PharmaEssentia Environmental Management Indicators

Management Items	Management Indicators	Unit	Target for 2024	Achievements in 2024	Short-term target (1 year)	Medium & long-term target (3-5 years)
Greenhouse gas inventory and energy consumption	Energy intensity	GJ/million TWD	≦ 5	4.78	≦ 5	≦ 5
	Greenhouse gas emissions intensity	tCO_2e/million TWD	<1	0.5	<1	<1
Waste management	Waste intensity	ton/million TWD	<0.01	0.003	<0.01	<0.01

In terms of waste management and air pollution management, PharmaEssentia invested NT$9.39 million in environmental costs (including pollution prevention equipment, biopharmaceutical waste treatment, management activities, and pollution prevention) in 2024, an increase of 71% compared to the previous year; NT$6.23 million was used on PEG air pollution prevention process equipment, which reduced emissions of air pollutants. In terms of water resource protection, our Taichung Plant regularly applies for water pollution prevention permits; production, operations, and reports are completed in accordance with these permits, and regular sample test report results all adhered to standard limits.

PharmaEssentia continues to implement routine inspections and deficiency corrections in accordance with environmental regulations set by competent authorities. Our main environmental deficiencies in 2024 included failure to conduct daily boiler inspections, detached labels on waste facility pipelines, failure to label waste items and waste areas; all deficiencies have since been corrected. PharmaEssentia regularly attends on-site promotion meetings with Taichung City Department of Environmental Protection and Central Taiwan Science Park Administration to implement management measures and reduce negative environmental impacts.

PharmaEssentia Environmental Investments in 2024

(Unit: TWD)

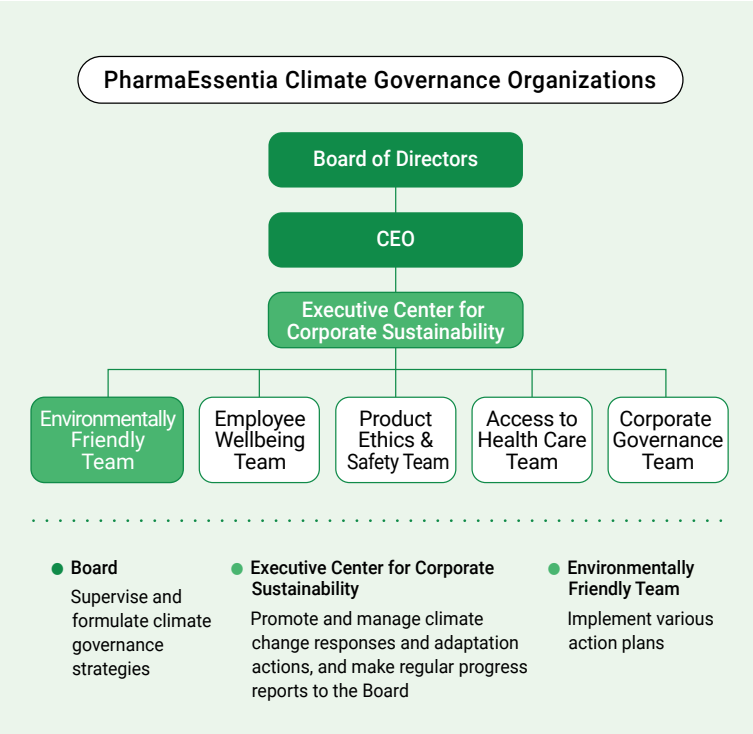
Indicator	Expenditures	Ratio
Pollution prevention equipment and costs	6,382,478	67.98%
Waste treatment costs	2,065,245	22.00%
Management activity costs	940,400	10.02%
Total	9,388,123	100.00%

4.2 Climate and Nature Actions

Enterprises are facing severe challenges due to impacts from global climate change, and the risks and challenges caused by climate change are significantly impacting corporate value chains. The Financial Stability Board (FSB) proposed the Task Force on Climate-Related Financial Disclosures (TCFD) in 2017, providing a set of guidelines to help enterprises identify climate-related risks and opportunities. PharmaEssentia adopted the TCFD guidelines for the first time in 2022 to identify climate-related risks and opportunities, and also used these guidelines in 2023 to further assess potential financial impacts caused by climate-related risks and opportunities under different scenarios. We conducted ISO 14064-1:2018 organizational greenhouse gas inventories to respond and adapt to climate change from a carbon management perspective. PharmaEssentia climate actions and implementations associated with the four aspects of climate governance, strategy, risk management, and metrics and targets according to TCFD guidelines are detailed below. In 2024, PharmaEssentia determined that there were no major changes to internal operations and external environments. We therefore continued to use the climate-related risks and opportunities identified in 2023, and updated related indicators and targets using results achieved in 2024. We plan to re-identify climate-related risks and opportunities in 2025.

Governance: Supervision and Management of Climate Issues by the Board of Directors and Senior Executives

The Board of Directors is the highest climate governance unit at PharmaEssentia, and is responsible for supervising and formulating strategies associated with climate change from a sustainable development perspective, as well as responding to domestic and foreign net zero initiatives. The Board has authorized the Executive Center for Corporate Sustainability and the Environmentally Friendly Team to promote climate change management actions. Executive units include the environmental safety department and related responsible units such as the R&D, production, logistics, warehousing, and engineering departments, which all implement different tasks. The environmental safety department convenes biweekly meetings/factory meetings each month and reports project progress to senior managers. The Executive Center for Corporate Sustainability presents ESG project progress reports to the Board every quarter.



Strategy: PharmaEssentia Global Climate Strategies

To assess impacts on organizational operations from short, medium, and long term climate-related risks and opportunities, PharmaEssentia and external consultants conducted manager interviews, surveys, and discussions with managers from related departments to identify climate-related risks and opportunities, and also conducted discussions with responsible departments to actively formulate solutions.

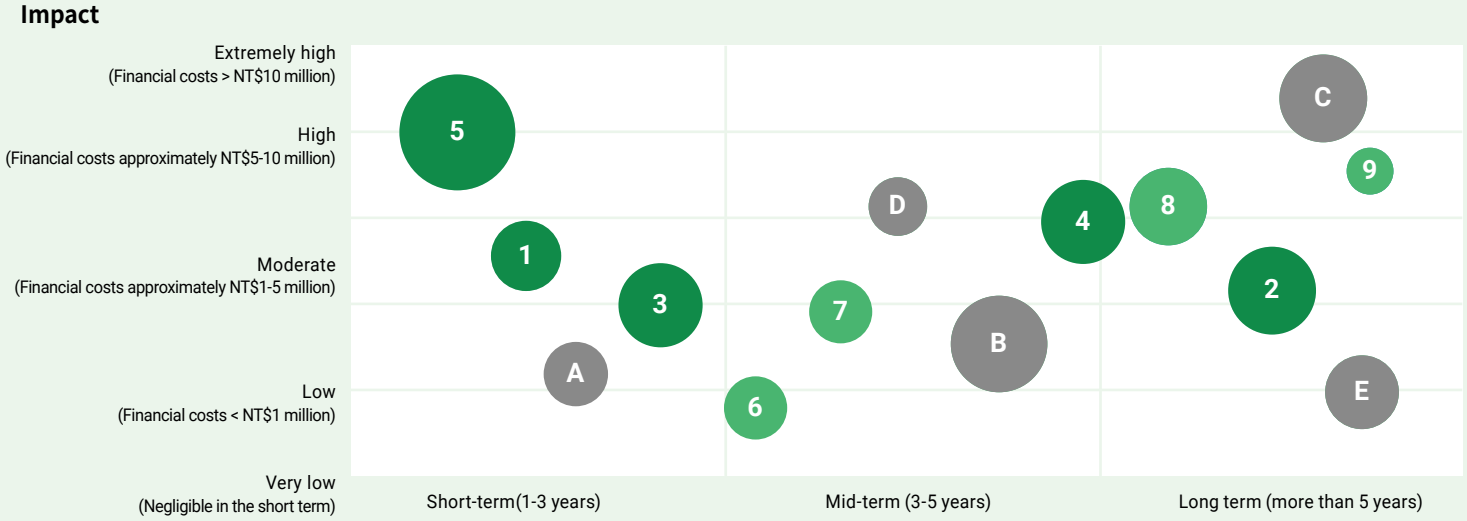
Physical Risks

We assessed climate change impacts to our main operational sites and determined that the probability of operational interruptions from severe climate impacts was low to extremely low, as we already considered flood and drought risks when constructing factories at our production sites. We plan to closely track impacts to operational activities from climate-related risks and adjust inventory levels accordingly.

Transition Risks

Taiwan has already established laws incorporating 2050 net zero emissions targets, so strengthened carbon emission reporting obligations and carbon fee levies are highly probable short-term risks. PharmaEssentia has already prepared for these risks and completed greenhouse gas inventories and verifications in advance of Financial Supervisory Commission requirements. Our Taichung Plant incorporated the ISO 14001 Environmental Management System in 2024 and our Taipei Headquarters plans to incorporate this management system in 2027 to strengthen environmental and energy management.

Short, Medium, and Long Term Climate Risks and Opportunities Matrix



Transition Risks

1. Greenhouse gas management and carbon fee levies
2. Legally required renewable energy usage proportions
3. Legally required net zero carbon emission targets
4. Uncertainties in new energy and carbon reduction technologies
5. Raw material shortage pressures

Physical Risks

6. Floods caused by extreme climate
7. Droughts caused by extreme climate
8. Rising temperatures
9. Rising sea levels

Climate-Related Market Opportunities

A. Carbon reduction benefits from resource efficiency enhancements
B. Emerging business models under low-carbon and energy conservation trends
C. Market opportunities generated by solutions to diseases caused by climate change
D. High-efficiency buildings
E. Investment in renewable energies or participation in carbon trading markets

Note: Financial costs were estimated using current data based on price levels for 2023. Evaluation results may differ under other background conditions.
Circle sizes represent financial cost volumes

PharmaEssentia's climate risk management strategy is focused on management and adaptation of relatively significant climate risks over the short term (1-3 years), using management actions to reduce medium to long-term risk impacts, and formulating possibilities for climate opportunities.

PharmaEssentia's identified short-term climate risks include "raw material shortage pressures," "greenhouse gas management and carbon fee levies," and necessary preparations for "legally required net zero carbon emission targets." We therefore prioritized management of these three risks. Medium and long-term climate risks include "legally required renewable energy usage proportions" and "uncertainties in new energy and carbon reduction technologies"; we plan to observe conditions associated with these risks which are likely to occur in the medium to long term, and confirm whether immediate management is required for these risks when conducting assessments next year. In terms of climate opportunities, our Taichung Plant identified "carbon reduction benefits from resource efficiency enhancements" as a climate opportunity. We are also planning to upgrade our current energy-saving equipment and use energy-saving equipment at our new factories.

Scenario Simulation Analysis

We assessed impacts from climate-related risks and opportunities under different scenarios, as well as possible response measures. We considered three of the Intergovernmental Panel on Climate Change (IPCC) RCP (Representative Concentration Pathway) scenarios (RCP 2.6, RCP 4.5, and RCP 8.5), and estimated impacts on PharmaEssentia's main factories based on current climate data for Taiwan under different RCP scenarios.

- **RCP 2.6** is a mitigation scenario with extremely low radiative forcing, and represents a pathway where global warming is maintained at below 2°C above pre-industrial levels
- **RCP 4.5** is a moderate and stabilized scenario
- **RCP 8.5** is a scenario with high greenhouse gas emissions, and represents a pathway where all governments do not implement any greenhouse gas reduction measures

RCP 2.6

Taiwan (Taichung Plant)

Average Temperature Increase, 2031-2050	Average rainfall volumes, 2031-2050
0.3~2.1℃	-5.3~12%

Situation:
Rising temperatures may increase the temperatures of factories and surrounding areas, and extreme climates may increase the probabilities of drought or heavy rainfall, but level and scope of impact are relatively low under this temperature controlled scenario.

Responses:

- **PharmaEssentia:** Our factories are currently located in science parks, so risks are low
- **Supply chain:** Warn against possible supply delays due to natural disasters and establish second/third backup sources

RCP 4.5

Taiwan (Taichung Plant)

Average Temperature Increase, 2031-2050	Average rainfall volumes, 2031-2050
0.7~2.4℃	-4.7~13.6%

Situation:
Rising temperatures may increase the temperatures of factories and surrounding areas, lowering production efficiency. Extreme climates may lead to droughts or floods from heavy rainfall.

Responses:

- **PharmaEssentia:** Our factories are currently located in science parks, so risks are low
- **Supply chain:** Warn against possible supply delays due to natural disasters and establish second/third backup sources

RCP 8.5

Taiwan (Taichung Plant)

Average Temperature Increase, 2031-2050	Average rainfall volumes, 2031-2050
1.0~3.1℃	-7.7~13%

Situation:
Extreme temperature increases and changes in annual average rainfall volumes will intensify impacts from extreme climate. Factories may encounter blackouts or be unable to operate due to droughts or floods, and therefore require additional costs for improvements.

Responses:

- **PharmaEssentia:** Apart from strengthening PharmaEssentia disaster prevention capabilities to meet extreme climate conditions, we also plan to conduct supply chain and transportation route disaster prevention drills and strengthen business continuity plans
- **Supply chain:** Warn against possible supply delays due to natural disasters, establish second/third backup sources, change materials, or rebuild supply chains

Source: Taiwan Climate Change Projection Information and Adoption Knowledge Platform (TCCIP)

Transition Risk Scenarios

In terms of transition risks, PharmaEssentia assessed transition risk scenarios using the Shared Socioeconomic Pathways (SSPs) methodologies proposed by the IPCC Sixth Assessment Report (AR6).

	Low-Risk Scenario →	Moderate-Risk Scenario →	High-Risk Scenario
Scenario description	SSP1-1.9 pathway Orderly global transition to achieve net zero by 2050	SSP1-2.6 pathway Delayed global transition toward Paris Agreement <2°C target	SSP4-6.0 pathway No new carbon reduction actions and all countries maintain current policies
Temperature increase by century's end	1.4°C	1.6°C	>3°C
Transition risks	Gradual implementation of climate policies starting from 2021	Rapid implementation of climate policies starting from 2031	Maintain status quo with no new policies
Impacts to PharmaEssentia	Our headquarters are located in Taiwan, where the government has already legislated 2050 net zero targets, so we plan to implement phased carbon reduction targets in accordance with national targets. We have already completed ISO 14064-1:2018 organizational greenhouse gas inventories and plan to formulate carbon reduction plans based on inventory results.	PharmaEssentia will monitor implementation by all operational sites based on local market conditions.	PharmaEssentia will monitor implementation by all operational sites based on local market conditions.

Analysis of Financial Impacts from Climate Change

After considering organizational and operational impacts from the aforementioned climate-related risks and opportunities, PharmaEssentia actively formulated related responses and adaptation actions to enhance climate resilience. We continued to conduct ISO 14064-1:2018 organizational inventory processes in 2024 to build a solid foundation for future carbon management capabilities.

	Transition Risks		Physical Risks	Climate-Related Opportunities	
Topics	• Greenhouse gas management and carbon fee levies • Legally required renewable energy usage proportions • Legally required net zero carbon emission targets • Uncertainties in new energy and carbon reduction technologies	• Raw material shortage pressures	• Floods caused by extreme climate • Droughts caused by extreme climate • Rising temperatures • Rising sea levels	• Carbon reduction benefits from resource efficiency enhancements • Emerging business models under low-carbon and energy conservation trends • Market opportunities generated by solutions to diseases caused by climate change	• High-efficiency buildings • Investment in renewable energies or participation in carbon trading markets
Potential Financial Impacts	• Increases in carbon management operational costs: Carbon taxes in overseas markets, carbon fees in Taiwan, and energy related taxes will increase operational costs • Investments in renewable energies and equipment will increase costs • Investments in energy and carbon reduction resources, and allocation of resources to inventory, verify, and disclose organizational greenhouse gas emissions, and further expand inventory scope to carbon footprints across entire product life cycles will increase operational costs	• Raw material shortages and increased transportation costs due to climate change	• Natural disasters may cause operational interruptions or situations that cannot be resolved by current emergency response measures, which will affect production and lead to financial losses and revenue declines • Natural disasters (such as snowstorms in the US) may cause shipping delays, damage to local operational equipment, and personnel injuries, thereby increasing operational costs • Natural disasters may disrupt raw material sources, obstruct production operations, interrupt product shipments, and affect operating income • Using insurance to reduce financial losses will increase factory flood prevention costs • Long-term temperature rises may increase energy consumption in factories or cold chain costs	• Invested around NT$5.5 million to install energy-efficient chillers and air compressors in 2023-2024 • Potential carbon assets derived from carbon management (carbon rights)	• Potential carbon assets derived from carbon management (carbon rights) • Potential market opportunities may arise from developing solutions associated with climate-related disease domains
Financial Impact Assessments	• Carbon fees: Assuming that PharmaEssentia's annual carbon emissions are less than 5,000 tons and carbon fees are NT$300/ton, annual costs would be around NT$1.5 million • Greenhouse gas inventories: All factories are gradually incorporating management systems and verifications, and we estimate that annual costs would be lower than NT$3 million • Greenhouse gas inventories, emission reductions, energy combinations, and efficiency enhancements: We plan to further calculate the costs required for reducing greenhouse gases and enhancing energy efficiency at all factories	• Our raw materials are required to strictly comply with GMP regulations, so need verifications and certifications at each stage; increases in raw material costs are difficult to estimate, so we plan to avoid costs through advance preparation and by increasing our stock. We estimate that costs will increase by 10-20%, so our procurement costs will increase by NT$10 million each year	• Our Taichung Plant has measures in place to overcome water shortages lasting from 3-4 weeks, so production is unlikely to be affected; additional financial costs under this condition are extremely low • If natural disasters interrupt transportation in our supply chains, our safety stock can allow us to maintain operations for 3-6 months; additional financial costs under this condition are extremely low • Additional energy consumption costs and transportation costs from long-term temperature rises require further evaluation • We are actively applying for marketing authorizations in different regions around the globe to diversify regional climate risks • We strive to diversify production bases, increase raw material procurement sources, and make relevant preparations	• Greenhouse gas inventories, emission reductions, energy combinations, and efficiency enhancements: We plan to further evaluate the benefits generated from reducing greenhouse gases and enhancing energy efficiency at all factories • We strive to lower energy intensity and reduce energy dependencies	• There is currently insufficient information to estimate financial performance from emerging solutions

In response to the aforementioned financial analyses, we compiled the following climate-related risk and opportunity topics, and formulated PharmaEssentia's key response strategies as well as responses for all departments as follows:

	Transition Risks		Physical Risks	Climate-Related Opportunities	
Topics	Carbon management ● Greenhouse gas inventory and reduction ● Energy combinations and efficiency enhancements	Raw material management	Operational damage caused by hurricanes, floods, and other extreme climate events, triggering the need to strengthen factory emergency response capabilities	Resource efficiency enhancements	Satisfy unmet medical needs
Pharma-Essentia Key Response Strategies	Strengthen PharmaEssentia carbon management capabilities through continued implementation of: ● Greenhouse gas inventories at all operational sites ● Phased greenhouse gas reduction targets ● Assessments of benefits from carbon neutrality or 2050 net zero targets through comprehensive consideration of carbon management costs and revenues	● For raw material management, increase raw material sources and evaluate new suppliers ● Incorporate climate change considerations in future R&D and add more options	● Regularly assess factory response capabilities, provide warning and identification of risks, and increase factory emergency response capabilities ● **New Zhubei Plant:** PharmaEssentia is building a new factory in Zhubei which adheres to green building standards, and has made preparations for climate risks and impacts ● Regular training and internal process improvements to enhance climate resilience and response capabilities of global PharmaEssentia operational sites	● Evaluate resource efficiency enhancements from upgraded or replaced equipment ● Evaluate benefits from renewable energy installations or participation in carbon trading markets	● Diseases caused by climate change will become a future R&D focus of the biopharmaceutical industry. PharmaEssentia is also continuing to focus on associated trends while assessing unmet needs caused by climate-related diseases and feasibility of PharmaEssentia R&D strategies ● Panco is undertaking other projects that require cold chain transportation services, and has purchased temperature controlled boxes in 2024 to reduce use of polystyrene boxes
Departmental Responses	● **Production/environmental safety department:** Our "Environmental Protection Policy" serves as an internal guideline for environmental impact prevention and response, and we have established the "Greenhouse Gas Management Procedures"; our Taichung Plant, our main production site, was the first location where we implemented greenhouse gas inventory processes, which has since completed inventories and third-party verifications for 2023. We continued to conduct inventory processes and third-party verifications in 2024, and made progress on our carbon reduction pathway, achieving phased carbon reduction targets by enhancing resource efficiency at current factories	● **Procurement department:** Conducts assessments based on material categories and source locales, increases backup procurement sources, seeks out green supply chains, and requires the top five suppliers by annual transaction volumes to reduce carbon emissions ● **R&D department:** Reduces environmental impacts while incorporating bioengineering and digital transformation technologies, including by: - Reducing use of materials (reagents/solvents/toxicants) - Assessing energy consumption and temperature controls in equipment/production methods/all production stages/all storage, transportation, and preservation processes - Using eco-friendly and recyclable materials ● **Production department:** Develops automated production processes based on actual conditions	● **Environmental safety department:** Assesses possible levels of impact and corresponding emergency response measures, and increases assessment frequencies. Our Taichung Plant has established the "Factory Facility Emergency Response Management Standards" and implements associated emergency response mechanisms to ensure that equipment can operate normally when natural disasters, equipment abnormalities, and hazard incidents occur so all personnel can conduct production processes in safe environments ● Adheres to Central Taiwan Science Park and Hsinchu Science Park's response and management measures to prevent physical risks	● Our Taichung Plant phased out an air compressor in 2024 and will continue to phase out equipment with high energy consumption (such as air compressors and chillers) to enhance energy conservation and energy efficiency ● Establish energy monitoring systems, optimize steam process controls, and recycle waste heat ● Plan to apply for green building certificates for our new Zhubei Plant, apply for green building subsidies, and lower organizational carbon emissions	● The R&D department and Executive Center for Corporate Sustainability Access to Medicine Team and Product Ethics and Safety Team jointly and regularly track related topics

Risk Management

2.3 Risk Management described our corporate risk management mechanisms encompassing corresponding responses to different risk categories, thereby lowering corporate impacts from said risks. This section further describes our management mechanisms and actions toward climate risks based on TCFD framework guidelines.

Risk Management Guidelines and Practices

We have established internal risk management policies, procedures, and internal controls based on related regulations to appropriately manage all risk issues, impacts, and corresponding material topics. Every year, the Board approves overall corporate risk management targets and policies, and assigns senior management to oversee promotion and execution of various issues to monitor risk management mechanisms and ensure that they are operating effectively.

Climate Risk Management Processes

We consider climate-related risk management policies, actual assessment methodologies, and preventive measures to lower operational impacts toward climate risks. We continued to inventory major operational risks in 2024, implemented climate risk assessment processes and training for environmental risks, and ensured that all departments implemented specific practices for handling various risks. We plan to conduct these processes every year to ensure full understanding and tracking of risk changes, so we can formulate relevant reduction management procedures and measures when appropriate. We have established risk management targets and policies, and continue to monitor our risk management mechanisms to ensure that they are operating effectively.

Metrics and Targets

The biopharmaceutical industry's main climate change response actions are focused on carbon reduction. To achieve the aforementioned targets, PharmaEssentia also strives to reduce carbon emissions at all stages. We have incorporated ISO 14064-1 greenhouse gas inventory standards, regularly inventory greenhouse gas emissions at all operational sites, manage key climate metrics, and have already disclosed Scope 3 inventory data. PharmaEssentia continues to evaluate whether the climate risks and actions for each year require updated responses. We also actively invest in research of diseases caused by climate change, and work to find more solutions at the source through medical research.

Metrics and Targets for Main Topics

Topics	Carbon Management	Rising Raw Material Costs	Severity of Typhoons, Floods, and Other Extreme Weather Events
Responses	Scope 1, Scope 2, and Scope 3 greenhouse gas emissions and related risks ● PharmaEssentia's greenhouse gas emissions mainly stem from Scope 2 purchased electricity. In 2024, our Scope 1 and Scope 2 greenhouse gas emissions were lower than 5,000 tCO_2e ● Our greenhouse gas emissions policies adhere to national 2050 net zero targets and the National Development Council's goal to achieve a 24% reduction in overall carbon emissions by 2030	● We track material usage using raw material consumption volumes/ revenues as an indicator	● Regularly assess factory response capabilities, provide warning and identification of risks, and increase factory emergency response capabilities ● New Zhubei Plant: PharmaEssentia is building a new factory in Zhubei which adheres to green building standards, and has made preparations for climate risks and impacts
Metrics and Targets	● Greenhouse gas emission intensity (tCO_2e/million TWD)	● Raw material consumption intensity: Raw material consumption volumes (g)/revenues (thousand TWD) ● Improve resilience: Reduce raw material procurement risks from environmental impacts	● Regular implementation of emergency response measures
Achievements in 2024	● Greenhouse gas emission intensity was 0.5 (tCO_2e/million TWD), a reduction of 43% compared to 2023 ● For more information on carbon emissions and carbon intensity calculation formulas, please refer to 4.3 Energy Management	● Raw material consumption intensity: 1.06 g/thousand TWD in 2024, higher than 2023 (0.30 g/ thousand TWD)	● Carried out prevention measures aligned with Central Taiwan Science Park measures ● Assessed and adjusted US market safety stock

Operational Sites and Biodiversity Conservation GRI 304-1

PharmaEssentia's production base (Taichung Plant) is located in the Central Taiwan Science Park Taichung Science Park. We are currently constructing our Zhubei Plant in the Hsinchu Biomedical Science Park and formulating plans to construct our Houli Plant at the Central Taiwan Science Park Houli Science Park (7th Redevelopment Zone section). These three factories are not located in environmental protection areas or protected species/species restoration habitats, and therefore do not have direct biodiversity impacts. PharmaEssentia continues to track local environmental and conservation issues through the Central Taiwan Science Park Sustainable Development website, and is also considering support for conservation and environmental actions. We continue to sponsor Jane Goodall Institute charity projects, and helped more schoolchildren enhance biodiversity and conservation awareness in 2024 as part of our contribution to biodiversity issues (please refer to 6.3 Philanthropic Activities).