reduce material usage and carbon emissions from transportation</li> <li>Strengthen communication between suppliers and customers, facilitating the procurement of green materials and the launch of compliant products</li> <li>Conduct ESG risk investigation, assessment and coaching improvements for suppliers; planning requires key/high energy-consuming suppliers to conduct carbon inventories</li> <li>Plan to import LCA product life cycle carbon footprint assessments for main products</li> </ul>	
Market	Opportunities	Participate in investment in the renewable energy supply market	Invest in the eco energy industry in line with the tightening of renewable energy regulations and the trend of RE100, such as setting up a solar power plant with micro-electric energy; develop relevant market opportunities	Medium	Short term	Increased revenue		
		Expand climate mitigation market demand	In respect to the global acceleration of expanding net zero emission goals and demand derived from carbon control policies, Advantech's IoT software and hardware products are entering the climate mitigation application market in areas such as energy information management systems	Medium	Short term	Increased revenue	<ul> <li>Invest in renewable energy companies or cooperate with their technology to ensure the supply of eco electricity in the future; and improve the cloud management platform technology related to the new energy field</li> <li>Integrate IoT products, solutions and technical services; expand applications in client energy management. eco energy and</li> </ul>	
		Participate in the construction of relevant renewable energy infrastructure	In response to the development needs of renewable energy, we are developing intelligent maintenance and monitoring solutions related to energy and energy storage equipment, e.g., in renewable energy communication gateways, thereby increasing market share in the new energy industry	High	Short term	Increased revenue	<ul> <li>client energy management, eco energy, and energy storage equipment, environmental monitoring, etc.</li> <li>Regional business units and the emerging business opportunity division can instantly grasp new business opportunities in climate-related markets, formulating business development plans</li> <li>Plan and quantify eco revenues from low</li> </ul>	
		Expanding demand for climate adaptation solutions	Intensified climate change will bring adaptation needs, and Advantech is integrating IoT technology to provide solutions for landslide and flood control monitoring, sponge cities, intelligent agriculture, etc. to tap into emerging adaptation opportunities	Low	Medium term	Increased revenue	carbon/climate related solutions	

\*Note:

99

1.Impact level: conduct internal assessments based on the likelihood of occurrence and the degree of impact, dividing them into "High," "Medium," and "Low."

2. Impact period: considering when occurrence might happen, divided into "short term (<3 years)," "medium-term (3-5 years)," and "long-term (>5 years)."

# 4.3 Greenhouse Gas Inventory and Energy Management Actions



Advantech adheres to the original devotion to the idea of being a global citizen, and to the corporate purpose of living a happy life. We are thus willing to contribute to environmental improvement and labor safety maintenance. Advantech has gone beyond introducing the ISO 14001 environmental management system in 1996 and the OHSAS 18001 occupational safety and health management system in 2005 (revised in 2020 to ISO 45001). In addition to complying with the relevant government environmental protection and labor safety and health laws and regulations, we are also committed to reducing the impact on overall environmental safety and health in the greenhouse gas management, product design, product use, and disposal stages. And through the participation and commitment of all employees, we can achieve the goal of environmental protection and sustainable development of the business. This chapter's writing scope covers Taiwan factories region and Kunshan factories, together accounting for 94% of total revenue; there is also further disclosure of a small amount of information concerning our Japan factories.

## Management Guidelines for Major Topics/Management Structure

Major issues	Greenhouse gas inventory and energy management actions	ltem	2021 Results	2022 Goals	2025 Goals
Materiality	Global climate change is an important issue for humankind at present. We are committed to reducing greenhouse gas emissions and energy consumption, implementing greenhouse gas inventory, and promoting energy and resource conservation and management. We look forward to fulfilling our responsibilities for global environmental protection and creating a sustainable green industry.		<ul> <li>Advantech's overall GHG emission density per unit of revenue decreased by 16.49% compared with 2020</li> <li>The annual reduction of energy consumption per unit of output value in the Taiwan manufacturing area is 16.32%; the annual reduction of energy consumption per unit area in the office area is 6.60%; and the annual reduction of absolute electricity consumption is 1.51%.</li> </ul>	<ul> <li>Manufacturing (factories) annual reduction target of electricity consumption per NT\$10,000 of output value: Taiwan 7.77%, Kunshan 16.47%</li> <li>Regarding building energy savings in</li> </ul>	Advantech's overall GHG emission density per unit of revenue decreased by 30% compared with 2019
Management policy	<ul> <li>Comply with all energy and carbon management regulations and target zero violations.</li> <li>Identify risks posed by climate change and respond accordingly.</li> <li>Set short-, medium- and long-term goals for energy conservation and carbon reduction and formulate practical practices and promote them.</li> </ul>	Energy Management	equipment in Kunshan the Plant, the annual increase in energy consumption per unit output value in the manufacturing area is 16.70%; the annual increase in energy consumption per unit area in the office area is 9.24%; and the annual increase in absolute electricity consumption is 42.92%.	office areas, the annual reduction targets of electricity consumption per square meter: Taiwan 2.21%, Kunshan 2.13%	
Goals and	In accordance with management policy objectives, every year we evaluate whether achievement of key performance indicators		<ul> <li>Overall energy use of the Japan factories was reduced by 10% compared to 2019.</li> <li>The Intelligent Energy Management System (iEMS) has been introduced in Linkou and Kunshan.</li> </ul>	Overall energy use target of the Japan factories: reduction of 10% compared to 2019.	
	(KPIS) has improved in comparison with the previous year as a means of improving management.	Renewable Energy Development	<ul> <li>Solar panel power generation at Linkou</li> <li>Plant to account for 4.5% of total electricity consumption.</li> <li>Announce green energy targets and invest in solar power plants.</li> </ul>		Advantech Taiwan to use renewable energy to account for 46% of its total electricity consumption.

Sustainability Vision and Goals	Company Management and Governance	Innovation and Service	Green Operations	Employee Care	Altruism and Social Benefit	Appendix
-16.49	In 2021, the per unit of compared w	Company's overall* GHG revenue decreased b ith 2020	emissions by 16.49%	-2.75%	In 2021, the Company's of consumption per unit of 2.75% compared with 20	overall* power revenue decreased by 20
<b>B</b> List	2021 CDP Awarded B L	Climate Change Ques .ist	tionnaire,	- <b>1,700</b> up	In 2021, Advantech's r (Taiwan and China) will energy-saving solutions, reduction will exceed 1,7	main factory regions invest in a total of 25 and the overall carbon 700 tons/year

\*Note: Taiwan and Kunshan

## 4.3.1. Greenhouse Gas Inventory and Management

Advantech is creating a low-carbon business environment. Based on Taiwan's Greenhouse Gas Reduction and Management Act, and on the quantification, monitoring, reporting and verification procedures for greenhouse gas inventory provided by the ISO 14064-1 standard, we established a Greenhouse Gas Inventory Promotion Committee in order to promote various tasks connected to greenhouse gas inventory and reduction. We have done so with a view of reducing direct and indirect greenhouse gas emissions year by year. In 2011, we also joined the Carbon Disclosure Project (CDP) and have disclosed the Company's carbon reduction plans and performance annually.

## A Greenhouse Gas Inventory

Advantech's Taiwan factories make reference to ISO 14064-1 and to the GHG Protocol Evaluator Tool, in addition to requiring self-inspections. Furthermore, thirdparty on-site inspections have been carried out by Taiwan SGS Limited starting from 2019. Organizational boundaries are drawn in reference to the suggested requirements given by the ISO 14064-1:2018 standard. Organizational boundaries are set with operational control rights, and domestic and overseas subsidiaries are not included; furthermore, we establish the Company's greenhouse gas inventory management procedures and inventory reports, and we redefine the emission source inventories. Organizational boundaries include Rueiguang Headquarters, Taipei Sunny Building, the Donghu Factory, and the Linkou Campus. In addition to the qualitative and quantitative inspections of Category 1 (direct GHG emissions) and Category 2 (indirect GHG emissions associated with energy production), the scope of inventory inspections also involves conducting inventory of some items in Categories 3 and 4 (indirect greenhouse gas emissions).

In Category 1 (direct GHG emissions), Advantech's Taiwan factories emitted a total of 629.9276 metric tons of  $CO_2e$ . The emissions of each region are shown in Table 4.3.1.

Advantech's Kunshan factories conducted their first 2014 annual ISO14064-1 greenhouse gas emission inventory in 2015, and a third-party on-site inspection was conducted by the China Quality Certification Center (CQC). As a result of the 2021 inventory, it was found that Advantech's Kunshan region produced a total of 2,741.26 metric tons of  $CO_2e$  in Category 1 (direct GHG emissions).

Region	Greenhouse gas	Carbon dioxide (CO <sub>2</sub> )	Methane (CH <sub>4</sub> )	Nitrous oxide (N <sub>2</sub> 0)	Hydrofluorocarbons (HFCs)	Perfluorocarbons (PFCs)	Sulfur hexafluoride (SF <sub>6</sub> )	Nitrogen trifluoride(NF <sub>3</sub> )	Total (CO₂e mt)
Taiwan	Rueiguang Headquarters	0.2992	-	-	113.3860	-	-	-	113.6852
	Taipei Sunny Building 0.5246 -		-	-	108.9025	-	-	-	109.4271
	Donghu Factory	0.1551	-	-	-	-	-	-	0.1551
	Linkou Campus	29.8074	0.0168	-	376.836	-	-	-	406.6602
China	Kunshan Factory	1,855.5891	26.1853	5.0978	854.3865	-	-	-	2741.2587
Japan	Japan Factory	Not counted	Not counted	Not counted	Not counted	Not counted	Not counted	Not counted	Not counted
	Total	1,886.3754	26.2021	5.0978	1,453.5110	-	-	-	3,371.1863

Table 4.3.1 GHG Category 1 Emissions of Advantech's Main Factories in 2021

\*Note:

1. The Taiwan Donghu Factory has no direct combustion source, and most of the equipment containing refrigerant is R22 refrigerant (which is controlled by the Montreal Protocol and is not included in inventories), so its emissions are zero.

2.Plant expansion in Kunshan, China.

Among Advantech's Taiwan factories, Category 2 emissions (indirect GHG emissions associated with energy production) only involve the use of purchased electricity. Carbon emissions are calculated based on the 2020 electricity coefficient of 0.502 kg CO<sub>2</sub>e announced by the Bureau of Energy of the Ministry of Economic Affairs, for a total of 9,654.05 metric tons of CO<sub>2</sub>e. For Advantech's Kunshan factories, Category 2 emissions (indirect GHG emissions associated with energy production) including the use of purchased electricity and purchased steam for a total of 19,036.17 metric tons of CO<sub>2</sub>e. Carbon emission calculation of electricity refers to the 7.2.2 grid emission factor of 610.10 kg CO<sub>2</sub>e in "Guidelines for Accounting Methods and Reporting of Corporate Greenhouse Gas Emissions of Enterprises in Other Industries." Carbon emissions calculations for steam refer to an emission factor of 110 kg CO2/GJ for steam given in "Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions associated with energy production) only involve the use of purchased electricity. Carbon emissions are calculated based on the electricity coefficient of 0.598 kg CO<sub>2</sub>e announced by Japan, for a total of 1,734.20 metric tons of CO<sub>2</sub>e. Table 4.3.2 shows the emissions of GHG Category 1 and Category 2 among Advantech's factories. The combined emissions of Category 1 and Category 2 in 2021 came to 33,795.61 metric tons of CO<sub>2</sub>e.



	Category 1	Category 2	
Table 4.3.2: GHG C	ategory 1 and Catego Factories ir	ry 2 Emissions of Advante 2021	ech's Main

**Company Management** 

and Governance

Sustainability Vision and

Area		Category 1 Volumes of Direct GHG Emissions	Volumes of Indirect GHG Emissions Associated with Energy Production	Total (CO₂e mt)
	Rueiguang Headquarters	113.6852	935.3199	1049.0051
Taiwan	Taipei Sunny Building	109.4271	1,364.3512	1,473.7783
Taiwaii	Donghu Factory	0.1551	907.4955	907.6506
	Linkou Campus	406.6602	6,446.8848	6,853.5450
China	China Kunshan Factory 2,741.2587		19,036.1688	21,777.4275
Japan Japan Factory		Not counted	1,734.2000	1,734.2000
Total emissions volume		3,371.1863	30,424.4202	33,795.6065

Innovation and Service

Green Operations

#### \*Note:

1.Greenhouse gas emissions of Advantech's Taiwan factories are calculated using the latest version of the "Greenhouse Gas Factor Management Table" (version 6.0.4 released in June 2019) of the Environmental Protection Administration of the Executive Yuan, and the Global Warming Potentials (GWP) of each greenhouse gas as announced by the IPCC in 2013.

2.Due to expansion of the factory in Kunshan, China, emissions increased compared to 2020. 3. Greenhouse gas inventories in the Japan factories have not been verified by a third party.

Figure 4.3.1 Category 1 and 2 GHG Emissions among Advantech's Main Factories in Recent Years

Altruism and Social

Benefit

#### Advantech's Direct and Indirect Energy Greenhouse Gas **Emissions in Recent Years**



The average GHG emission per unit of turnover in 2021 (Category 1 and Category 2) was 0.00058 tons of CO<sub>2</sub>e per NT\$1,000, which is 4.31% lower than the average GHG emission per unit of turnover in 2019 of 0.00061 tons of CO<sub>2</sub>e per NT\$1,000. We are thus continuing to move towards the 60% SBT target set for 2030. The main reason is that Advantech achieved overall reduction in electricity consumption by integrating manufacturing systems in Linkou and Donghu factories, improving manufacturing efficiency and making good use of Linkou's energy-saving systems. Meanwhile, the Advantech Kunshan Manufacturing Center has launched various energy-saving projects since 2019, including the establishment of an energy-saving efficiency evaluation mechanism for each unit, energy-saving evaluation and verification of electrical machinery and equipment, and reduction of domestic electricity costs. In the future, we will continue to set an annual goal of reducing greenhouse gases per unit of turnover. In addition

to achieving the goals set by the SBT announcement, this will also deeply embed the concept of energy saving in the hearts of colleagues and help it become an important part of the Company's culture.

In order to discover the key factors for climate change mitigation, Advantech Taiwan has also initiated inventories of other sources of GHG emissions in addition to emissions from its own operations. In 2019, the GHG Protocol Evaluator Tool was adopted to identify other types of GHGs along with relevant inventory methodologies being established. This was done with a view to identifying emission hotspots, setting reduction targets, and gradually implementing reduction measures. Please refer to Table 4.3.3 for identification and emissions in Category 3 and Category 4 for Advantech Taiwan and China-Kunshan in 2021.



#### Table 4.3.3 Identification and Emissions in GHG Categories 3 and 4 for Advantech Taiwan and Kunshan

Category Item	Category Statement Verification	Taiwan Factory Region Emissions (CO <sub>2</sub> e mt)	China-Kunshan Factory Region Emissions (CO₂e mt)
Category 3	Employee travel (air travel)	4.2945	7.4368
Category 3	Employee travel (High Speed Rail travel)	3.4301	Not counted
Category 3	Linkou Campus vehicle traffic	394.9829	Not counted
Category 3	Product shipping (domestic ground transportation)	2.3013	Not counted
Category 4	Business waste disposal (transportation)	1.2414	119.671
Category 4	Business waste disposal (incineration)	0.6018	Not counted
Category 4	Business waste disposal (burial)	0	Not counted
Category 4	Fuel and energy	1,775.0377	Not counted

## A Participation in the international Carbon Disclosure Project (CDP) evaluation

Since 2015, Advantech has cooperated with customers to participate in the evaluations of the international Carbon Disclosure Project (CDP). The CDP currently maintains the world's largest database related to climate change, and questionnaires are sent out every year to investigate companies' responses to climate change and greenhouse gas emissions and reductions. This is done so as to assess risks and opportunities for these companies arising from climate change. Through the annual regular CDP information disclosure, Advantech reviews areas including climate regulations, climate disasters, and other climate-related issues one by one to uncover hidden risks in our operations and management. In this way, we undertake effective reduction and elimination measures to meet the requirements of international customers for greenhouse gas management. Advantech was selected as Level B in 2021.

Company Management Innov and Governance

Innovation and Service Green Operations

Employee Care

Appendix

## ٨ Energy Data Management

The main source of greenhouse gas emissions from Advantech's factories was carbon dioxide generated during the power generation process of the externally purchased electricity required for the Company's operations. This emission source accounted for more than 90% of the Company's overall emissions in 2021. In 2021, Advantech's total energy consumption (electricity, steam, gasoline, diesel, natural gas) in Taiwan, Kunshan (China), and Japan came to 224,165.74 GJ.

Figure 4.3.2: Electricity Consumption among Advantech's Main Factories in Recent Years

Electricity Consumption Statistics for Advantech's Factories (Taiwan,



\*Note: In 2021, the China-Kunshan factory was expanded and electricity consumption therefore increased.

#### Figure 4.3.4: Non-Renewable Fuel Consumption among Advantech's Main Factories in Recent Years

#### Advantech (Taiwan, China) Non-Renewable Fuel Consumption



Figure 4.3.3: Trends in Electricity Consumption per Unit of Turnover among Advantech's Main Factories in Recent Years

#### Advantech (Taiwan, China) Electricity Consumption per Unit of Turnover



#### Figure 4.3.5: Non-Renewable Energy Consumption of Steam among Advantech's Main Factories in Recent Years

#### Advantech (Taiwan, China) Steam Energy Consumption (Nonrenewable)



\*Note: The scope covers factories in Taiwan and in China-Kunshan, but only the China-Kunshan plant uses steam

# **4.3.2 Energy Management Actions**

## Linkou Campus

The smart energy saving strategy of the Linkou Campus can be explained in terms of the two major systems of manufacturing and office facilities. The energy-saving facilities in the Linkou office area mainly achieve daily energy saving through intelligent parking, human-like energy-saving offices, and intelligent meeting rooms.

Intelligence is mainly implemented in the manufacturing system by means of an Intelligent Factory Situation Room: Advantech's manufacturing centers have been actively undergoing digital transformation in recent years. Through sensors deployed on the job site, information can be collected in real time and uploaded to the cloud for analysis. All plant information is displayed in real-time in the Situation Room, and management members can keep track of the latest production line statuses anytime, anywhere. Advantech's Intelligent Factory Situation Room monitors manufacturing, equipment yield and preventive maintenance, ambient temperature and humidity, and air quality. It also incorporates an energy management system.

## Neihu Headquarters

Advantech's Neihu Headquarters replaced its water chiller and LED lamps in 2020. Among them, the replacement of LED lamps reduced lighting energy usage by 65%. Together, the two projects have saved a total of 166,960 kWh of electricity. In 2021, we continued to replace office LED lamps for annual savings of 235,188 kWh of electricity. In the future, old and inefficient equipment will continue to be replaced to improve energy efficiency.

## Advantech Kunshan Manufacturing Center

AKMC's energy-saving facilities mainly save energy by promoting the optimization of energy management systems, automatic control renovation of air-conditioning systems, air compressor upgrades, and human-sensing systems.



Company Management and Governance Innovation and Service Green Operations

Employee Care

• Energy-saving facilities in the office area

water chillers, and other equipment

• Upgrades or replacement of air compressors,

Altruism and Social Benefit Appendix

## A Overall Energy Management Strategies and Actions

In addition to the energy-saving facilities in each area described above, Advantech's overall energy management strategy includes: daily energy savings, development of an iEMS building energy management system, and a clean energy strategy.

• LED lamp replacement

#### **1.Daily Energy Savings**

- Try to replace in-person meetings with video conferencing
- Prioritize the procurement of office equipment and information electronic products with energy-saving labels
- Control indoor air temperatures
- Encourage employees to turn off the lights

#### 2. Development of iEMS Building Energy Management System

Advantech is committed to developing an Intelligent Energy Management System (iEMS). We carry out energy-saving management in the two dimensions of management and operations, doing so through energy consumption information capture, data uploads to the cloud, AI analysis, information presentation, and real-time alarms; and via cooperation with scheduling adjustments, equipment cleaning, and maintenance, and the replacement of high-energy-consuming equipment.

Advantech's iEMS was upgraded in mid-2020, and the platform was migrated to Advantech's WISE-Stack private cloud by the end of 2020. Officially launched in Linkou in the first quarter of 2021, the first wave of functions included an overview of energy conservation performance used by top decision makers, real-time energy consumption monitoring, and abnormal energy consumption analysis for the use of managers, and so on. Furthermore, it was launched in the Kunshan Campus in the second half of 2021, and other manufacturing systems will be introduced in the future.

In addition, we upload the monthly electricity and water consumption information of Advantech Linkou, Neihu, Kunshan, Shanghai, Xi'an and Beijing to the internal eManager system. this allows the unit responsible for energy conservation of each factory office (factory or general affairs) to see the changes in monthly electricity consumption and water consumption, comparisons with the previous month and the year-ago period, and whether energy saving targets have been achieved. We produce energy-saving management from top to bottom through the internal transparency of energy consumption information.

## **3.Clean Energy Strategy**

- Solar power generation: the Linkou Campus is equipped with solar power panels, which have been in use since June 2019. In 2021, they generated about 48,489 kWh of electricity per month on average for use in parallel with Taipower. In addition, the new building in Linkou Phase 3 is also expected to be fully equipped with solar panels, with an estimated power generation capacity of 8,000 kWh per month.
- Electricity purchases: The Company announced we would invest in eco power plants in 2021, targeting to use 50% eco electricity in 2026 and 100% eco electricity in 2032. We expected to gradually begin using eco electricity in 2023.



Figure 4.3.6	Advantech	Taiwan's	Ten-Year	Carbon	Neutrality Plan
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≡ <b>iEMS</b> Energy Management System	n							⊕ (	e) 2022/ 18:04:	04/08   P0 37   <b>N</b>	owered by <b>/ISE-PaaS</b>
Advantech Carbon Neutral Plan											
Year	2019	2020	2021	2022	2023	2024	2026	2028	2030	2031	2032
Renewable energy target(%)	-	-	-	-	26%	49%	50%	60%	70%	85%	100%
Renewable energy target(MWh)	-	-	-	-	6,000	12,000	13,875	18,859	24,921	32,214	40,346
Expense of renewable energy(NT\$*000)	-	-	-	-	10,200	20,400	24,522	35,489	48,826	64,871	82,761
Energy saving target(MWh)	-	-	730	469	299	360	367	391	417	422	423
Energy saving target(YOY%)	-	-	3.54%	2.14%	1.28%	1.45%	1.31%	1.23%	1.16%	1.10%	1.04%
Expense of energy saving(NT\$"000)	-	23,000	3,760	4,596	5,000	4,000	1,000	1,000	1,000	1,000	1,000
Expense of renewable energy and energy saving(NT\$'000)	-	23,000	3,760	4,596	15,200	24,400	25,522	36,489	49,826	65,871	83,761
Estimated carbon emission(ton)	9,175	9,733	9,988	10,781	8,558	6,264	6,965	6,311	5,362	2,854	0
Estimated carbon emission per revenue(ton/US \$m)	7.48	8.46	6.51	6.39	6.39	3.21	3.24	2.66	2.05	1.04	0
Estimated carbon reduction(% by 2019)	-	13%	-13%	-15%	-38%	-57%	-57%	-64%	-73%	-86%	-100%
The ratio of renewable energy and energy saving expense to revenue(%)	0%	0.0666%	0.0082%	0.0091%	0.0273%	0.0417%	0.0396%	0.0514%	0.0636%	0.0801%	0.0970%

Taiwan : Net Zero by 2050

Advantech Taiwan : Carbon Newtral by 2032

Carbon Reduction Goal of then Year : -13%

Company Management and Governance Innovation and Service Green Operations

Employee Care

Appendix

Table 4.3.4 Energy-Saving Solutions among Advantech's Main Production Factories in2021 (Taiwan and China)

Factory	Project name	Number of cases	Power savings (10,000 units/year)	Carbon emission reductions (Tons/year)
	LED lighting replacement	4	390.55	198.79
	Air conditioning system adjustments	3	111.60	56.81
	Ice machine system adjustment and replacement	3	85.45	43.49
Taiwan	Management measures - parameter adjustments	2	41.50	21.12
	Air compressor replacement and adjustment	2	34.75	17.69
	Management measures - turning off lights	3	21.77	11.08
	Other equipment improvements	2	9.04	4.60
	LED lighting replacement	2	80.85	640.4129
China	Air conditioning optimization	2	84.9	672.4929
	Pump energy savings	2	5.37	42.53577
	Total	25	865.7815	1,709.0240

# Table 4.3.5 Electricity Usage Information per Unit among Advantech'sMain Production Factories in 2021 (Taiwan and China)

YOY changes	Taiwan	Kunshan, China
Factory energy consumption per unit output value (kWh/10,000)	Annual decrease of 16.32%	Annual increase of 16.7%
Office energy consumption per unit area(kWh/m²)	Annual decrease of 6.60%	Annual increase of 9.24%



## Future Plans

109

Looking to the future, Advantech integrated the Taiwan factory and concentrated production in the Linkou Phase 2 Intelligent Factory. Furthermore, through the energy management system and production line optimization management mechanism, we will achieve energy consumption reduction targets and reduce electricity consumption to realize energy saving benefits. For the sake of the continuation of human life and forever keeping a green environment on the Earth, Advantech is not only committed to reducing the impact on the overall environmental safety and health in product design, use and disposal activities, and complying with relevant regulations. We also pursue these aims through the participation and commitment of all employees to achieve environmental protection and sustainable development of the business.

## 4.4 Environmental Management

## **M** Highlighted Performance

0%

No violation of environmental laws or environmental regulations and no fines in the past 3 years

NEW

Expanded the collection of environmental data (adding Japan factory information)

# **4.4.1 Environmental Responsibility**

In terms of environmental management, Advantech not only implements environmental protection work related to sewage and waste in accordance with relevant laws and regulations, but has also formulated an Environmental Safety and Health Management System Manual as a guiding principle for the operation of the management system, and regularly inspects and implements management. All sewage meets discharge standards and is reported as required. Business waste is also entrusted to be disposed of by gualified removal companies.

The Company's environmental declaration and environmental policy are as follows:

- 1. In our design and production of products and services to our customers, we are committed to the concept of green to reduce and prevent the generation of waste and pollution through the 3R (Reuse, Recycle, Reduce) as far as possible. Also committed to energy conservation, waste reduction, emission reduction, and circular economy to reduce the impact of products and production activities on the environment.
- 2. Evaluate the risk and opportunity to establish management program to promote energy conservation and reduce waste of resources in accordance with global climate change, environmental issues and international regulations and standards related to environmental protection, energy and resource efficiency.
- 3. Establish a green supply chain from design, production, delivery and service through the cooperation with customers, suppliers and outsourcing parties.
- 4. Ensure that all our activities comply with requirements of environmental, health, safety & HSF regulations and customers' designation. Promote relevant environmental, health, safety & HSF protection knowledge and activities through education and training, so that all personnel may participate in achieving the objective of continuous improvement and zero disasters, occupational diseases and pollution.
- 5. Continuously promote improvement through the management system, deeply construct the corporate risk management culture for environment, safety, and health, strengthen the important responsibility and awareness of sustainable development with all employees, joint ventures and stakeholders. Also follow this policy due diligence when merging and acquiring related businesses.

Sustainability Vision and

**Company Management** and Governance

Innovation and Service Green Operations **Employee** Care

Appendix

Altruism and Social

Benefit

## A Environmental Promotion Procedures and Actions

Promotional Procedures	Management Action
Environmental protection related management operational rules, environmental management system (ISO 14001), greenhouse gas inventory (ISO 14064)	<ul> <li>Pollution precautions and prevention</li> <li>Environmental education training</li> <li>Environmental management system maintenance</li> <li>Greenhouse gas management</li> </ul>



In order to achieve the promise of eco operation and sustainable development, the Company has established an environmental management system since 1996. We have done so in order to better implement the planning of environmental protection issues and to achieve the effectiveness of resource use. At the same time, through our Environmental Safety and Health Committee, we have established Advantech's environmental safety and health conceptual framework, advocated energy conservation, improved energy efficiency, and listed energy cost reduction as an annual key audit item. Furthermore, we regularly review performance through our environmental management system and GHG inventory. Table 4.4.1 shows the environmental management system and greenhouse gas inspection and certification of each factory region of Advantech. This chapter's writing scope covers the Taiwan factory region and the Kunshan factory region, together accounting for 94% of total revenue; there is also further disclosure of a

111

#### small amount of information concerning our Japan factory region.

Table 4.4.1 Environmental Management System and Greenhouse Gas Inventory Certification of Each Factory Region of Advantech

Factory Environment Certification Program	HQ Rueiguang/ Taipei Sunny Building	ATMC Donghu	ATMC Linkou	AKMC Kunshan	AJMC Japan
ISO 14001:2015	$\bigcirc$	$\checkmark$	$\checkmark$	$\bigcirc$	$\checkmark$
ISO 14064:2018	$\bigcirc$	$\bigcirc$	$\checkmark$	$\bigcirc$	-

Table 4.4.2 Statistics on Environmental Violations at Each Factory Region of Advantech

Factory Year	HQ Rueiguang/ Taipei Sunny Building	ATMU Donghu	ATMU Linkou	AKMC Kunshan	AJMC Japan
2021	-	-	-	-	-
2020	-	-	-	-	-
2019	-	-	-	-	-
2018	-	-	-	1	-

## Advantech's Environmental Resources Inputs and Outputs (Scopes for Taiwan, Kunshan, and Japan)



Company Management Inno and Governance

Innovation and Service Green Operations

Appendix

# **4.4.2 Energy Resource Use and Waste Management**

## Water Use and Management

Advantech's factories use water-saving faucets and toilets and promote water-saving measures in order to find ways to reduce water consumption per person. All factories are located in developed industrial areas or campuses in metropolitan areas. In terms of tap water supply, there is no extraction of groundwater or well water.

The total water consumption of Advantech's factories in the past four years is shown in Figure 4.4.1. Further analysis of the water consumption per unit of revenue in Advantech's factories in the past four years is shown in Figure 4.4.2. Water consumption and water consumption per unit of revenue in 2021 increased compared with previous years, mainly due to the expansion and operation of the Kunshan Factory (Phase 5). Advantech has successively implemented water-saving improvement plans in recent years. In Taiwan, water-saving solutions such as rainwater recycling and reuse are mainly used for domestic water, intelligent irrigation water saving, and intelligent air-conditioning cooling water and chilled water system monitoring and control, for the sake of reducing overall water consumption. The Kunshan factory area has installed water meters in the production workshops of each factory and conducted water metering management. This distinguishes water used for Phase 1, Phase 2, Phase 3, Phase 4, and Phase 5, dormitories, kitchens, and equipment, analyzing reasonable water consumption. In addition, Advantech Linkou Phases 2 and 3 are equipped with rainwater recovery systems for sprinkler irrigation and toilet flushing. We have an annual replacement rate of more than 50% as the design goal, but quantitative monitoring has not yet been practically implemented. Flow meters have been installed and it is expected that quantitative monitoring of the actual replacement rate of the rainwater recovery system will start in the second quarter of 2022; and this will form the basis of program improvements. The Kunshan plant recycles water resources through a water recycling and regeneration system. The recovery rate of reclaimed water has reached 70% and annual water savings has attained 53%. In the future, more improvement plans will be planned to save water resources.

Figure 4.4.1 Water Consumption among Advantech's Factories in Recent Years

Figure 4.4.2: Trend Chart of Water Consumption per Unit of Revenue at Advantech's Factories in Recent Years



#### Advantech Water Consumption

113



# Trend Chart of Water Consumption per Unit of Revenue at Advantech's Factories (Taiwan, China) in Recent Years

## **M** Waste Management and Resource Recovery Management

Zero waste is the ultimate goal of Advantech's waste management. We take total waste reduction and waste recycling as a strategy, in addition to reducing waste output and achieving waste reduction through source management measures such as reduction of raw materials. Advantech also actively promotes the recycling of waste, such as reusing packaging materials to replace the existing end-of-pipe treatment model, turning waste into useful resources. this not only truly achieves resource recycling, but also reduces energy consumption and waste disposal costs. Advantech devotes attention to its waste contractors every year. If a contractor breaches the contract or violates government regulations, it will undertake corresponding disposal or guidance or replacement. In 2021, Advantech did not have any major breach of contract or violation of laws by waste contractors. The Company's waste management model is shown in Table 4.4.3.

Type of waste		Content description	Action taken	Ultimate disposal method
	Bottles	PET bottles/styrofoam/steel or aluminum cans, etc.	Dedicated recycling	Reuse
	Paper	Newspapers/magazines/photocopying paper/ printing paper/cartons/boxes, etc.	Dedicated recycling	Reuse
	General-use glass	Beverage bottles, etc.	Dedicated recycling	Cyclical use
General household waste	General-use plastic	Beverage bottles/waste containers, etc.	Dedicated recycling	Cyclical use
	Other recyclable resources	Batteries/toner clips/lights, etc.	Headquarters/photocopier manufacturers	Cyclical use
	Food waste recycling	Compost food waste / pig food waste, etc.	Management Committee	Fertilizer use
	Domestic waste Office household waste, etc.		Management Committee	Incineration (Taiwan) Sanitary burial (Kunshan)
	General business waste	PCB scrap / waste electronic parts / waste sponges / waste tape, etc.	FDedicated recycling	Incineration / Landfill / Reuse
Business waste	Hazardous industrial waste	Waste tin slag/chemical waste liquid, etc.	Outsource the processing to a qualified removal processing company	Solidification and landfill/incineration/ reuse

Table 4.4.3 Advantech Waste Management Model

Regarding the final disposal weights of waste at Advantech's factories in Taiwan, Kunshan, and Japan, because the weight of domestic waste is an approximate estimate of the contracted clearance, weight information for further disposal classifications is not yet available. Therefore, only information on disposal of industrial waste is disclosed. Please see this as shown in Table 4.4.3, Figure 4.4.3, and Figure 4.4.4.

Sustainability Vision and Goals	Company Management and Governance	Innovation and Service	Green Operations	Employee Care	Altruism and Social Benefit	Appendix	
Figure 4.4.3: Disposal Volume of Business Waste among Advantech's Factories Figure 4.4.4: Waste Disposal Volume per Unit of Revenue among Advante							

in Recent Years

Advantech (Taiwan, China) Waste Disposal Volume per Unit of Revenue

Factories in Recent Years



#### Advantech Disposal Volume of Business Waste

33.05 33.08 2020 2021

\*Note: The source of statistics on the weight of waste in the Taiwan and Kunshan plants is the data reported by each factory to the competent authorities.

According to the statistics, the total waste disposal volume of Advantech's production regions (Taiwan, China, and Japan) in 2021 was approximately 1882.44 metric tons. Out of this, there was 1,877.69 metric tons (99.7%) of non-hazardous waste and only 4.75 metric tons (0.3%) of hazardous waste. In recent years, Advantech has introduced the tin dross recycling project to successfully recycle harmful waste tin dross, reducing the production of hazardous waste. See Table 4.4.4 and Figure 4.4.5 for waste disposal in production areas in Taiwan and China.

	Incineration	Burial	Recycling
Hazardous Industrial Waste (mt)	1.95	0	0
Non-Hazardous Business Waste (mt)	491.18	0	1339.0

#### Table 4.4.4: Waste Disposal Methods of Advantech's Factories (Taiwan, China) in 2021

Figure 4.4.5: Business Waste Disposal Status among Advantech's Factories in Recent Years

#### Advantech (Taiwan, China) Business Waste Disposal Status



## Air Pollutant Management

Air pollutants have become one of the important environmental issues of global concern. In 2017, the International Agency for Research on Cancer (IARC) listed air pollutants as known primary human carcinogens. Volatile organic compounds (VOCs) are one of the most important portions of air pollutants that are harmful to ecology and health. Advantech also cares about the effectiveness of air pollution controls and about atmospheric air quality. Volatile organic compounds generate PM 2.5 that is less than 1/28 the diameter of a human hair and so fine that it penetrates into the lungs very easily; thus, the impact of VOCs on human health cannot be ignored. Regarding air pollution data and information disclosures, Advantech has put together three key points:

- Advantech's production process does not generate ozone-depleting substances (ODS) and hence there are no ODS emissions.
- Advantech Taiwan and Advantech Japan mainly utilize assembly processes with low air pollution load, so there is no emission of nitrogen oxides, sulfur oxides, or volatile organic compounds (VOCs).
- Advantech's Kunshan (China) Campus utilizes liquid coating and powder coating processes, and the volatile organic compounds (VOCs) emitted are all in compliance with local regulations.

Please refer to Table 4.4.5 for volatile organic compounds (VOCs) emitted by Advantech's manufacturing factories in recent years. The substantial increase in VOCs in 2021 was due to increased production capacity.

Factory Year	HQ Rueiguang/ Taipei Sunny Building	ATMU Donghu	ATMU Linkou	AKMC Kunshan	AJMC Japan
2021	-	-	-	31.42	-
2020	-	-	-	8.94	-
2019	-	-	-	5.52	-
2018	-	-	-	6.01	-





\*Note: The scope covers factories in Taiwan, China-Kunshan, and Japan, but only the China-Kunshan factory produces VOCs.

In order to implement environmental reduction targets, Advantech Kunshan (China) has adopted effective control of volatile organic compounds (VOCs). This has been accomplished through online real-time continuous monitoring and outsourced monitoring and management of emissions, and improvements in equipment processing efficiency to reduce environmental emissions. Improvement projects have been implemented successively in recent years.

Company Management and Governance

Innovation and Service Green Operations

Employee Care

Altruism and Social Benefit Appendix

## 4.5 Appendix : Key Performance in Product Environmental Specification Compliance and Voluntary Environmental Labeling

Advantech revised its internal management standards for various environmental protection policies related to the management of environmentrelated substances (such as EU RoHS (including EU 2015/863), REACH, POPs, etc.), and introduced the IECQ HSPM QC080000 hazardous substance management system in 2009 to conduct risk control through Advantech's supplier management platform and supply chain eco information management platform. Advantech's selection of materials for various products conforms to the relevant environmental protection standards of the following countries according to the product sales area, as shown below:

#### 1. RoHS Directive

- 2. REACH SVHC Control Requirements for Substances of Very High Concern
- 3. Product Recycling Specifications
  - 3.1 EU Waste Electrical and Electronic Equipment Directive (WEEE)
  - 3.2 International Standards ISO 11469 Standard (marking of plastic parts)
- 4. Battery Recycling Regulations
- 5. Waste Packaging Regulations
- 6. Energy Conservation Related Regulations
  - 6.1 EU Energy-Related Products Directive (ErP) Mark
  - 6.2 Energy Star Mark



Figure 4.5.1 Example of Environmental Declaration on Advantech's Product Marketing Website

## **DSD-3055**

55" FHD Industrial Digital Signage Monitor & Touch



## International Energy Conservation and Environmental Protection Marks

Energy Star Mark: since 2009, Advantech's specific types of models conform to Energy Star, an international energy-saving and environmental protection mark; the models introduced in the past four years are shown in Table 4.5.1.

# Table 4.5.1 Advantech Products Introducing the Energy Star EnvironmentalProtection Mark in the Past Four Years

Product Number	Product Type		
ESY152,ESY15i5,ESY22i2,EY22i5			
ESY20X2;ESY20X3;ESY20X5;ESY20X7			
ESY15X2;ESY15X3;ESY15X7;ESY17X2;ESY17X3;ESY1 7X7;ESY15X5			
ESY15i2,ESY15i5,ESY22i2,ESY22i5	Panel PC Industrial computer equipment with screen		
AIM-37AC, AIM8IAC, AIM8I, AIM 10W			
DSDM-055FD-45NE-V, DSDM-155FD-45NE-V			
DSDW-049FD-45NE-V			
GSC-7152W, GSC-7152W-C3AE			
AIM-75			

## EU Energy-Related Products Directive (ErP) Mark

Since 2021, Advantech has been responding to the international trend of carbon reduction and low energy consumption. Except for certain types of models, we have independently increased the thorough implementation of ErP, which is in line with the international energy conservation and environmental protection label; see Table 4.5.2 for the planned model introductions.

Table 4.5.2 Advantech Products Expected to Introduce the ErP Environmental Label in 2022

Product Number	Product Type	
TPC-107W-N31A		
UNO-127-E22BA UNO-127-E23BA		
IPC-610 (AIMB-708) IPC-320 (AIMB-308)	Computers and computer servers	
PPC-415 PPC-112W		
POC-621		
VEGA-7110-75R		
VEGA-6301M		