



04

Sustainable Environment

- 4.1 Environmental Impact and Management in Production Process
- 4.2 Climate and Nature Actions
- 4.3 Energy Management
- 4.4 Water Stewardship
- 4.5 Waste and Pollution Management

Achievement Highlights

71% Environmental investment growth rate in 2024

43% Reduction in greenhouse gas emission intensity

32% Reduction in energy consumption intensity

-78.07 tCO₂e in emissions

Invested in energy-saving machinery and equipment, including replacing air compressors and introducing energy-saving water chillers, reducing energy usage by 158,000 kWh from 2023-2024

+46.8%

Taichung Plant recycled 9.72 million liters of water in 2024

ISO 14064-1

Taipei Headquarters and Taichung Plant completed ISO 14064-1 verifications for 2023

ISO 14001

Taichung Plant completed ISO 14001 verifications

TCFD

Continued to promote TCFD climate-related financial disclosures

PharmaEssentia pledges to minimize negative environmental impacts during product production processes and life cycle stages. We established environmental health and safety policies as well as environmental management indicators that include future targets for waste intensity, energy intensity, and greenhouse gas emissions intensity; incorporated the Task Force on Climate-Related Financial Disclosures (TCFD) framework to identify material climate risks & opportunities and formulate response measures; and regularly track progress on indicators and response measures.










Material Topics

- Evaluation of Environmental Impacts from Drug Production Processes

Main Stakeholders

- Shareholders and Investors
- Media
- NPOs/NGOs

4.1 Environmental Impact and Management in Production Process

Material Topics	Description of Impacts	Policies and Commitments
<div></div> <div></div> <div>Evaluation of Environmental Impacts from Drug Production Processes</div>	<div></div> <div>PharmaEssentia is a research-oriented biopharmaceutical company with R&D and manufacturing based in Taiwan as well as sales locations spread across Europe, the US, Japan, Singapore, China, and Korea. We work with local suppliers in all authorized markets on drug packaging, warehousing, distribution, and other components, and use various management systems to reduce negative environmental impacts from product R&D, production, and transportation processes.</div>	<div></div> <div>PharmaEssentia promulgated the Environmental Health and Safety Policy in 2018 to ensure employee health and safety, protect the environment, and prevent disasters. Environmental management is implemented through greenhouse gas management procedures, waste management procedures, chemical hazard management procedures, and other procedural documents. Additionally, our Taichung Plant has incorporated the ISO 14001 Environmental Management System to mitigate environmental impacts, enhance environmental management efficiency, and reduce negative environmental impacts from production and operational processes.</div>
Responsible Unit	Response Measures and Management Actions	
<div></div> <div>Taipei Headquarters: Occupational health and safety promotion team</div> <div>Taichung Plant: Greenhouse gas inventory promotion team (GHG promotion team)</div> <div>Material sustainability issues: Compiled and managed by the Executive Center for Corporate Sustainability Environmentally Friendly Team</div>	<div></div> <div><ul style="list-style-type: none">● PharmaEssentia invested NT\$9.39 million in environmental costs in 2024● Education and training: As of 2024, a total of 27 employees have obtained ISO 14064-1 internal auditor certification● TCFD/greenhouse gas inventory training hours: A total of 101 persons received 202 hours of training● General personnel response training for toxic and chemical substances of concern: 16 people obtained certification, including 9 employees from our Taichung Plant and 7 employees from our Taipei Headquarters</div> <div><ul style="list-style-type: none">● Appointed dedicated personnel to participate in regulatory training, policy promotion, and professional environmental lectures hosted by competent authorities● Hosted response personnel rescue and protection equipment training and annual disaster rescue and response training to enhance personnel disaster response capabilities● Continued to control air pollutant emissions and ensure zero leakages● Increased waste reuse rates (including recycling statistics for waste foam, waste glass, and waste plastic materials) to reduce waste incineration volumes and achieve circular economy concepts</div>	
Evaluation Mechanisms		
<div></div> <div>(Channels and Systems for Tracking Effectiveness of Response Measures and Management Actions)</div>	<div><ul style="list-style-type: none">● Short, medium, and long term management indicators: Waste intensity, energy intensity, and greenhouse gas emissions intensity● Internal audits:<ul style="list-style-type: none">• Non-periodic audits of waste treatment vendors• Periodic inspections of internal waste storage areas● Periodic assessments of unit waste generation intensity● External audits: Inspect legality of routine items in accordance with regulations established by environmental authorities● Quarterly on-site promotion meetings with Taichung City Department of Environmental Protection and Central Taiwan Science Park Administration, as well as engagement through communication meetings</div>	

Environmental Management Indicators and Investments



Targets and Achievements in 2024

- Waste intensity (ton/million TWD): 0.32%, a reduction of 51% compared to 2023
- Energy intensity (GJ/million TWD): 4.78, a reduction of 32% compared to 2023
- Greenhouse gas emission intensity (tCO₂e/million TWD): 0.5, a reduction of 43% compared to 2023
- Completed quarterly inspections of waste storage areas in 2024
- Waste recycling and reuse volumes in 2024 were increased by 10.28% compared to 2023
- Waste management: Zero pollution incidents
- Pollution prevention assessments: Zero pollution incidents
- Participated in 49.5 hours of external training (including promotion meetings) hosted by Taichung City Department of Environmental Protection and Central Taiwan Science Park Administration in 2024
- No major environmental violation incidents



Targets

Short-Term Targets (1-2 Years):

- Complete PharmaEssentia Zhubei Plant in 2025 and apply for green building certification
- Lower waste intensity (ton/million TWD) to less than 0.01
- Increase ratio of waste recycling and reuse volumes to overall waste volumes to reduce waste incineration/landfill volumes

Mid-Term Targets (3-5 Years):

- Continue to maintain and increase waste transferred to solid recovered fuel (SRF) vendors for reuse
- Incorporate ISO 14001 at Taipei Headquarters in 2027

Long-Term Goals (More Than 5 Years):

- Complete Houli Plant and provide smart pharmaceutical manufacturing and warehousing services to Taoyuan Aerotropolis
- Incorporate green building concepts into new plans during the planning and designing stages, and aim to obtain green building certification

PharmaEssentia established environmental management indicators in response to potential environmental impacts from production processes, and regularly invests in pollution control and waste treatment processes. We continue to track progress, respond to government environmental regulatory requirements and external audit requirements, and optimize management actions. Our Taichung Plant incorporated the ISO 14001:2015 Environmental Management System in 2024 and formed a promotion team composed of members from related units. The team is responsible for executing management system processes, undergoing education and training, carrying out risk assessments, and adopting response measures. A third-party verification statement was

obtained from SGS in December 2024. In terms of greenhouse gas management, our Taichung Plant and Taipei Headquarters have both incorporated the ISO 14064-1:2018 Greenhouse Gas Inventory Management System. We completed external verifications for 2023 greenhouse gas inventories at year-end 2024 and have obtained a third-party verification statement. Greenhouse gas inventories for 2024 are currently ongoing. PharmaEssentia has formulated short, medium, and long term management targets for greenhouse gases, energy, and waste, and has adopted measures to enhance energy and waste handling efficiency in response to global market and production capacity demands, and to reduce environmental burdens from production processes.



Taichung Plant obtained ISO 14001 Environmental Management System SGS verification statement in 2024



Taipei Headquarters and Taichung Plant obtained ISO 14064-1 third-party verifications for 2023 greenhouse gas inventories



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 ₂ e/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%

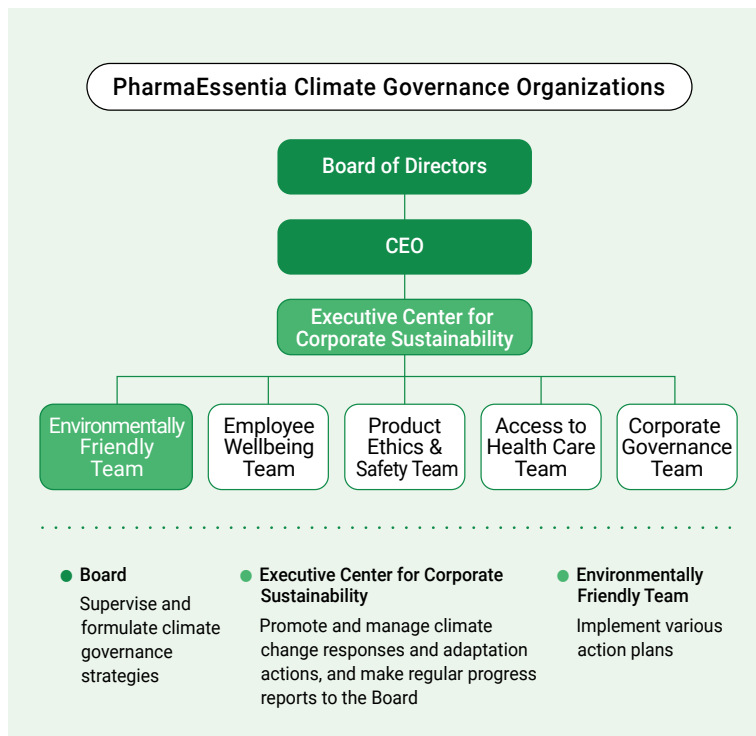
4.2 Climate and Nature Actions

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.

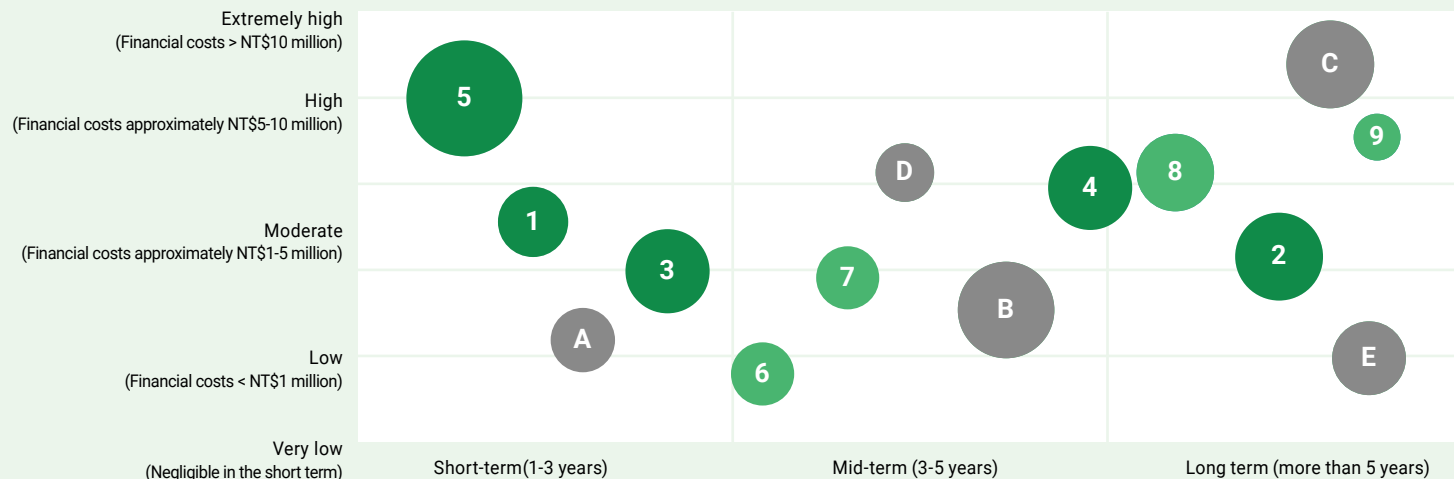
Transition Risks

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

Impact



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

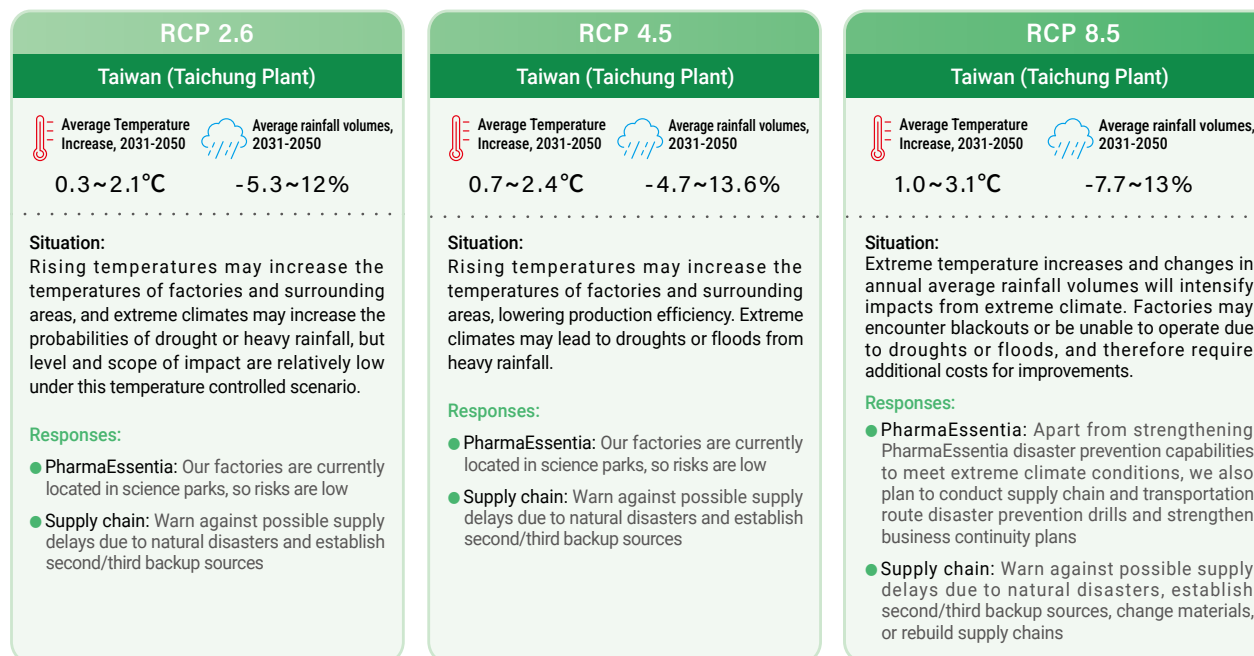
PharmaEssentia's climate risk management strategy is focused on management and adaptation of relatively significant climate risks over the short term (1-3 years), using management actions to reduce medium to long-term risk impacts, and formulating possibilities for climate opportunities.

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



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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Floods caused by extreme climate Droughts caused by extreme climate Rising temperatures Rising sea levels 	<ul style="list-style-type: none"> 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
Potential Financial Impacts	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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)
Financial Impact Assessments	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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

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	<p>Carbon management</p> <ul style="list-style-type: none"> 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	<p>Strengthen PharmaEssentia carbon management capabilities through continued implementation of:</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> For raw material management, increase raw material sources and evaluate new suppliers Incorporate climate change considerations in future R&D and add more options 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Evaluate resource efficiency enhancements from upgraded or replaced equipment Evaluate benefits from renewable energy installations or participation in carbon trading markets 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<p>Scope 1, Scope 2, and Scope 3 greenhouse gas emissions and related risks</p> <ul style="list-style-type: none"> 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 tCO₂e 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 	<ul style="list-style-type: none"> We track material usage using raw material consumption volumes/revenues as an indicator 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Greenhouse gas emission intensity (tCO₂e/million TWD) 	<ul style="list-style-type: none"> Raw material consumption intensity: Raw material consumption volumes (g)/revenues (thousand TWD) Improve resilience: Reduce raw material procurement risks from environmental impacts 	<ul style="list-style-type: none"> Regular implementation of emergency response measures
Achievements in 2024	<ul style="list-style-type: none"> Greenhouse gas emission intensity was 0.5 (tCO₂e/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 	<ul style="list-style-type: none"> Raw material consumption intensity: 1.06 g/thousand TWD in 2024, higher than 2023 (0.30 g/thousand TWD) 	<ul style="list-style-type: none"> 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](#)).

4.3 Energy Management

► Energy Usage

PharmaEssentia's energy consumption mainly stems from purchased electricity and natural gas. Our total energy usage volumes increased in 2024, mainly as production volumes increased compared to 2023. We continue to improve energy efficiency in production processes and are considering investments in energy-saving equipment, including but not limited to purchasing suspension chillers, variable frequency air compressors, and energy-efficient equipment to reduce energy consumption and comply with Good Manufacturing Practice (GMP) requirements stipulating that production environments should maintain certain cleanliness and quality control standards. PharmaEssentia's specific achievements in 2023-2024 included phasing out air compressors and installing energy-saving chillers. Total investments amounted to NT\$5.5 million, and we reduced energy usage by 158,000 kWh, equivalent to 78.07 tCO₂e in emissions.

Energy Consumption at PharmaEssentia GRI 302-1

(Unit: GJ)

Energy Type	2022	2023	2024
Purchased power	24,383.01	24,697.91	32,570.99
Natural gas	9,499.14	11,287.08	13,976.93
Diesel	18.44	9.28	17.50
Gasoline	19.99	10.15	7.95
Total energy consumption	33,920.58	36,004.43	46,573.36

Note: This 2024 Sustainability Report restated energy consumption for 2022-2023 as greenhouse gas inventory verifications were completed in 2024, so we make updates using data verified by a third party

PharmaEssentia Energy Intensity GRI 302-3

Indicator	2022	2023	2024
Energy intensity (GJ/million TWD)	11.77	7.05	4.78
Change in energy intensity compared to previous year (%)	-	-40%	-32%

► Greenhouse Gas Emissions

PharmaEssentia's largest greenhouse gas emission source is Scope 2 purchased electricity. Following commercialization of our new drugs in global markets, overall sales and production volumes in 2024 continued to grow, and total electricity usage also grew accordingly. Energy intensity and greenhouse gas emission intensity decreased by 32% and 43% compared to the previous year. PharmaEssentia's Taipei Headquarters and Taichung Plant conducted ISO 14061-1 greenhouse gas inventories and obtained third-party verification of 2023 greenhouse gas emissions data in 2024. We are currently working to obtain greenhouse gas emissions verifications for 2024. Greenhouse gas inventory results will be used as a reference for continued improvement of energy efficiency to achieve our target of lowering greenhouse gas emission intensities.

PharmaEssentia Taichung Plant Greenhouse Gas Emissions

GRI 305-1 GRI 305-2 GRI 305-3(Unit: tCO₂e)

Indicator	ISO 14064-1	Description	2022	2023	2024
Scope 1	Category 1	Direct energy use	569.55	690.11	828.26
Scope 2	Category 2	Electricity from Taiwan Power Company	3,037.27	2,900.10	3,080.84
Scope 3	Category 3	Fuel transportation, raw material upstream transportation, product downstream transportation, employee commutes, business travel, waste transportation	657.79	122.59	106.70
	Category 4	Sold products, outsourced product processing, services, waste treatment		747.02	819.23
Total			4,264.61	4,459.82	4,835.03

PharmaEssentia Taichung Plant Greenhouse Gas Intensities GRI 305-4

Indicator	2022	2023	2024
Greenhouse gas emissions intensity (tCO ₂ e/million TWD)	1.48	0.87	0.50
Change in greenhouse gas emission intensity compared to previous year (%)	-	-41%	-43%

Note 1: The greenhouse gas emissions data in this table were taken from PharmaEssentia's Taichung Plant, and revenues used for calculating intensity encompassed the entire company. This 2024 Sustainability Report restated greenhouse gas emissions data for 2023 as greenhouse gas inventory verifications were completed in 2024, so we make updates using data verified by a third party

Note 2: Inventoried greenhouse gases included carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and trifluoride nitrogen (NF₃)

Note 3: These figures were calculated using the "emission factor method." The emission factors for purchased electricity were taken from the Ministry of Economic Affairs Energy Administration. Electricity emission factors for 2021 and 2022 were 0.509 (kgCO₂e/kWh) and 0.495 (kgCO₂e/kWh), respectively. GWP values for various greenhouse gases listed in IPCC AR6 (2021) were used as a basis for calculating carbon equivalents for natural gas emissions

Note 4: Total product sales for the year (million TWD) were used to measure usage intensity and emission intensity

PharmaEssentia Taipei Headquarters 2023 Greenhouse Gas Emissions

GRI 305-1 GRI 305-2 GRI 305-3(Unit: tCO₂e)

Indicator	ISO 14064-1	Description	2023
Scope 1	Category 1	Direct energy use	25.99
Scope 2	Category 2	Electricity from Taiwan Power Company	1,230.93
Scope 3	Category 3	Emissions associated with transportation (Waste removal transportation)	0.63
	Category 4	Indirect emission sources from raw materials/services (Indirect emissions from waste treatment and indirect emissions from wastewater treatment)	247.95
Total			1,505.50

Note: The greenhouse gas emissions data in this table were taken from PharmaEssentia Taipei Headquarters, and we obtained third-party verifications for our greenhouse gas emissions in 2024

4.4 Water Stewardship

► Water Withdrawal, Water Discharge, and Recycled Water

Water used at PharmaEssentia's operational sites in Taiwan and Panco were all sourced from tap water. According to the World Resources Institute (WRI) water risk mapping tool, our operational sites were all located in areas with low to moderate water stress in 2024. Our Taichung Plant is our main production site, and our water consumption included water used for production processes and domestic usage; wastewater was discharged through the Central Taiwan Science Park Taichung Science Park sewage treatment plant. Every year, in accordance with Ministry of Environment regulations, our Taichung Plant commissions testing institutes certified by the Ministry of Environment Environmental Management Administration to conduct water quality tests on discharged water every six months to ensure compliance with Ministry of Environment and Central Taiwan Science Park Administration discharge standards. In 2024, total water withdrawal volumes at our Taipei Headquarters and Taichung Plant both increased compared to the previous year, mainly as overall production volumes increased, and we added water withdrawal volumes from the Taipei Bioinnovation Park and expansions on the 18th and 19th floors into water withdrawal data for our Taipei Headquarters.

PharmaEssentia continues to improve water management measures, and our Taichung Plant recycles process RO brine and wastewater for use in air-conditioner cooling towers to enhance water reuse efficiency. In 2024, we recycled 9.72 million liters of water, an increase of 46.8% compared to 2023.



Water Resources Used at PharmaEssentia's Main Operational Sites

GRI 303-3 GRI 303-4 GRI 303-5

(Unit: million liters)

Operational sites	2022			2023			2024		
	Water withdrawal volumes	Water discharge volumes	Water consumption volumes	Water withdrawal volumes	Water discharge volumes	Water consumption volumes	Water withdrawal volumes	Water discharge volumes	Water consumption volumes
Taipei Headquarters	7.38	7.38	-	7.63	7.63	-	22.89	22.89	-
Taichung Plant	18.11	9.13	10.5	14.13	5.74	8.98	22.97	9.77	13.2
Panco	Not recorded			1.4	1.4	-	0.11	0.11	-
Total	25.49	16.51	10.5	23.16	14.77	8.98	45.97	32.77	13.2

Note 1: In 2024, water withdrawal and water discharge volumes for our Taipei Headquarters included data from the Taipei Bioinnovation Park and expansions on the 18th and 19th floors, and therefore water volumes were significantly higher than for 2023

Note 2: Water discharge and water consumption volumes for 2022-2023 were revised in our 2024 Sustainability Report following internal confirmations

► Water Pollution Control and Wastewater Discharge Management Indicators

The quality of water discharged from our Taichung Plant is tested every six months in accordance with Ministry of Environment regulations by a testing institute certified by the Environmental Protection Administration. Test results for 2024 all adhered to regulation standards. Additionally, discharged water is appropriately treated at the Central Taiwan Science Park Administration Taichung Science Park sewage treatment plant before discharge. The discharged water adheres to wastewater treatment system standards for the pharmaceutical manufacturing industry set by the Central Taiwan Science Park Administration. In 2024, the quality of water discharged from our Taichung Plant adhered to regulated items and limits, and therefore did not raise any significant environmental pollution concerns.

In 2024, PharmaEssentia incurred a fine for 1 violation of the Water Pollution Control Act, mainly as our Zhubei Plant construction site submitted a plan for reducing runoff wastewater, but the Department of Environmental Protection discovered during an on-site inspection that the runoff wastewater treatment facilities were not consistent with the original submitted plan, so a fine of NT\$70,000 was imposed. In response to the discovered violation, the construction company has already submitted a new runoff wastewater reduction plan, which has been reviewed and approved by the Department of Environmental Protection, ensuring that the procedures comply with related regulatory requirements. PharmaEssentia has directed the construction company to strengthen on-site management measures, increase inspection frequencies, and ensure that the wastewater treatment facilities are operating normally. We also strengthened personnel training, established internal monitoring and management mechanisms, and comprehensively strengthened compliance and management capabilities.

Taichung Plant Water Discharge Management

Factory	Operations Center	Manufacturing Center
Discharge handling method	Regulated discharge	Regulated discharge
Inspection items	None	pH, COD, BOD, SS, water temperature, true color, free available residual chlorine
Discharge standards and standard sources (Environmental indicators and regulatory compliance)	Taichung Science Park underground sewage discharge standards	Taichung Science Park underground sewage discharge standards
Discharge location	Commercial building	Junhao Factory area

4.5 Waste and Pollution Management

► Prevention of Air Pollution

GRI 305-6

PharmaEssentia does not use or discharge ozone-depleting substances (ODS) listed in the Montreal Protocol or any persistent organic pollutants (POPs). We conduct regular tests and file reports on fixed air pollution sources in accordance with Ministry of Environment regulations, and test results showed that all of our discharged air pollutants were lower than regulated values. Due to global commercial sales needs and increases in total production volumes, our overall discharge volumes have increased, but are still lower than regulation amounts. PharmaEssentia did not violate any air pollution regulations in 2024.

PharmaEssentia Volumes of Main Discharged Gases

(Unit: kg)

Discharged gas	2022	2023	2024
NOx	444.2	425.7	578.4
SOx	34	32.3	30.4
Volatile organic compounds (VOCs)	9.3	17.1	12.6
Hazardous Air Pollutants (HAPs)	434.2	607.9	700.4
Particulate matter (PM)	7.8	7.4	9.8
Hydrogen chloride (HCl)	0.1	0.2	0.6
Total	929.6	1,090.6	1,332.2

Note: The data in this table were taken from PharmaEssentia's Taichung Plant; Panco Healthcare did not discharge any of the air pollutants listed in this table

► Waste Management

PharmaEssentia's waste mainly encompasses general industrial waste from production and manufacturing, as well as small amounts of chemicals used for R&D and experiments. We manage waste in accordance with regulations to prevent legal violations and environmental pollution risks from improper treatment. We also keep informed of trends in environmental protection laws, reduce waste at the source through R&D, adjust process designs, and improve material usage rates as part of our environmental protection implementations. We are gradually establishing a global footprint, and our production capacity and efficiency are also continuing to improve. We continue to reduce waste volumes and improve unit output efficiency, aiming to lower unit waste output volumes and intensities. We adhere to short, medium, and long term targets and action pathways to refine our management guidelines and implement management actions.

► Waste Generation and Treatment

GRI 306-1 GRI 306-2

PharmaEssentia reviewed waste generation, disposal, treatment, recycling, and other processes from a product life cycle perspective, and carefully recorded input material amounts and generated waste amounts. We also commissioned a qualified third-party waste treatment company to handle our waste.

► Input and output

Input characteristics

Waste is generated from manufacturing and production, QC test analyses, and laboratory R&D work. Hazardous waste, which includes small amounts of toxicants used in laboratories and infectious waste, is first sterilized under high heat in our factory and laboratories. Infectious waste is commonly treated as general waste following this sterilization process, but we still treat hazardous waste as infectious waste following sterilization to ensure compliance with related control measures.

Activity records

We carefully record amounts used and stocked for toxic chemicals, and also calculate generated waste volumes. In 2024, we generated a total of 40.24 tons of waste, an increase compared to the previous year mainly due to increases in process production batches.

Impact assessments

Factory production, QC test analyses, and laboratory R&D processes all adhere to pharmacopeia regulations (the raw materials used cannot be arbitrarily replaced by toxic compounds) and comply with GMP regulations, so can prevent process contamination and impacts on subsequent drug quality. Waste is recycled from back-end processes to reduce environmental impacts.

► Handling and Monitoring

Categorization and handling

Hazardous waste, biopharmaceutical infectious hazardous waste, solid/liquid hazardous waste, and non-hazardous waste are handled separately.

Monitoring by multiple parties

Our contracted waste treatment vendors are all legally established Class A or Class B certified waste disposal/treatment vendors. We also use a "three-party linked cross-check process" that requires relevant forms to be confirmed by PharmaEssentia, waste disposal companies, and final treatment companies before reports are filed and completed on the Environmental Protection Administration official website. This enables us to control and manage final waste destinations. We organize annual vendor audits of disposal/treatment processes as well as route inspections each year to ensure that waste is handled appropriately. We did not discover any legal violations incurred by vendors during previous audits.



► Generated Waste Volumes

We are gradually establishing a global footprint, and our production capacity and efficiency are also continuing to improve. We continue to reduce waste volumes and improve unit output efficiency, aiming to lower unit waste output volumes and intensities. We adhere to short, medium, and long term targets and action pathways to refine our management guidelines and implement management actions. PharmaEssentia's waste reuse and recycling volumes continued to grow in 2024, increasing by 10.28% compared to 2023. Our waste intensity in 2024 declined by 51% compared to the previous year, and has decreased year by year.

PharmaEssentia Waste Volumes (Unit: Tons)

Waste Category		2023	2024
Non-hazardous waste	Recycling and reuse	6.01	6.63
	Landfill	-	-
	Incineration	24.53	22.81
	Other	-	-
Total		30.54	29.44
Hazardous waste	Recycling and reuse	-	-
	Recycled Resources	-	-
	Landfill	-	-
	Incineration, Biopharmaceutical waste	1.97	2.10
	Incineration, Organic liquid waste	6.47	5.84
	Incineration, Non-organic liquid waste	0.83	0.53
	Other	-	-
	Total	9.27	8.47
Total waste volumes		39.81	37.91
Total recycled/reused waste volumes		6.01	6.63
Proportion of recycled/reused waste		15.10%	17.49%

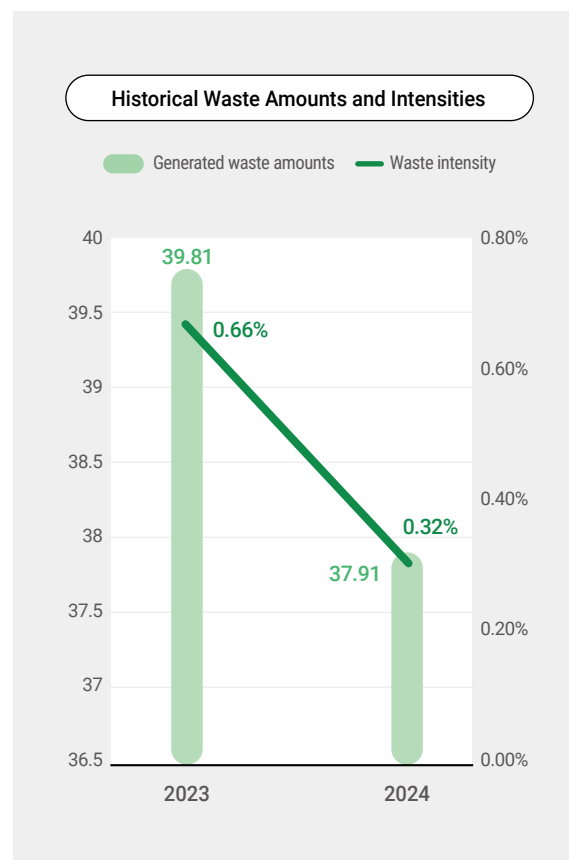
Note 1: The data in this table were taken from Taipei Headquarters, Panco Healthcare, and Taichung Plant

Note 2: PharmaEssentia added data on recycled and reused waste (including waste foam, waste glass, and waste plastics) in 2023. Materials recycled and reused in 2024 included 0.53 tons of waste plastics and 0.9 tons of waste glass

PharmaEssentia Waste Intensities

Indicator	2022	2023	2024
Waste intensity (ton/million TWD)	0.9%	0.66%	0.32%
Change in waste intensity compared to previous year (%)	-	-26%	-51%

Note: Waste intensity = (Total waste volumes - Total recycled and reused waste volumes)/revenue in millions for the year



► Production and Packaging Material Management

Our Taichung Plant is a Good Manufacturing Practice (GMP) factory. In order to comply with regulatory requirements, many of the materials used during operating processes are disposable, particularly materials used for packaging semi-finished or completed products. To prevent cross contamination and protect products, we avoid reusing these packaging materials. Non-renewable materials used in 2024 included disposable bags used during production processes as well as pipe fittings/filters and other consumables that come into contact with products, accounting for 87.7% of all materials. Renewable materials mainly included cardboard boxes/package inserts and other packaging materials.

PharmaEssentia Product Packaging Materials (Unit: Tons)

Category	Sub-categories	2022	2023	2024
Renewable materials	Cardboard boxes/package inserts(FP)	0.08	0.1	0.14
Non-renewable materials	Disposable consumables used during production processes (FP)	0.09	0.09	0.11
	Blister packs/syringe labels/plunger rods/safety needles (FP)	0.09	0.1	0.13
	Disposable bags used during production processes	1.26	1.35	1.29
	Total non-renewable materials	1.44	1.54	1.53

► Management of Toxic Chemicals and Chemical Substances of Concern

PharmaEssentia uses small amounts of toxic chemicals and chemical substances of concern listed by the Ministry of Environment during R&D and production processes (including machine cleaning processes). We therefore pay special attention to source control when managing these substances, properly classify and store all chemical substances, and keep written records of amounts used to track usage of chemical substances, prevent environmental pollution, and prevent hazards to human health. No incidents involving spills of chemical substances or waste occurred in 2024.

► Toxicant Categorization and Controls

PharmaEssentia categorizes chemical substances in accordance with the "Toxic and Concerned Chemical Substances Control Act" and stores toxicants in laboratory fume hoods by category. As we use many different types of chemicals, we have established the "Chemical Hazard Management Procedures" to regulate the procurement, usage, storage, and disposal of toxicants; stipulate clear responsibilities and control measures; and ensure accurate recordkeeping of used and stored chemical amounts.

Panco Healthcare is a logistics center which uses no chemicals and is mainly engaged in processing and labeling. Our logistics center has established the "Cleanup Procedures for Processing and Labeling Lines" to ensure proper on-site handling of pharmaceutical breakage and spill incidents that may occur during processing and labeling. No pharmaceutical breakage incidents occurred during processing operations in 2024.

► Toxicant Disaster Response Actions

PharmaEssentia has 16 general-level professional response personnel. To maintain the safety of our colleagues, we have established the "Chemical Spill Emergency Response Standard Operating Procedures" to enable rapid and effective completion of response procedures. As of 2024, no chemical spill incidents have occurred at PharmaEssentia. The laboratories at our Taichung Plant are equipped with comprehensive emergency response equipment which our colleagues can use when responding to emergencies, and we check equipment conditions and safety stock every month. We conduct annual toxicant spill disaster handling drills each year to ensure that our colleagues can respond promptly and effectively in emergency situations, thereby minimizing disaster impacts. We plan to establish professional toxicant response personnel at our factories in future based on the "Regulations for Management of Professional Response Personnel for Toxic Chemicals and Chemical Substances of Concern"; disaster units are responsible for adopting necessary protection, response, and disposal measures when emergencies occur, and professional response personnel from other units carry out supporting disaster response tasks and implement factory toxic disaster response procedures and toxicant operator training.



1

Toxicant spill



2

Reporting spill



3

Response team dons protective clothing



4

Containment of spill area



7

Personal protective equipment (PPE) decontamination and cleaning



6

Waste collection and handling



5

Removal of toxicant in the spill area

► PharmaEssentia 2024 Toxic Disaster Response Drill

PharmaEssentia conducted a toxicant disaster response drill in December 2024 to simulate a methylene chloride spill which occurred when warehouse personnel slipped and accidentally dropped a container filled with methylene chloride when moving this toxic substance to the explosion-proof cabinet in Room 106. The response drill encompassed rescue personnel donning protective clothing, toxicant containment, and removal.