5

Green Manufacturing and Operation

Recommended Primary Stakeholders for This Section:

☐ Suppliers ■ Customers ☐ Employees ■ Investors ■ Government ■ Media ■ General Public

5.1 Climate Governance and Strategies

GRI 3-3 201-2 302-4 305-5

Material Topics Climate Strategy and Energy Management

Green Manufacturing and Operation

Climate change is a major global challenge. TSC is committed to sustainability by continuously reducing its environmental footprint through energy-saving and carbon-reduction efforts.

Since 2022, TSC has conducted climate risk and opportunity assessments based on the TCFD framework to develop response strategies.

TSC also manages carbon emissions based on greenhouse gas inventories and has implemented ISO 14001 and ISO 50001 systems across key areas—energy, water, waste, wastewater, and air pollution—to ensure comprehensive environmental management.

Policy and Commitment

Promote a wide range of energy-saving initiatives to improve energy efficiency, explore alternative energy sources, and reduce the environmental impact of greenhouse gas emissions—all with the goal of enhancing climate resilience.

Management Approach and Evaluation Mechanism

- Conduct regular assessments of the financial impacts of climate change in accordance with the TCFD framework
- Continuously roll out and conduct greenhouse gas emission inventories, as well as expand its scope and categories
- Attain ISO 14064 certification to enhance the transparency and reliability of carbon emissions data
- Implement a range of energy reduction initiatives and monitor progress on an ongoing basis
- Participate in international CDP evaluations

Action Plans and Performance

- **Completed a TCFD-based quantitative assessment of climate-related risks and opportunities, focusing on GHG cost increases and stricter sustainability regulations.**
- **Achieved GHG inventory coverage for 50% of production sites, with ISO 14067 Product Carbon Footprint implementation underway.**
- **In 2024, energy-saving measures reduced consumption by 1,694.45 GJ, equivalent to 223.1 metric tons of CO_2e.**
- **Renewable energy accounted for 23% of total energy use.**

Note: 1. Coverage refers to the ratio of sites with GHG inventories completed to the total number of TSC sites.

5.1.1 Climate Governance and Strategies

TSC actively addresses climate-related risks and opportunities. In line with the TWSE's Rules Governing the Preparation and Filing of Sustainability Reports and the TCFD framework, we disclose our management approaches and response actions with transparency. By incorporating climate risk and opportunity assessments into our corporate risk management, we continue to promote low-carbon transition and enhance climate resilience through four key dimensions: governance, strategy, risk management, and metrics and targets.

Climate Governance Framework

In 2024, TSC elevated the ESG Committee to a Board-level functional committee, responsible for overseeing climate-related risks, opportunities, strategies, targets, and outcomes. The ESG Office supports the committee by planning meetings and compiling sustainability performance for reporting to both the ESG Committee and the Board.

GHG and energy-related initiatives are jointly led by production and business units, addressing both risk mitigation and adaptation. The ESG Committee reports to the Board at least twice a year on climate action progress, GHG inventory, and renewable energy deployment.

Board of Directors	The highest governance body for climate change, overseeing TSC's overall climate change management and major decision-making.
	Report the implementation plans and results to the Board of Directors twice a year.
ESG Committee	Responsible for formulating climate-related policies and strategic directions, planning execution programs, promoting initiatives, and tracking the effectiveness of implementation plans.
	Report the implementation plans and results to the Board of Directors twice a year.
ESG Office	Convened by the Administration Division / Corporate Governance Officer, the ESG Office collaborates with site supervisors and executive secretaries to develop carbon reduction strategies and major action plans, and assists with committee meeting planning and coordination.
Functional Teams	The Climate Change Response Action Project Execution Team is responsible for executing various greenhouse gas reduction plans in alignment with annual goals, and regularly engaging in communication and discussions with the ESG Office.

Management approach based on the TCFD recommendations		Implementation in 2024
Governance	The ESG Committee at TSC was elevated to a Board-level functional committee and is responsible for overseeing climate-related risks, opportunities, response strategies, targets, preventive measures, and concrete outcomes.	• In 2024, the original ESG Committee was elevated to a Board-level functional committee to strengthen climate governance. • A total of four ESG Committee meetings were held, covering topics such as the Greenhouse Gas Inventory progress report, a draft carbon reduction pathway map, and analysis of green energy usage requirements.
	The ESG Office annually reviews and assesses climate change issues, plans response strategies, promotes risk prevention, reviews implementation performance, and regularly reports to the ESG Committee.	The ESG Office formulated guidance strategies and main action plans related to climate change, which were then implemented by the Functional Team and other relevant units.
Strategy	TSC develops a methodology for assessing climate change risks and opportunities in accordance with the TCFD framework to identify short-, medium-, and long-term climate risks and opportunities.	• TSC evaluated climate risks faced by the company and its upstream and downstream value chains in terms of potential impact, likelihood of occurrence, and vulnerability, and developed corresponding response measures. For details, please refer to the tables "Climate-related Risks and Impacts on TSC Value Chain" and "Climate-related Risks and Response Measures for TSC." • Climate-related opportunities were identified based on the characteristics of TSC's business and low-carbon strategy planning. For details, please refer to the table "Climate-related Opportunities."
	TSC analyzes the potential operational and financial impacts of major climate risks and opportunities based on the TCFD framework.	TSC completed impact assessments for major climate risks under different scenarios, such as **"increased costs associated with greenhouse gas (GHG) emissions" and "tightening sustainability-related regulatory requirements."** For details, please refer to "Climate Risk Impact Assessment and Scenario Analysis."
	TSC analyzes climate risks under various scenarios and evaluates short-, medium-, and long-term carbon reduction strategies.	Based on the IEA's (International Energy Agency) Announced Pledges Scenario (APS) and Net Zero Emissions by 2050 Scenario (NZE), TSC analyzed the impact of risks such as "increased costs associated with greenhouse gas (GHG) emissions" and "tightening sustainability-related regulatory requirements, "and formulated climate change strategies and mitigation measures accordingly.
Risk Management	TSC has established a climate change risk identification procedure based on the TCFD framework.	TSC identified climate risks with reference to climate-related laws, regulations, and scientific research. For the risk identification procedure, please refer to "Climate Risks and Opportunities."
	• TSC develops corresponding adaptation and mitigation strategies based on the results of climate risk identification and prioritization. • TSC integrates the risk identification process into its existing risk management framework.	The ESG Office leads the materiality assessment of climate-related risks. Based on this assessment, the ESG Office formulated strategies and measures, which were confirmed by the ESG Committee and implemented in daily operations as part of the integrated risk management process.
Metrics and targets	TSC sets climate change-related management indicators to facilitate annual performance tracking.	TSC set reduction of total greenhouse gas emissions, use of renewable energy, and improvement of energy efficiency as performance metrics for climate change management.
	TSC conducts annual greenhouse gas inventories and discloses Scope 1, Scope 2, and partial Scope 3 emissions to assess the impact of its operations.	Based on the results of various inventories and assessments, TSC continued implementing carbon reduction measures to reduce organizational greenhouse gas emissions. For more details, please refer to "5.2.1 Carbon Emissions and Management."
	TSC reviews the achievement of climate management targets on an annual basis.	The ESG Office regularly reviewed the performance of climate change mitigation projects, compiled the results, and reported them to the ESG Committee. The Board of Directors monitored implementation outcomes on a regular basis.

Climate Risks and Opportunities Evaluation Procedures

To strengthen its management of climate-related risks and opportunities, TSC established a climate risk management procedure in alignment with the TCFD recommendations. The procedure consisted of the following five steps:

01 Compile a list of climate risks and opportunities	A climate risk and opportunity list was developed based on the TCFD framework, international sustainability indicators, peer benchmarking, and site-specific factors. Each risk was assessed by impact level, vulnerability, and likelihood, then ranked by percentile.
02 Analyze the scope of risk impacts	Risks were assessed across three dimensions: impact level, vulnerability, and likelihood. Each risk was ranked by percentile based on its overall impact.
03 Rank risk by materiality	TSC cross-referenced the results with each risk's location on the risk matrix. Risks that meet both of the following conditions - **(1) ranked in the top 20% by risk value, and (2) located in the high-vulnerability, high-impact zone** (orange area) on the matrix—are classified as high-risk. Risks that meet neither condition are classified as low-risk, while those that meet only one condition are classified as medium-risk.
04 Confirmation and Submission	The ESG Office reports climate risks, corresponding opportunities, response strategies, and the risk matrix to the ESG Committee member.
05 Response Strategies and External Disclosure	The ESG Office managed climate-related risks and opportunities, with functional teams executing related measures and controls. Annual disclosures were made via the Sustainability Report and company website.

Condition 1: Risk Value

- Risk values were calculated by multiplying scores for vulnerability, impact, and likelihood of occurrence. Risks in the top 20–30% range were considered high-risk, while those in the bottom 20–30% were considered low-risk.
- This approach offers a comprehensive assessment of vulnerability, impact, and likelihood.

Condition 2: Matrix Position

- Risks located in the orange area of the matrix—representing relatively high vulnerability and high impact—are considered high-risk and require mitigation.
- Risks in the gray area—representing relatively low vulnerability and low impact—are considered low-risk and generally only require resource reallocation.

TSC identified 10 climate-related risks and 3 climate-related opportunities. The identified transition risks include **increased costs associated with greenhouse gas (GHG) emissions, tightening sustainability-related regulatory requirements, and shifting customer preferences.** The physical risks include short-term events such as typhoons and heavy rainfall, and long-term risks such as rising average temperatures. We plan to identify and assess climate-related risks and opportunities on a triennial basis, taking into account the frequency, characteristics, and potential timing of such risks. In the interim years, we will review existing risks and verify the adequacy of corresponding response measures. In 2023 and 2024, we conducted quantitative assessments of the transition risks—increased costs associated with greenhouse gas (GHG) emissions and tightening sustainability-related regulatory requirements—based on their likelihood and potential impact.

Identifying the Impact of Climate-related Risks on the Value Chain

To evaluate the impact of climate risks across the value chain, TSC conducted a tiered assessment covering upstream suppliers (e.g., wafer and diffusion materials), its own operations, and downstream customers (including information technology, communications, digital appliances, and automotive electronics)

Supervisors conducted impact assessments using a three-tier scoring method across the three categories—upstream suppliers, TSC operations, and downstream customers. Risk impact scores were then ranked by percentile: the top 33.4% were categorized as high impact; 33.4% to 66.7% as moderate impact; and the bottom 33.3% as low impact. This evaluation identified the relative impact of climate risks on Taiwan's semiconductor value chain, providing a basis for strategic operational planning.

Climate-related Risks and Impact on TSC's Value Chain

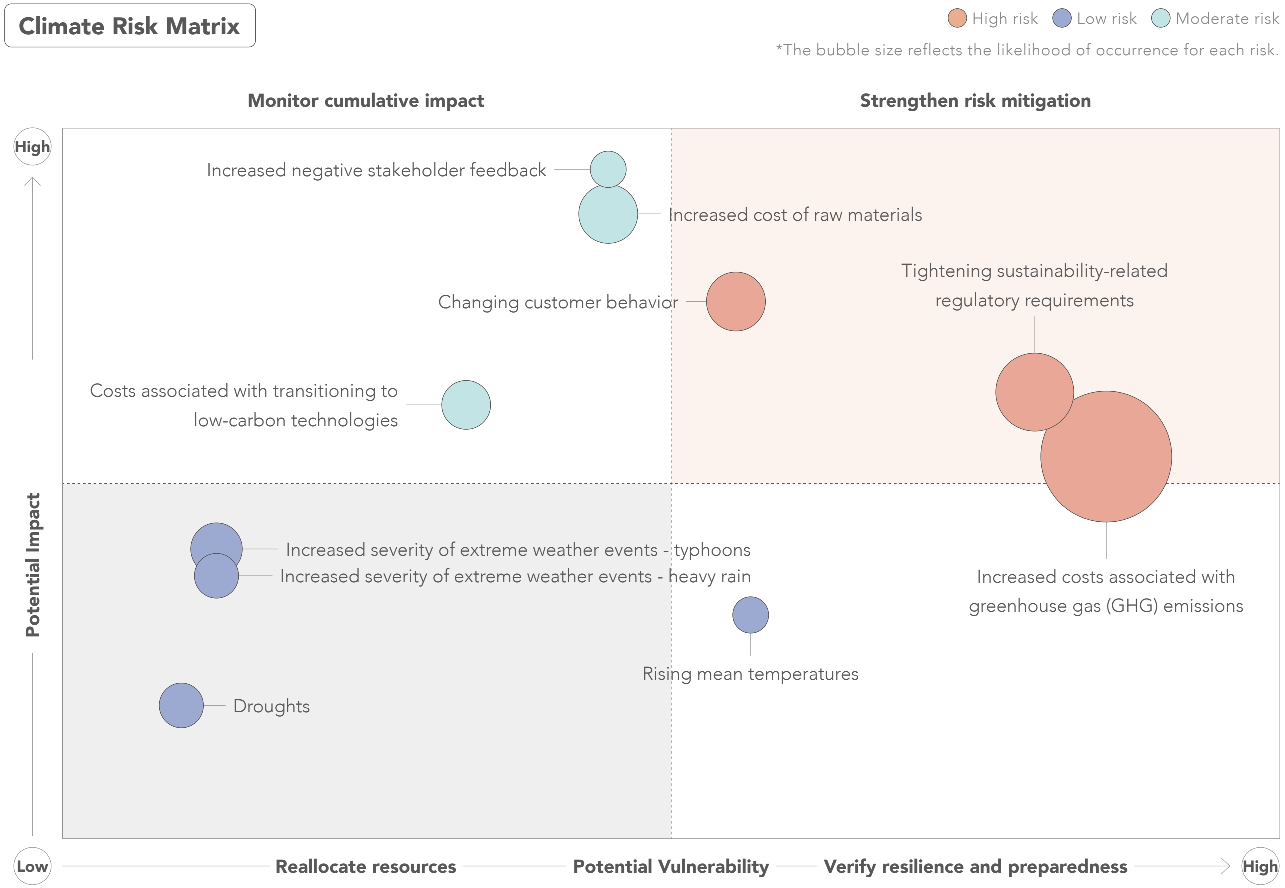
Low | Moderate | High

Type of Risk	Dimension	Risk	Value Chain Impact		
			Upstream	TSC	Downstream
Transition	Policy and legal	Increased costs associated with greenhouse gas (GHG) emissions	Low	High	High
		Tightening sustainability-related regulatory requirements	Low	High	Moderate
	Market	Changing customer behavior	Low	Moderate	High
		Increased cost of raw materials	High	High	High
	Technology	Costs associated with transitioning to low-carbon technologies	Low	Low	Moderate
	Reputation	Increased negative stakeholder feedback	Low	Moderate	Moderate
Physical	Acute	Increased severity of extreme weather events - typhoons	High	Moderate	Low
		Increased severity of extreme weather events - heavy rain	Low	Low	Low
		Droughts	Low	Low	Low
	Chronic	Rising mean temperatures	High	Low	Low

Identifying the Materiality of Climate Risks

To assess the materiality of climate-related risks to TSC, supervisors from operational sites in Yilan, Lije, Shandong, and Tianjin evaluated each risk from three dimensions: potential impact, potential vulnerability, and likelihood of occurrence. A comprehensive assessment of climate risk materiality was then conducted based on these three dimensions. The impact levels of each risk were ranked in percentile order, with the top 20% to 30% classified as high-risk and the bottom 20% to 30% classified as low-risk. Based on the results, each risk was mapped onto a materiality matrix. A risk was classified as high-risk if it met both of the following conditions - (1) ranked in the top 20% to 30% by risk value, and (2) located in the high-vulnerability, high-impact zone (orange area) on the matrix—are classified as high-risk. Risks that meet neither condition are classified as low-risk, while those that meet only one condition are classified as medium-risk. Using this methodology, a climate-related risk matrix specific to TSC was developed. The results serve as a basis for formulating risk response and mitigation strategies, as well as crisis management mechanisms.

Climate Risk Matrix



TSC assessed the potential impact of the ten identified climate-related risks on its operations and financial planning based on a materiality analysis, and subsequently formulated corresponding risk response measures, as outlined in the following table. In light of the potential impacts of climate-related risks and opportunities on various aspects of our operations, TSC actively promotes and implements energy-saving initiatives, develops a renewable energy roadmap, and closely monitors climate-related policies and regulations. Upon confirmation by the ESG Committee, these measures are progressively integrated into our daily operational management and overall risk management procedures.

Climate-related Risks and Response Measures

Low / Moderate / High

No.	Dimension	Risk	Description	Potential Financial Impact	Timeframe of Impact on TSC	Risk Level	Response Measures and Strategies
Transition risk							
1	**Policy and legal**	**Increased costs associated with greenhouse gas (GHG) emissions**	With the implementation of Taiwan's Climate Change Response Act and other climate-related policies and regulations globally (such as carbon tax/tariffs, emission trading systems, and carbon pricing/fees), TSC products may face increasing costs related to carbon emissions. These regulations are expected to tighten over time, leading to rising expenses.	Increased costs	Short term	High	• Adopt energy-saving equipment • Develop innovative products • Adopt low-carbon or renewable energy sources (renewables accounted for~23% of total energy use in 2024) • Raise employee awareness of carbon reduction
2	**Policy and legal**	**Tightening sustainability-related regulatory requirements**	According to Taiwan's Pathway to Net-Zero Emissions by 2050, energy transition has been identified as one of the key strategies, with a strong emphasis on maximizing the use of renewable energy. In addition, Taiwan's Renewable Energy Development Act stipulates that electricity users with a contracted capacity of 5,000 kW or more must meet a 10% renewable energy requirement by 2025. These policies are accelerating TSC's climate actions, including increasing the share of renewable energy, reducing product carbon footprints, and enhancing climate-related management.	Increased costs	Short term	High	• Improve product efficiency • Increase use of low-carbon/renewable energy • Continuously optimize energy management • Strengthen employee knowledge and skills in carbon management
3	**Market**	**Changing customer behavior**	In response to global trends toward net-zero emissions and reduced environmental impact, customers are increasingly opting for products with lower carbon footprints and minimal environmental impact, or requiring more transparent environmental information for the products/services they procure. If TSC is unable to meet these evolving expectations, there is a potential risk of customer attrition.	Reduced revenue	Medium term	High	• Develop products or services that minimize environmental impact. • Improve product efficiency • Use eco-friendly packaging materials.
4	**Market**	**Increased cost of raw materials**	In recent years, the frequency of extreme climate events has disrupted the stability of raw material supplies. Natural disasters can block mining routes, while high temperatures may reduce productivity, increasing the difficulty of raw material extraction and transportation. These challenges can lead to supply shortages, higher logistics and scheduling costs, and ultimately result in increased operating expenses.	Increased costs	Medium term	Moderate	• Keep a close eye on suppliers level of focus on climate issues • Conduct supplier risk assessment to avoid or reduce sourcing from high-risk production areas
5	**Technology**	**Costs associated with transitioning to low-carbon technologies**	With the increasing global emphasis on carbon reduction, many companies now require their supply chains to adopt sustainable and low-carbon practices. In response, TSC is gradually planning its transition and promoting the adoption of carbon reduction technologies and equipment. These efforts are expected to increase TSC's operating costs.	Increased costs	Medium term	Moderate	• Invest in R&D initiatives on high-performance equipment and low-carbon technologies • Actively develop talents in low-carbon transition • Assess investment in low-carbon technologies and equipment
6	**Reputation**	**Increased negative stakeholder feedback**	As climate change continues to gain attention, stakeholders increasingly favor companies that adopt low-carbon practices and demonstrate positive contributions to society and the environment. If TSC fails to implement proactive climate actions, we may fall short of stakeholder expectations and risk reputational damage.	Reduced funding	Long term	Moderate	• Strengthen climate change response and prevention • Enhance appropriate disclosure of our company's climate action information • Strengthen communication with stakeholders

No.	Dimension	Risk	Description	Potential Financial Impact	Timeframe of Impact on TSC	Risk Level	Response Measures and Strategies
Physical risk							
7	**Acute**	**Increased severity of extreme weather events - typhoons**	Increasing frequency and severity of typhoons will lead to the following impacts: • Potential damage to power infrastructure, leading to partial regional outages and interruptions in operations or services. • Disruptions in the supply chain. • Rising insurance premiums for assets located in high-risk areas, thereby increasing operating costs.	Increased costs	Medium term	●	• Strengthen flood control, drainage facilities, and contingency measures at our production sites • Roll out and implement a business continuity plan (BCP) • Strengthen the emergency supply mechanism
8	**Acute**	**Increased severity of extreme weather events - heavy rain**	The increasing frequency and amount of heavy rain may cause damage to production sites, interruptions in manufacturing operations, and disruptions to transportation systems that prevent employees from reporting to work.	Reduced revenue	Medium term	●	• Strengthen flood control, drainage facilities, and contingency measures at our production sites • Roll out and implement a business continuity plan (BCP) • Strengthen the emergency supply mechanism
9	**Acute**	**Droughts**	Water shortages resulting from droughts may cause interruptions in water supply, increased water tariffs, and disruptions in the procurement of external water sources, thereby affecting water usage in manufacturing processes. Such conditions may further lead to interruptions in operational activities.	Increased costs	Medium term	●	• Implement water conservation measures • Develop water recycling plans to increase the use of reclaimed water
10	**Chronic**	**Rising mean temperatures**	Climate change has resulted in prolonged periods of high temperatures, driving up electricity demand and global energy costs. Moreover, droughts caused by high temperatures pose a risk of operational disruptions.	Increased costs	Long term	●	• Implement water conservation measures • Roll out and implement a business continuity plan (BCP) • Closely monitor electricity consumption and adjust it as needed in a timely manner.

Note: Short term represents a period of up to three years; medium term represents a period from three to five years; and long term represents a period of five years and above.

Climate-related Opportunities

The assessment identified three key climate-related opportunities, summarized below. These opportunities are further detailed in the following table.

Climate-related Opportunities

No.	Opportunity Dimension	Opportunity	Implications for TSC	Potential Financial Impact	Timeframe of Impact on TSC
1	**Products and Services**	**Enhancing product energy efficiency**	Proactively improving the energy efficiency of products helps customers and end-users reduce energy consumption and greenhouse gas emissions during the product lifecycle. In response to the emerging market of automotive chips for new energy vehicles and the rapid development of the 5G industry, TSC will continue optimizing product performance to expand market share and improve profitability.	Increased revenue	Short term
2	**Resource Use Efficiency**	**Using more efficient production and distribution processes**	By improving energy efficiency in production processes and logistics, and enhancing the management of materials, energy resources, and waste, TSC can reduce energy use and carbon emissions, while also lowering operational costs.	Reduced costs	Medium term
3	**Resilience**	**Participating in renewable energy programs**	Increasing the use of low-carbon energy and developing diversified power supply sources to strengthen climate resilience. TSC will continue implementing and procuring renewable energy to achieve low-carbon energy transition.	Changed costs	Medium term

Note: Short term represents a period of up to three years; medium term represents a period from three to five years; and long term represents a period of five years and above.

Climate Risk Impact Assessment and Scenario Analysis

In 2022, TSC initiated the identification of climate change-related risks and opportunities. From 2023 to 2024, based on the degree of risk, probability of occurrence, and potential vulnerability, TSC conducted a quantitative financial impact analysis focusing on two key transition risks: "Increased costs associated with greenhouse gas (GHG) emissions" and "Tightening sustainability-related regulatory requirements". To analyze the potential future impact of climate change on TSC, we conducted scenario-based assessments using the Net Zero Emissions by 2050 (NZE) and Announced Pledges Scenario (APS) proposed by the International Energy Agency (IEA), aiming to understand how different scenarios may affect TSC.

Transition Risk – Increased Costs Associated with GHG emissions

With the gradual implementation of policies such as the EU Carbon Border Adjustment Mechanism (CBAM), Taiwan's carbon fee mechanism, and China's carbon trading system, TSC may face increasing financial pressure in the future—regardless of whether the Company is directly subject to these mechanisms—through pass-through costs related to energy, equipment, and materials. At this stage, TSC has assessed the impact of electricity price increases, carbon tax levies, carbon tariffs on exported products, and carbon cost pass-through within the supply chain under the NZE and APS carbon pricing scenarios.

Risk factor	Climate scenario	Scenario assumptions	2024 Carbon Pricing Parameters (Unit: amount/ton CO_2e)	Scenario analysis factors	Potential financial impact
Transition Risk-Increased costs associated with greenhouse gas (GHG) emissions	Scenario 1: Net Zero Emissions (NZE) Achieving net-zero emissions in the energy sector by 2050	Under the NZE scenario, global energy sector emissions reach net-zero by 2050. Greenhouse gas emissions will decline annually, with global average temperature rise staying below 1.4° C by 2100.	• Asia- Taiwan: NT$300 Tianjin, China: RMB34.30 Shandong, China: RMB45.61 **US$90 by 2030** • Europe- US$80.82 • US- US$55 **US$140 by 2030**	• Cost of carbon tax • Electricity cost at production sites • Carbon tariffs on exported products • Procurement costs	The estimated financial impact of increased costs associated with greenhouse gas (GHG) emissions may account for approximately 0%–5% of total annual revenue. The main sources of impact include: 1. Exceeding Legal Thresholds for Scope 1 and 2 Emissions at Production Sites: Based on projected production capacity and electricity consumption at TSC's four production sites in Taiwan and mainland China before 2030, if future Scope 1 and 2 emissions exceed regulatory limits, TSC may cross the threshold for carbon fee payments, resulting in increased emission-related costs. 2. Pass-Through of Carbon Taxes/Fees in Purchased Energy: As power generators in the regions where TSC operates are subject to carbon pricing mechanisms, the additional costs may be passed on through electricity prices, thereby increasing the cost of externally purchased electricity. 3. Carbon Tariffs on Exported Products: TSC's products exported to countries that have implemented carbon tariffs may face increased costs due to such levies. 4. Pass-Through of Carbon Costs in Material Procurement: Upstream equipment manufacturers and raw material suppliers facing rising carbon prices may experience higher production costs, which may subsequently be passed on to TSC, leading to increased procurement costs.
	Scenario 2: Announced Pledges Scenario (APS)	The APS scenario assumes that all government-announced greenhouse gas reduction and net-zero targets worldwide are achieved on schedule and in full. Under this scenario, global greenhouse gas emissions are projected to peak in the mid-2020s, with the global average temperature rising by 1.7°C by the year 2100.	• Asia- Taiwan: NT$300 Tianjin, China: RMB34.30 Shandong, China: RMB45.61 **US$40 by 2030** • Europe- US$80.82 • US- US$55 **US$135 by 2030**		

Transition Risk – Tightening Sustainability-related Regulatory Requirements

With the tightening of international renewable energy initiatives (such as RE100), supply chain carbon disclosure requirements, and industry net-zero policies, expectations from external stakeholders regarding the use of renewable energy and disclosure of carbon footprint information have risen significantly. TSC assessed that if it maintains its current renewable energy usage plan, it may not meet the industry benchmark for carbon emissions limits in the future, potentially facing operational risks and market competition pressures. As policy and market pressures continue to expand, TSC will not only need to increase the proportion of green electricity used, but also implement digital carbon management and conduct product-level carbon inventory assessments to support customer surveys, evaluations, and labeling requirements.

In response to this risk, TSC has initiated planning for renewable energy usage and is simultaneously expanding its carbon inventory and product carbon footprint management systems based on ISO 14064 and ISO 14067 standards. These efforts aim to enhance transparency of carbon information and regulatory compliance capabilities, ensuring the company can meet the increasingly stringent carbon reduction demands from external stakeholders.

In 2024, TSC also conducted scenario simulations and financial impact forecasts for renewable energy demand at its Taiwan and China production sites. According to the net-zero targets set under the IEA's NZE and APS scenarios, TSC assessed the potential financial impacts that may arise at its Taiwan and China production sites due to increasing renewable energy demand and stricter carbon reduction regulations, as outlined below:

Risk factor	Climate scenario	Scenario assumptions	Potential financial impact
Transition Risk - Tightening sustainability-related regulatory requirements	Scenario 1: IEA APS in line with industry regulation initiatives	**By 2030** • All countries' Nationally Determined Contributions (NDC)and long-term net-zero targets are achieved on schedule, limiting global temperature rise to 1.7° C. • TSC is subject to industry-specific carbon reduction regulations and complies accordingly.	With increasingly stringent sustainability regulations and growing international customer demand for low-carbon procurement, failure to effectively increase renewable energy use and improve information disclosure could result in higher operating costs, increased pressure from cost pass-through in procurement and production, and the risk of market loss due to failure to meet customers' carbon emission thresholds. This poses potential challenges to the company's financial stability and long-term competitiveness.
	Scenario 2: IEA NZE RE100	**By 2030** • It is assumed that the global energy sector will achieve net-zero CO_2 emissions by 2050, with all countries cooperating to reach global net-zero emissions, thereby limiting the temperature rise to 1.5° C. • TSC faces industry decarbonization regulations and high-intensity RE100 initiatives, and must implement emission reduction measures to comply with customer expectations, policy requirements, and industry standards.	

Climate Change Risk Metrics and Targets

In response to the impacts and challenges of climate change, TSC aligns with Taiwan's 2050 net-zero emissions target and actively supports government policies by striving to reduce the climate impact and risks associated with its operations. Our production sites in Taiwan consistently achieve an annual electricity-saving rate exceeding legal requirements by more than 1%. The Company continues to promote a variety of energy-saving and carbon-reduction initiatives. Each year, the Taiwan sites consistently exceed regulatory targets with a savings rate above 1%, while enhancing operational resilience and energy efficiency through the adoption of energy-efficient equipment, process optimization, and the implementation of ISO-related management systems. TSC also conducts greenhouse gas inventories in accordance with the ISO 14064-1 standard. In 2024, the company's Scope 1 and Scope 2 greenhouse gas emissions both showed a downward trend compared to the previous year. Notably, due to a significant increase in the proportion of renewable energy used, Scope 2 emissions were **reduced by 11,108.32 metric tons of CO_2e, representing a 36% decrease.** The greenhouse gas type covered in this year's inventory was carbon dioxide (CO_2) only.

Scope 1 and Scope 2 greenhouse gas emissions both showed a downward trend

Scope 2 emissions were reduced by

10,622

ton Co_2e

Strategy	Implementation Details	Implementation Results in 2024
Promoting energy-saving projects	Continue to carry out equipment upgrades and energy management through regular equipment inspections, replacing old and energy-intensive equipment with new energy-saving models to enhance carbon reduction effectiveness. For details, please refer to "5.2.2 Energy Management."	Throughout the year, multiple carbon reduction measures targeting energy-consuming equipment were completed at all sites, including equipment replacement and energy efficiency improvements. **Compared to the previous year, energy consumption was reduced by 1,694 GJ**, primarily in the form of electricity
Developing renewable energy	Formulate a renewable energy usage plan based on the principles of energy conservation, energy creation, and energy storage, with rooftop solar panel installation at TSC facilities as the first priority, followed by the purchase of green electricity	Renewable energy **accounted for 23%** of total energy consumption, primarily supplied by the Shandong Site and Tianjin Site
Establishing Robust Management Systems	Introduce and expand management systems such as ISO 14064 and ISO 14067. For details, please refer to "5.2.1 Greenhouse Gas Emissions and Management."	ISO 14064 certification was obtained; the Lije Site and Shandong Site expanded their inventory scope to include Categories 3 through 6; A product carbon footprint program under ISO 14067 was also launched
Digital carbon management	Evaluate smart carbon management solutions to replace manual data entry with digital technology and improve data quality.	Implementation is currently under planning to optimize inventory accuracy.

5.2 Energy Resource Management

GRI 305-1 305-2 305-3 305-4 305-5 TC-SC-110a.1 TC-SC-110a.2

TSC is committed to enhancing the efficiency of energy and resource use to prevent the overexploitation of natural resources and protect a livable environment for future generations. In addition to continuously expanding greenhouse gas inventories and obtaining third-party verification, TSC is also formulating alternative energy solutions. The company implements various energy-saving projects to replace outdated equipment and continues to strengthen water resource management measures, aiming to reduce environmental impact through concrete actions.

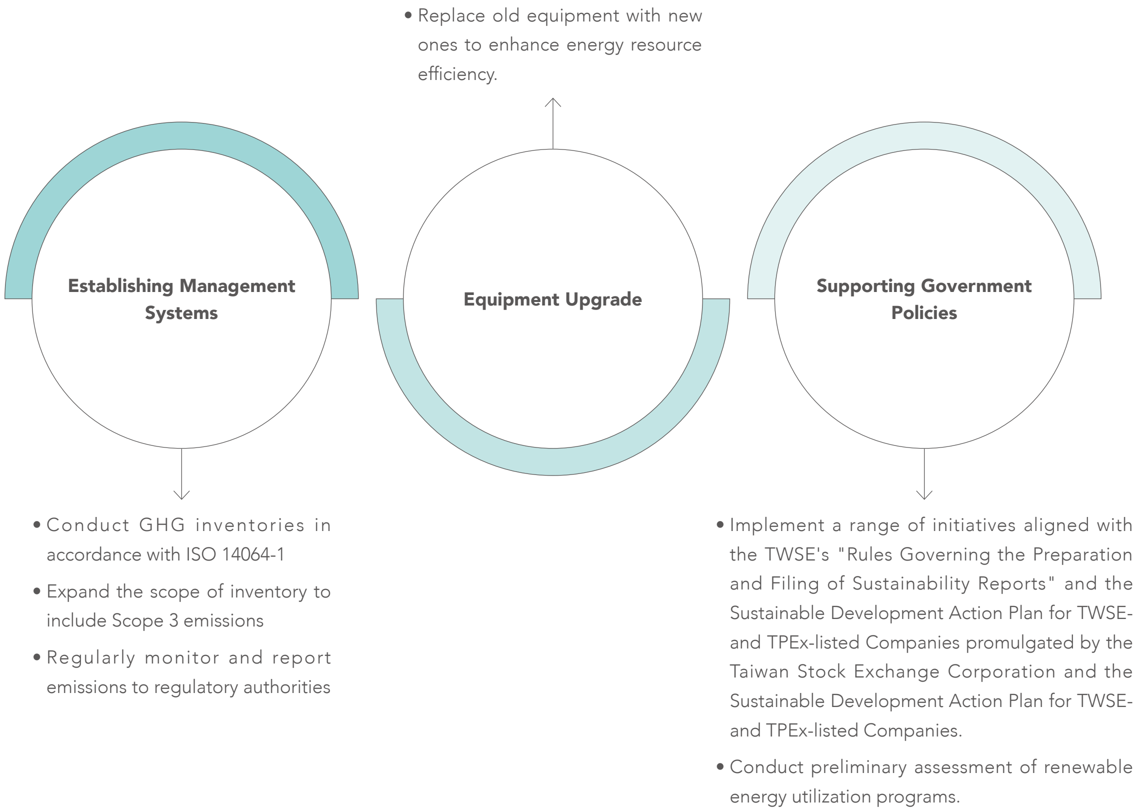
Coverage

Standards	Coverage[*1]	Verification body
ISO 14001 Environmental Management Systems	100%	TUV
ISO 50001 Energy Management System	25%	TUV
ISO 14064-1: 2018 Greenhouse Gas Inventory Standards	50%	TUV

Note:
1. Coverage refers to the number of certified sites divided by the total number of TSC sites.

5.2.1 Greenhouse Gas Emissions and Reduction Management

We conduct direct and indirect greenhouse gas inventories in compliance with the ISO 14064-1:2018 standards, and file our inventories with the competent authorities in accordance with regulatory requirements. In addition, we gradually set renewable energy targets in line with government policies while reducing greenhouse gas emissions through various greenhouse gas reduction programs and the deployment of renewable energy.



Greenhouse Gas Inventory Practices

TSC has established a greenhouse gas inventory mechanism in accordance with ISO 14064-1 standards. TSC also includes the progress of these inventories in the matters to be regularly reported to the Board of Directors in line with the Sustainable Development Action Plan for TWSE- and TPEx-listed Companies. We are expected to complete our overall greenhouse gas inventory, which will cover our production sites across Taiwan and China, as well as other overseas operating sites, by 2026. In addition, we continue to expand the scope of inventory categories to identify major carbon emission hotspots within the organization, thereby enabling the formulation of more precise GHG reduction targets. In 2024, **TSC's Scope 1 and Scope 2 greenhouse gas emissions declined**, primarily due to greater adoption of renewable energy, which **accounted for 23% of the company's total energy consumption.**

Carbon emissions at TSC are dominated by Scope 2 emissions from purchased electricity. As emissions are mainly concentrated in production sites, inventory initiatives have been launched at the site level, with full inventory completion expected by 2026.

Progress of Greenhouse Gas Inventory

▷ Initiate the inventory process

	2014	2022	2023	2024-2025	2026
Lije Site	▷ Initiate	Ongoing inventory and verification, inventory scope expanded			Achievement of TSC's full inventory coverage goal
Yilan Site		▷ Initiate	Ongoing inventory, preparing for verification		
Shandong Site			▷ Initiate	Ongoing inventory and verification	
Tianjin Site				▷ Initiate	
Other Operating Sites				▷ Initiate	

2024 Greenhouse Gas Emissions Overview

Unit:tCO_2e

Category	Emission Source	GHG Types	Emissions	Total
Lije Site				
1	Stationary combustion	CO_2, CH_4, N_2O	1.0945	6,785.0466
	Mobile combustion	CO_2, CH_4, N_2O	5.9701	
	Process emission	PFCs, HFCs, N_2O, SF_6, NF_3	6,743.4385	
	Fugitive emission	HFCs, CO_2, CH_4	34.5435	
2	Purchased electricity	CO_2	10,011.4488	10,011.4488
3 to 6	Transportation emissions (Category 3) and emissions from products used by the organization (Category 4)	CO_2	5,013.5888	5,013.5888
Yilan Site				
1	Stationary combustion	CO_2, CH_4, N_2O	2.5434	3.5194
	Mobile combustion	CO_2, CH_4, N_2O	0.3398	
	Process emission	VOCs	0.0000	
	Fugitive emission	HFCs, CO_2, CH_4	0.6362	
2	Purchased electricity	CO_2	3,666.4848	3,666.4848
3 to 6	Not yet inventoried			
Shandong Site				
1	Stationary combustion	CO_2, CH_4, N_2O	12.2255	224.3470
	Mobile combustion	CO_2, CH_4, N_2O	0.0718	
	Process emission	VOCs	0.1550	
	Fugitive emission	CH_4	211.8947	
2	Purchased electricity	CO_2	10,195.0454	10,195.0454
3 to 6	Transportation emissions (Category 3) and emissions from products used by the organization (Category 4)	CO_2	11,873.1980	11,873.1980
Tianjin Site				
1	Stationary combustion	CO_2, CH_4, N_2O	0.0000	633.9000
	Mobile combustion	CO_2, CH_4, N_2O	0.0000	
	Process emission	PFCs, HFCs, N_2O 、 SF_6, NF_3	606.2400	
	Fugitive emission	HFCs, CO_2, CH_4	27.6600	
2	Purchased electricity	CO_2	2,756.3800	2,756.3800
3 to 6	Transportation emissions (Category 3) and emissions from products used by the organization (Category 4)	CO_2	3,289.3900	3,289.3900

Historical Greenhouse Gas Emissions

Unit:tCO_2e

		2022	2023	2024
Direct Emissions	Category 1	136.79	4,742.84	7,646.82
Energy Indirect Emissions	Category 2	41,345.04	37,251.39	26,629.36
Total Emissions (Category 1 + 2) (A)		41,481.84	41,994.22	34,276.18
Denominator for Emission Intensity (Revenue in NT$ million) (B)		15,687	14,616	14,829
Emission Intensity (A/B)		2.64	2.87	2.31
Other Indirect Emissions	Category 3	2,675.77[1]	4,733.07	5,807.69
	Category 4	1,996.44[1]	11,022.35	14,368.49
	Category 5	-	-	-
	Category 6	-	-	-
Total Emissions (Category 3–6)		4,672.22	15,755.42	20,176.18

Note:

1. Greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).
2. In 2022, only Category 3 and Category 4 emissions from the Lije Site were included. From 2023 onwards, other indirect emissions include data from both the Lije Site and the Shandong Site.
3. Greenhouse gas inventory data was compiled using the operational control approach. Our production sites in Taiwan made the relevant calculations using the electricity carbon emission factor in 2024, while the GWP values for our Lije and Yilan sites were adopted from the IPCC AR5 and AR4 emission factors. On the other hand, our production sites in China made the relevant calculations using the 2012 North China Regional Grid emission factors, while the GWP values for these operating sites were adopted from the IPCC AR6 emission factors.
4. The total GHG emissions encompass Category 1 and Category 2 emissions from the Lije, Yilan, and Shandong sites. Emissions data from the Tianjin site, headquarters, Hsinchu Office, and other overseas locations were not included, as inventories at these sites have not yet been completed.
5. Due to the expansion of the GHG inventory scope in 2024, the base year for emission statistics has been adjusted to 2024.
6. There were no carbon dioxide emissions in 2024 resulting from biogenic combustion or biodegradation

Carbon Management Strategy

Carbon Management Roadmap

2024-2026
Laying the Organizational Foundation

- Integrate organizational carbon emissions inventory (ISO 14064)
- Conduct product carbon footprint inventory (ISO 14067)
- Identify climate-related risks and opportunities (TCFD)

2027-2028
Implement carbon reduction programs

- Establish a science-based reduction pathway (SBTi)
- Expand the use of renewable electricity

2029-2030
Driving Sustainable Growth

- Supply chain engagement
- Participate in carbon markets

According to its Carbon Management Roadmap, TSC's short-term objective is to establish a solid organizational foundation. This includes completing a comprehensive GHG inventory and initiating product carbon footprint calculations based on the ISO 14067 framework. At the same time, guided by its short-, medium-, and long-term carbon reduction strategies, TSC has strengthened energy-saving efforts across its facilities and begun utilizing renewable electricity. Key initiatives include: rolling out and implementing energy conservation programs, developing renewable energy, stepping up the establishment of management systems, and introducing digital management systems. With a number of energy conservation and carbon reduction measures in place, we endeavor to not only gradually replace old equipment at our production sites with high-efficiency treatment equipment and optimize energy efficiency on an ongoing basis, but also roll out and engage in energy transition by installing renewable energy equipment such as solar power generation facilities across all operating sites, thereby progressively advancing its energy transition efforts.

For direct emissions, TSC plans to progressively implement source management and equipment upgrade strategies to control emission intensity and mitigate direct carbon emissions from operational activities. In 2024, TSC recorded a year-on-year decline in both Category 1 and 2 GHG emissions, largely driven by the increased use of renewable energy. **Category 2 emissions were reduced by 7,718.04 metric tons of CO_2e, representing a 18% decrease.** All emission reductions were in the form of carbon dioxide.

Category 2 emissions were reduced by
7,718
ton Co_2e

Decreased by
18%

01 Rolling out and implementing energy conservation programs

- Implement energy-saving measures targeting high-consumption equipment and enhance chiller system efficiency across all production sites.
- Replace old equipment with new ones in order to enhance energy efficiency
- In 2024, TSC completed multiple energy-saving projects, achieving a reduction of **1,694.45 GJ** in energy consumption compared to the previous year, which is equivalent to a **decrease of 223.1 metric tons of CO_2e emissions.**

02 Developing renewable energy

- In 2024, green electricity accounted for **23%** of total electricity consumption.
- Draw up a renewable energy utilization plan based on the principles of energy conservation, energy generation, and energy storage, evaluating options such as installing solar panels on the rooftops of our facilities and purchasing green electricity.

03 Stepping up the establishment of management systems

- Completed the implementation of the ISO 50001 Energy Management System at the Lije Site
- ISO 14064-1:2018 Greenhouse Gas Inventory (Category 1 and 2, along with selected components under Category 3 to 6).
- Continuously update the ISO management systems and pass third-party verification on a regular basis.
- Initiated the ISO 14067 Product Carbon Footprint Implementation Plan in 2024.

04 Introducing digital management systems

- Implement smart monitoring and management of energy resources and collect data in real time to facilitate analysis and forecasting.
- Assess smart carbon management solutions by centralizing emissions data collection at headquarters and replacing manual entry with digital systems to enhance data accuracy and efficiency.

Product Carbon Footprint (PCF) Implementation Roadmap

ISO 14067 Product Carbon Footprint

Period	Milestone
2H24	Conduct kick-off meetings / formulate plan / define boundaries
1H25	Confirm product categories / execute inventory plan
2H25	Complete inventory / pass TUV verification / obtain ISO certification
FY26	Continue to perform annual inventories and TUV verifications

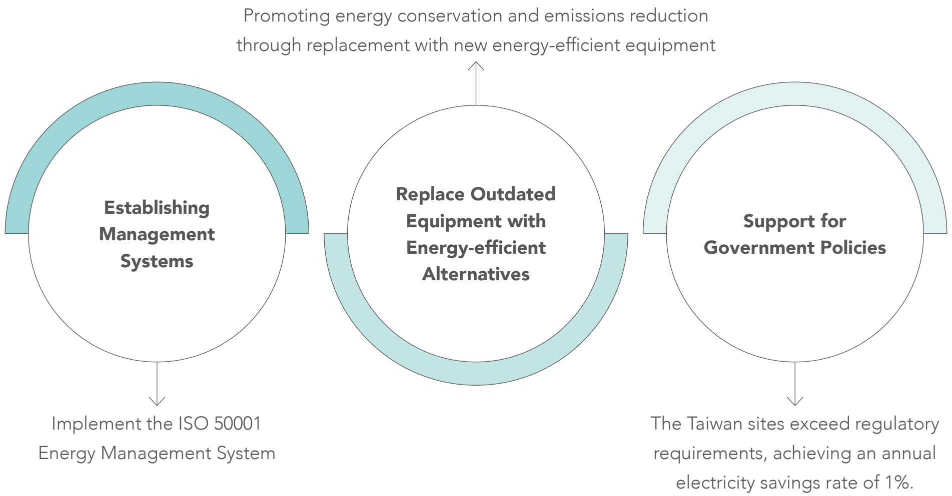
To better identify emission hotspots and enhance product competitiveness, TSC launched a full-scale Product Carbon Footprint (PCF) implementation plan in 2024. By calculating emissions throughout the stages of raw material sourcing, transportation, and manufacturing, the company aims to optimize energy and material efficiency throughout the product lifecycle, thereby advancing green innovation and long-term sustainability. Starting in 2025, product-specific analysis and life cycle inventory analysis will be gradually completed, with the goal of finalizing and passing third-party verification within the year.

5.2.2 Energy management

GRI 302-1 302-3 302-4 TC-SC-130a.1

TSC is committed to improving energy efficiency and closely monitoring electricity and energy use across operations. Each site develops its own energy-saving plans based on actual usage, focusing on high-consumption equipment and replacing outdated systems with energy-efficient alternatives.

Since 2023, the Lije and Shandong sites have begun phased implementation of the ISO 50001 Energy Management System to establish a PDCA cycle and formalize energy management. Through data monitoring and analysis, TSC identifies energy-intensive areas and drives continuous efficiency improvements.



Energy Structure

The energy sources used at production sites include electricity, diesel, gasoline, and other fuels. In 2024, electricity accounted for approximately 99.8% of total energy consumption.

Percentage of renewable energy → **23%**

TSC has already integrated renewable energy, which comprised 23% of total energy use. Other fuels are primarily used to power equipment such as emergency generators, forklifts, and lift trucks within the facilities. In recent years, the Shandong Site has replaced all diesel-powered forklifts with electric models, reducing diesel consumption by approximately 1.5 metric tons annually.

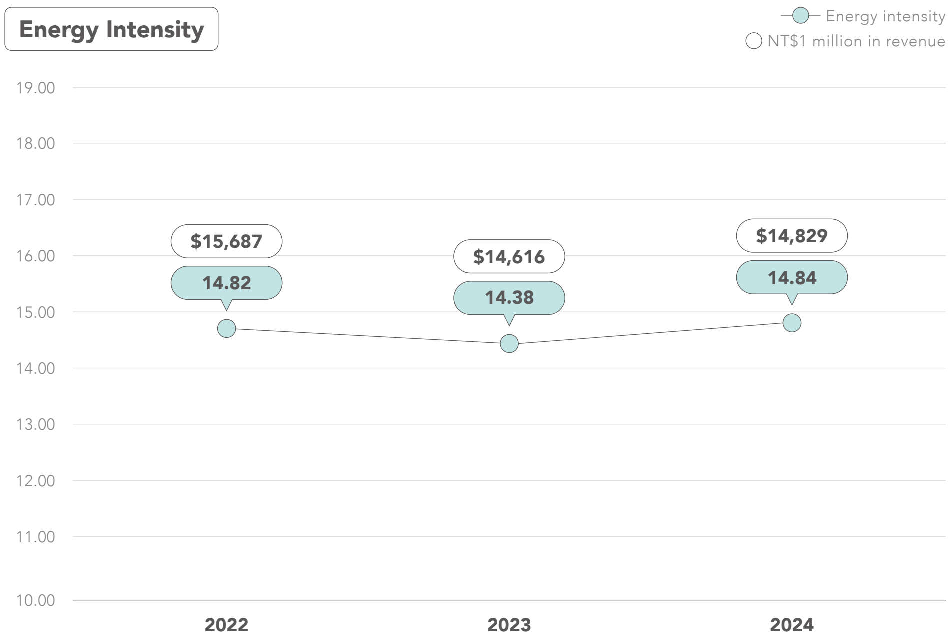
Energy Usage

Unit:GJ

		2022	2023	2024
Non-renewable energy	Liquefied Petroleum Gas	1.01	1.52	1.26
	Diesel	213.21	143.75	92.12
	Gasoline	137.72	236.03	290.53
	Purchased electricity	232,071.46	209,759.41	169,497.21
Renewable energy	Purchased electricity	0	0	50,108.40
Total energy usage of the organization		232,423.40	210,140.70	219,989.52
Proportion of energy use from purchased electricity (%)		99.85%	99.82%	99.83%
Proportion of renewable energy (%)		0%	0%	22.78%

Note:
1. Gasoline is not differentiated by octane rating.
2. Conversion factors are based on the 2023 Energy Statistics Handbook published by the Energy Administration, Ministry of Economic Affairs: Gasoline: 7,800 kcal/L (1 liter = 0.0327 GJ); Diesel: 8,400 kcal/L (1 liter = 0.0352 GJ); Electricity: 860 kcal/kWh (1 kWh = 0.0036 GJ).
3. All figures are rounded to two decimal places using the round-half-up method.
4. There is no energy consumption related to heating, cooling, or steam, nor any sale of electricity, heating, cooling, or steam energy.
5. In 2024, the total consumption of non-renewable energy was 169,881.12 GJ, while the total consumption of renewable energy was 50,108.40 GJ.

Energy Intensity



Note:
1. Energy Intensity = Total energy consumption within the organization (GJ) / Consolidated revenue (NTD million)
2. Revenue is based on the consolidated financial statements; energy consumption includes both renewable and non-renewable energy.

Renewable Energy Usage in 2024

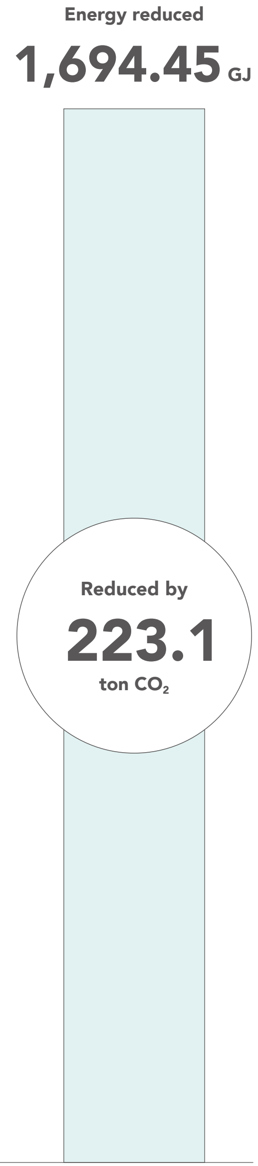
TSC monitors global renewable energy policies, regulations, pricing, and market trends to develop long-term strategies and explore feasible options. In 2024, the Shandong and Tianjin sites adopted renewable energy through mechanisms such as renewable energy certificates and third-party power transfers, **totaling 50,108.40 GJ—accounting for 23% of TSC's total energy use.**

Other sites will continue evaluating renewable energy programs and taking concrete actions to reduce GHG emissions and mitigate environmental impacts from operations.

Energy Improvement Initiatives and 2024 Implementation Results (Compared to 2023)

As electricity is TSC's main energy source, all energy-saving efforts in 2024 focused on electricity reduction. Key initiatives included improving cooling tower and chiller efficiency, upgrading lighting, and replacing air conditioning systems to support energy and carbon reduction goals.

In 2024, TSC adopted the ISO 50001 Energy Management System to guide energy-saving and equipment renewal projects. These efforts led to **a reduction of 1,694.45 GJ in energy consumption compared to 2023, equivalent to approximately 223.1 metric tons of CO_2e emissions.**



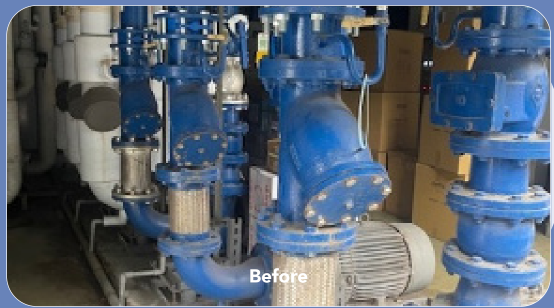
2024 Implementation Results

Chilled and Cooling Water Pump Optimization - Yilan Site

To conserve energy, reduce carbon emissions, and enhance resource efficiency while supporting increased production capacity while reducing electricity load, In recent years, the Yilan Site has actively promoted the replacement of aging equipment in recent years. Projects include installing a temperature difference monitoring system for the main pipelines of chilled water and cooling water, adding frequency converters to chilled water and cooling water pumps, installing frequency converter control panels and associated distribution wiring, and introducing an automated air conditioning control system to improve overall chilled and cooling water efficiency. Yilan Site continued to advance the chilled water and cooling water pump improvement plan. In 2024, pipeline replacement was carried out to further enhance pump conversion efficiency.

Implementation results

- The operating power of the cooling water pump was reduced from 31.04 kW to **16.72 kW**
- The operating power of the chilled water pump was reduced from 19.48 kW to **10.18 kW**
- The combined operation of the Cooling Water Pump (CWP) and Chilled Water Pump (CHP) resulted in annual electricity savings of **205,000 kWh**, **equivalent to a reduction of 101.5 metric tons of carbon emissions**



Lighting Efficiency Optimization - Lije Site

To actively advance sustainable operations, the General Affairs Department at the Lije Site implemented a lighting energy efficiency project in 2024 as part of its commitment to energy management and carbon reduction goals. The project focused on enhancing the energy efficiency of the site's lighting systems, with the following key measures:

① Conducted a comprehensive inventory of all lighting equipment to ensure the effectiveness and completeness of the improvement plan.

② Replaced traditional high-energy-consuming mercury lamps with LED lighting throughout the facility to improve energy efficiency.

③ Reduced the use of mercury lamps to lower energy consumption and minimize environmental impact, thereby achieving energy conservation and carbon reduction benefits.

Moving forward, TSC will continue enhancing lighting efficiency by evaluating the replacement of fluorescent lights with LED tubes in cleanrooms and office areas, and promoting energy-saving practices such as turning off lights in machine rooms and outdoor areas during off-hours.

Implementation results

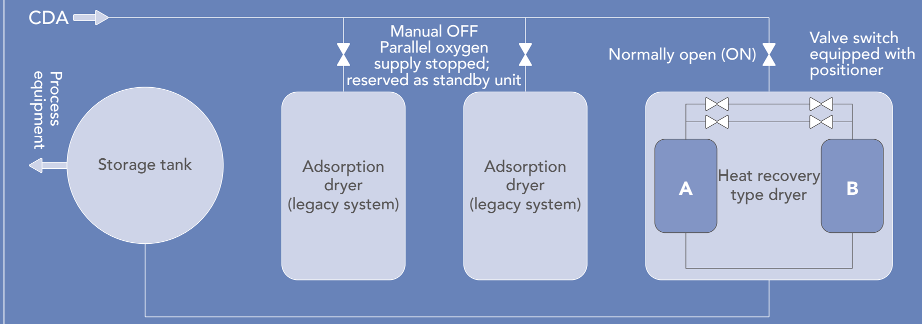
Mercury lamps were replaced with LED lighting, achieving annual electricity savings of **26,460 kWh, with an average energy consumption reduction of 70%**

Annual electricity savings
26,460kWh

Average energy consumption reduction of
70%

CDA Dryer System Energy Optimization - Lije Site

To enhance the energy efficiency of the compressed air system and reduce the risk of unexpected air supply interruptions, the Lije Site implemented an energy optimization project for its CDA (Clean Dry Air) dryer system in 2024. By adjusting equipment settings and improving control strategies, the project successfully reduced power consumption.



Implementation results

- Optimized the pneumatic valve control mechanism by installing positioners to ensure precise valve positioning during switching. This ensured that one valve was fully opened before the other was closed, thereby stabilizing operations and minimizing energy waste.
- Equipment air consumption was significantly reduced, with annual electricity usage decreasing from 360,555 kWh to 88,369 kWh, resulting in estimated **annual electricity savings of 272,186 kWh.**

Air Conditioning System Optimization: Enhancing Equipment Operating Efficiency - Lije Site

In 2024, the Lije Site carried out several initiatives to optimize air conditioning system efficiency, including enhancements to the chilled water system serving the warehouse and improvements to the process cooling water (PCW) pipeline. Strengthened inspection mechanisms and continuous auditing of system pipelines were conducted to ensure optimal shutdown protocols and equipment operating efficiency. These measures not only reduced electricity costs but also minimized unnecessary energy consumption.

Implementation results

- The usage of powered fluid pipelines in the large warehouse was reduced, and the chilled water flow for air conditioning was decreased, resulting in a savings of **24,854 kWh of electricity.**
- To address the high operating frequency of the PCW pump, the 6-inch PCW pipeline was modified, and heat exchangers and standby pumps were added. Losses were reduced and the flow distribution method of the PCW pipeline was improved, leading to an additional savings of **66,586 kWh of electricity.**

The chilled water flow for air conditioning was decreased

24,854 kWh

PCW pump electricity savings

66,586 kWh

5.3 Water Stewardship

Material Topics Water Stewardship

Policy and Commitment

- Comply with local water resource management regulations, aiming to improve water use efficiency through monitoring and record-keeping, while progressively strengthening water risk assessment and analysis. For sites with higher risk levels, implement water conservation mechanisms and set specific reduction targets.
- Commit to ensuring that all wastewater discharges comply with local regulations and effluent quality standards.

Management Approach and Evaluation Mechanism

- Regularly evaluate site-specific water risks using the WRI Aqueduct Water Risk Atlas, and apply tailored management measures.
- For sites with medium or higher water risk, implement a comprehensive water stewardship framework, including monitoring of water use, reclaimed water utilization, source diversification, and contingency planning.
- Maintain ISO 14001 Environmental Management System certification at all sites, reinforcing water stewardship through internal audits and external inspections.
- Establish Wastewater Management Procedures and drainage monitoring systems at each site; regularly test water quality parameters and report results to local authorities in compliance with regulations.

Action Plans and Performance

- **In the 2023 International CDP Water Security Assessment, the disclosure level has been upgraded from D (Disclosure) to C (Awareness) in 2024, indicating progress from basic disclosure toward enhanced awareness and response to water-related risks.**
- **In 2024, all sites complied with applicable wastewater discharge regulations, with no environmental exceedances or violations recorded.**

5.3.1 Water Stewardship GRI 3-3 303-1 303-3 303-4 303-5 TC-SC-140a.1

Approaches and Targets

As a semiconductor company, TSC recognizes the operational risks posed by climate change and water scarcity. In response, TSC continues to strengthen water stewardship across all sites by monitoring withdrawal, managing water quality, and maintaining ISO 14001 certification to drive ongoing improvements. Compliance with local water and wastewater regulations remains a key priority.

The Yilan and Lije sites are located in water-stable regions with consistent rainfall and low scarcity risk. The Tianjin site does not rely on groundwater and has experienced no water shortages. The Shandong site, identified as high risk by the WRI Aqueduct Tool, has implemented conservation measures since 2016, including eliminating high-consumption processes, promoting water recirculation, and reducing reliance on groundwater.

Water Resource Structure and Risk Management

TSC uses the WRI Aqueduct Tool to assess site-specific water risks. In Shandong, where water stress is high, the site aligns with local policies on groundwater restrictions and basin-wide water use limits. TSC has also built rainwater harvesting systems, shut down high-usage processes, and installed recycling equipment. These efforts have kept water use well below industry and regulatory limits, avoiding competition with other users.

Water stewardship is also extended to the supply chain. ISO 14001 certification is included in the evaluation of new and existing suppliers to improve environmental practices. TSC will continue to monitor water-related regulations, enhance site-level strategies, and collaborate with stakeholders to support sustainable water use.

Location	Geographical Features	Main Water Source	Water Risk	Management Mechanism
Yilan Site (Yilan County, Taiwan)	Two production sites in Taiwan are located in Yilan, a region with low-to-medium water stress. The Lanyang River Basin offers abundant water resources, making short-term shortages unlikely.	Groundwater (92%), tap water (8%)	Low-medium	Due to extended rainy seasons and the Yilan Site's proximity to the mountainside, along with a daily groundwater withdrawal of less than 100 tons, no signs of groundwater depletion or any need for water rationing have been observed.
Lije Site (Yilan County, Taiwan)		Surface water (Wulaokeng River) (91%), tap water (9%)	Low-medium	As the Wulaokeng River has consistently maintained its water flow over the years, the Lije Site currently does not require any water rationing measures.
Shandong Site (Shandong Province, Mainland China)	The Shandong Site is located in the northern Shandong Plain, near the Yellow River (130 km from its mouth) and the Bohai Sea (75 km away), with average annual rainfall of approximately 930 mm.	Groundwater (69%), tap water (31%)	Extremely high	Located in Binzhou City, the Shandong Site is subject to strict total volume controls are enforced by the local government on both Yellow River and groundwater sources. TSC has implemented long-term water conservation and resource management measures at Shandong Site for many years, resulting in unit water consumption significantly below both the industry average and the regulatory quota. Since 2016, the Shandong Site has decommissioned its most water-intensive operation—the pickling station—and upgraded equipment and recirculation systems in the electroplating process to reduce total water consumption. Going forward, the site will continue optimizing its water resource structure by gradually replacing part of the groundwater usage with tap water to reduce reliance on restricted sources and enhance water resource resilience.
Tianjin Site (Binhai New District, Tianjin, Mainland China)	The Tianjin Site is located in the Binhai New District in the eastern suburbs of Tianjin, facing the Bohai Sea to the east.	Surface water	Low-medium	The Tianjin Site's water is supplied by the Tianjin Development Zone Tap Water Company, primarily sourced from surface water. The site does not utilize groundwater and has not experienced water rationing or supply interruptions. Despite the current water supply stability, the site continues to follow ISO 14001 Environmental Management Systems requirements, including water monitoring and abnormal use record tracking. In response to evolving policies and site-specific usage patterns, water efficiency and risk management efforts will be continuously reinforced.

Note: 1. Other office branches, including Taipei and Hsinchu, use tap water as their primary source. As these offices are non-production facilities primarily used for domestic purposes, their water usage is minimal and has negligible impact on local water resources.

Water Withdrawal and Discharge Volumes in 2024

		Lije Site	Yilan Site	Shandong Site	Tianjin Site	Other Office Branches	TSC Total
Water withdrawal	**Surface water**	214.98	0.00	0.00	0.00	0.00	214.98
	Groundwater	0.00	32.76	155.09	0.00	0.00	187.85
	Seawater	0.00	0.00	0.00	0.00	0.00	0.00
	Third-party water (tap water)	21.23	2.56	69.45	300.65	2.34	396.23
	Total water withdrawal	236.21	35.32	224.54	300.65	2.34	799.06
Water discharge	**Total Water Discharge**	236.75	9.97	168.41	219.73	2.34	637.20
Water consumption	**Total water consumption**	-0.54	25.35	56.13	80.92	0.00	161.86

Note:
1. Water withdrawal data from third-party sources (tap water) and surface water is derived from water bills, while groundwater withdrawal volumes are recorded using on-site water meter readings at each operating sites.
2. The data collection scope covers all production sites and office branches, including the Taipei headquarters, Hsinchu office, and Hong Kong office. Data disclosure for the Taipei headquarters was estimated based on the proportion of water usage on each floor, as indicated in the office building's water bill. These office branches operate purely as administrative facilities and do not have separate water meters to track water discharge.
3. According to the WRI Aqueduct Tool, water stress is calculated as: Total annual water withdrawals divided by total available annual renewable supply. Areas with a water stress index between 40% and 80% are classified as high water stress areas, while those with a water stress index above 80% are categorized as extremely high water stress areas. TSC exclusively relies on freshwater sources with a total dissolved solid content of ≤1,000 mg/L. The production sites including Lije Site, Yilan Site, and Tianjin Site have water stress indices below 40%; the Shandong Site is situated in an extremely high water stress area, accounting for about 28% and 52% of TSC's overall water withdrawal and water consumption, respectively. All remaining office branches are located in areas with low water stress risk.
4. In 2024, TSC had no water withdrawal from seawater or produced water resources.
5. All process and domestic wastewater generated at TSC production sites undergoes on-site pretreatment before being discharged. This preliminary treatment is followed by connection to centralized wastewater treatment facilities operated by local governments or industrial parks, as required by local regulations. After further treatment by third-party service providers, the wastewater is discharged into nearby rivers or streams, which ultimately flow into the ocean.

5.3.2 Wastewater Management GRI 3-3 303-2 303-4

Wastewater Monitoring Mechanism

TSC has implemented a comprehensive wastewater management system to reduce environmental impact. Each site operates treatment facilities under permits aligned with local Effluent Standards, conducting daily water quality testing and regular third-party verification to ensure compliance.

Standardized Wastewater Management Operating Procedures are followed at all sites, detailing collection, monitoring, testing, and reporting protocols. Discharge and chemical dosage are recorded daily, with 24-hour monitoring in place. Data is reviewed by system engineers and supervisors, and monthly reports are submitted for site-level review.

Some wastewater contains trace amounts of nickel and fluoride. Taiwan sites comply with the Effluent Standards for semiconductor manufacturing; China sites follow the Integrated Wastewater Discharge Standards enforced by local authorities.

Historical Trend of Wastewater Discharge

Discharge volumes vary by site due to differences in production scale and activities. In 2024, TSC discharged a total of 636.91 million liters of wastewater. All sites remained in full compliance with applicable standards, and no water pollution incidents occurred.

Water Quality Control Mechanism

Yilan Site

Wastewater from the Yilan Site is discharged into the Yilan River under the supervision of the Site Affairs Department, which performs daily pH checks, weekly suspended solids tests, and semi-annual reporting, along with annual ISO 14001 audits. As wastewater mainly comes from cutting processes, it contains only minimal suspended solids (<5 mg/L) and remains neutral (pH 7±1) without chemical adjustment, posing negligible environmental risk. Following the Environmental Protection Bureau's recommendation, TSC obtained a simplified wastewater discharge permit in 2024, including relocation of groundwater treatment tanks to prevent leakage and soil contamination.

Lije Site

The Lije Site discharges wastewater into Xincheng River, with its treatment system monitored 24/7 and water quality analyzed twice daily. Data is collected by environmental and site affairs staff, reviewed by engineers and supervisors, and compiled into monthly reports for senior management. Any exceedances trigger immediate analysis and corrective action. Management performance is certified annually under ISO 14001, and effluent quality is verified quarterly by third-party inspections, covering key parameters such as fluoride, nitrate nitrogen, nickel, ammonia nitrogen, suspended solids, COD, and pH, with results reported to the Ministry of Environment.

Shandong Site

The Shandong Site, licensed by the Bureau of Ecology and Environment, has established comprehensive wastewater management procedures and operates an on-site treatment station. Discharge water quality is continuously monitored 24/7 for key indicators—pH, ammonia nitrogen, COD, and flow rate—and consistently meets regulatory standards. In addition, a third-party agency collects at least four samples monthly to test 16 indicators, with results confirming compliance with the Discharge Standards for the Electronic Industry. Actual emissions, such as COD (~30 mg/L vs. 500 mg/L limit) and ammonia nitrogen (~0.2 mg/L vs. 45 mg/L limit), remain well below limits, minimizing environmental impact. The site has also established clear operational procedures, conducts inspections every two hours, and is equipped with an emergency accident pool to manage any anomalies and ensure stable, compliant discharge.

Shandong Site — Wastewater Process Optimization

In 2024, the Shandong Site optimized its wastewater discharge process by eliminating isopropyl alcohol (IPA), a key contributor to COD. This reduced the organic pollution load, improved wastewater treatment performance, and supported the site's commitment to clean production, green manufacturing, and sustainable development.

Tianjin Site

Wastewater discharged from the Tianjin Site is channeled to a municipal wastewater treatment plant. The site is equipped with an online wastewater monitoring system, which monitors the value of pollutants in wastewater on a daily basis and sends the data to the Environmental Protection Bureau. The testing unit of the site's vendors regularly collects water from the site to test the quality of discharge water, and files reports based on production data with the Environmental Protection Bureau. Key monitored substances include five-day biochemical oxygen demand (BOD_5), suspended solids, total nitrogen, total phosphorus, pH value, ammonia nitrogen, and chemical oxygen demand (COD). In addition, the Shandong Site engages external vendors to validate the content of its ISO 14001 implementation and related documentation, carry out performance evaluation in the area of management, and issue the relevant certificates on an annual basis.

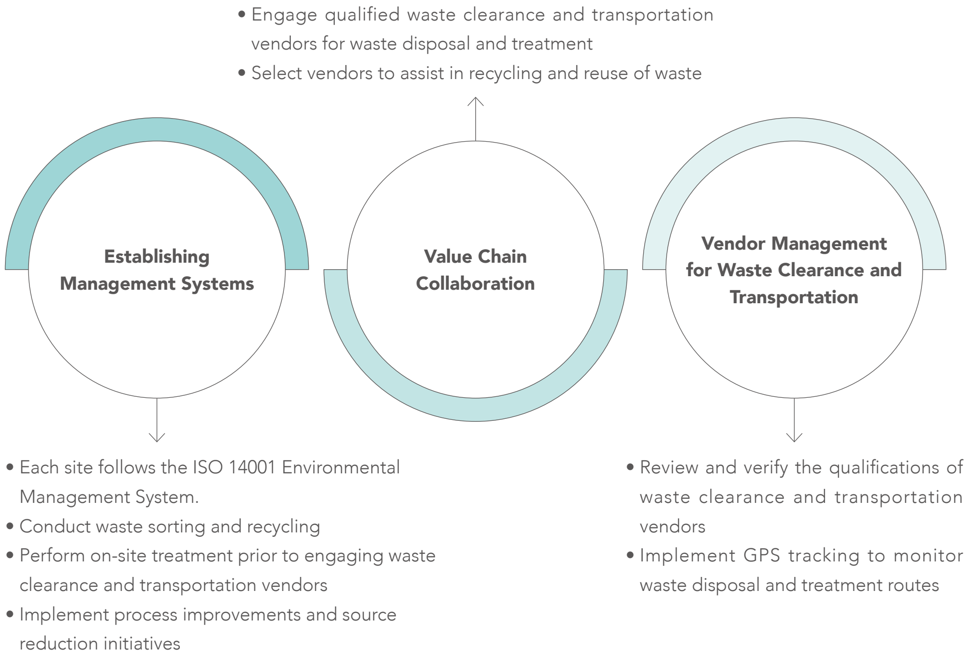
5.4.1 Waste Management

GRI 306-1 306-2 306-3 306-4 306-5 TC-SC-150a.1

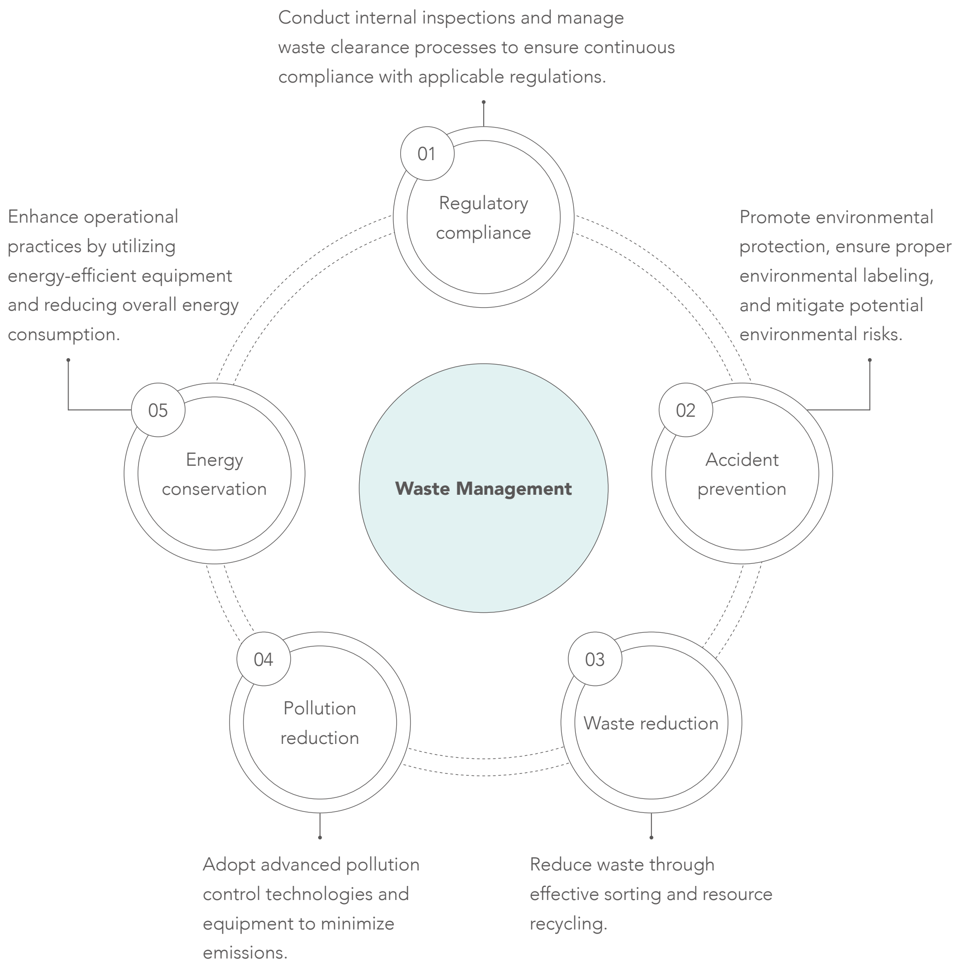
TSC is committed to minimizing environmental impact—particularly from waste—while improving resource efficiency and reducing operational costs. All sites are certified under ISO 14001 and conduct regular internal audits.

To manage waste responsibly, each site classifies on-site resource-type waste and outsources removal, processing, and recycling to licensed vendors. Special waste, such as chemical solvents, is temporarily stored in designated areas and handled by government-approved contractors.

To ensure traceability, TSC has established a contractor audit plan that includes on-site inspections, GPS tracking, and a comprehensive vendor management system to strengthen waste control practices.



TSC's Commitment to Waste Management



Waste Disposal Process

TSC utilizes various raw materials and process inputs in its semiconductor component production activities, which generate different types of waste. Key inputs include silicon wafers, chemicals (such as etchants and cleaning agents), additives (such as adhesives and resins), and packaging materials (such as wooden crates, pallets, and plastic films). Based on process characteristics, waste sources are categorized into four operational activity types:

① **Front-end processes (e.g., wafer cutting, etching, and cleaning):** generate waste such as heavy metal-containing sludge, organic solvent liquids, and wastewater treatment filter materials

② **Back-end assembly (e.g., adhesion, encapsulation, and testing):** generate adhesive residue, waste resin, and discarded electronic components

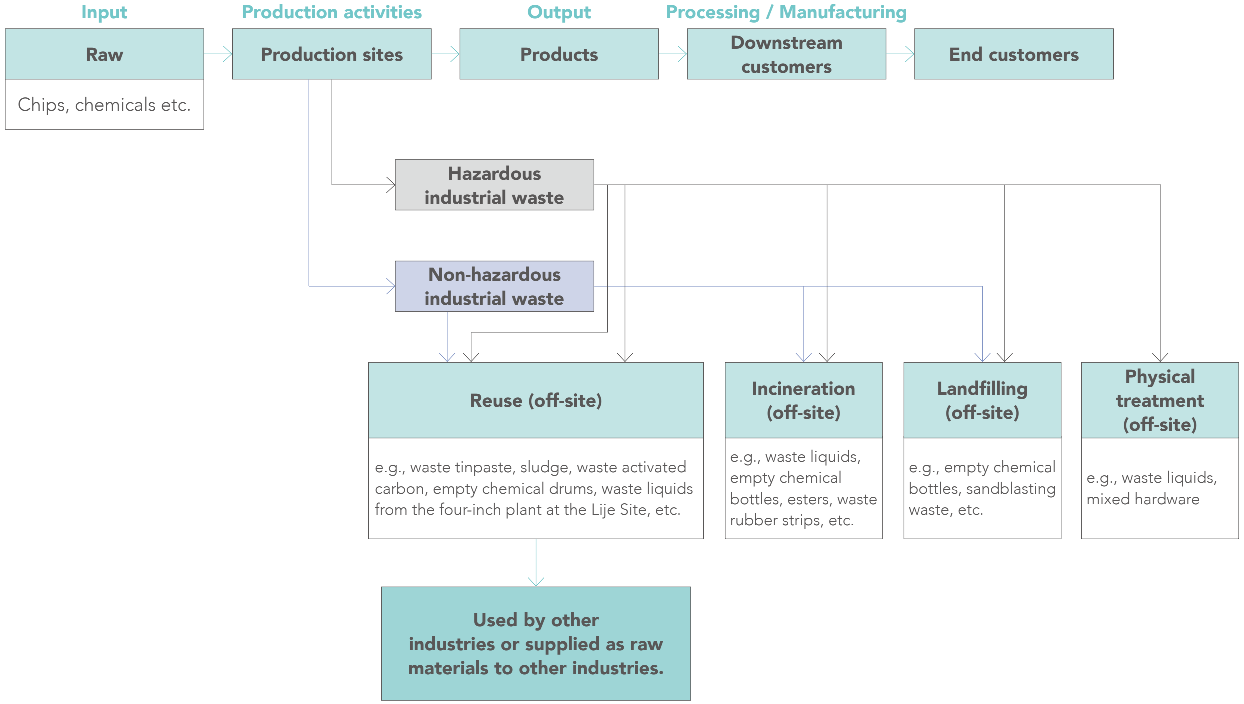
③ **Equipment and consumables replacement:** includes cleaning chemical drums, empty barrels, waste glass, and other non-product-related waste

④ **Packaging and shipment:** generates general industrial waste such as pallets, cardboard boxes, and heat-shrink plastic films.

To ensure effective waste management, each site follows a comprehensive system aligned with ISO 14001. This includes four key components: source reduction, classification and temporary storage, recycling, and outsourced treatment. All waste handling is documented and declared in accordance with regulatory requirements.

Hazardous and general industrial waste is mainly treated off-site by qualified vendors using methods such as physical treatment, incineration, landfilling, or recycling. Some sites conduct basic pre-treatment for empty chemical drums and waste liquids before outsourcing for reuse in other industries. General industrial waste is primarily managed through landfilling, incineration, or recycling.

Office waste from locations such as Taipei, Hsinchu, and overseas sites is treated as domestic waste and handled by licensed vendors in line with local regulations.



Waste Statistics

In 2024, TSC generated a total of 2,130.27 metric tons of waste, including 936.73 metric tons (44%) of hazardous industrial waste and 1,193.54 metric tons (56%) of non-hazardous waste. Each production site engages qualified waste clearance and transportation vendors to assist with waste disposal and treatment. Waste statistics for each production site are compiled internally by the site affairs unit and reported on a regular basis. Supporting documents, such as the triplicate waste weighing form, are retained for future reference in accordance with local government regulations.

To enhance waste management practices, the Lije Site has implemented a calcium fluoride sludge reduction program and partnered with designated vendors to recycle waste liquids from the four-inch plant. These waste liquids are fully recycled and reused as raw materials in cement manufacturing. The Yilan Site is working with external vendors to develop reuse mechanisms. The Shandong Site is promoting source reduction initiatives, including a program to replace heat-shrink plastic films, aiming to reduce raw material usage at the source and, in turn, decrease overall waste generation.

Total Waste in 2024

Unit: metric tons

Category		Item	Off-site	On-site
Hazardous waste	Direct disposal	Incineration (including energy recovery)	0	0
		Incineration (excluding energy recovery)	182.26	0
		Landfilling	1.15	0
		Other disposal methods	544.43	0
	Reuse	Preparation for reuse	0	0
		Recycling	208.89	0
		Other recycling operations	0	0
Total Hazardous Waste			936.73	0
Non-hazardous waste	Direct disposal	Incineration (including energy recovery)	0	0
		Incineration (excluding energy recovery)	52.84	0
		Landfilling	468.45	0
		Other disposal methods	0	0
	Reuse	Preparation for reuse	531.94	0
		Recycling and reuse	140.31	0
		Other recycling operations	0	0
Total Non-Hazardous Waste			1,193.54	0
Hazardous Waste + Non-hazardous Waste			2,130.27	

Note:
1. "Other disposal methods" include physical treatment.
2. In 2024, the total of hazardous industrial waste was 936.73 metric tons, and the reuse rate was 22%, including preparation for reuse, recycling, and other recycling operations. This figure was calculated based on the amount of hazardous industrial waste reused as a percentage of the total hazardous industrial waste generated.
3. The non-hazardous industrial waste reuse rate was 56%, also including preparation for reuse, recycling and reuse, and other recycling operations. The calculation was based on the amount of non-hazardous industrial waste reused as a percentage of the total non-hazardous industrial waste generated.
4. The classifications of "hazardous" and "non-hazardous" are based on the Methods and Facilities Standards for the Storage, Clearance and Disposal of Industrial Waste in Taiwan, and the People's Republic of China's Law on the Prevention and Control of Environmental Pollution by Solid Wastes.
5. The data in the table covers all production units. Office branches in Taipei, Hsinchu, and overseas are excluded, as the waste generated from these offices is categorized as general domestic waste. Such waste is collected and processed regularly by the buildings' designated waste clearance and transportation vendors in accordance with local government regulations.

Waste Reduction Actions

Lije Site

In 2024, waste reuse rate as high as → **86%**

The Lije Site actively promotes off-site resource utilization, converting production waste into reusable materials. **In 2024, the site achieved a waste reuse rate of 86%.** Through value chain collaboration, it has reduced energy consumption, lowered treatment costs, and improved recycling efficiency.

Key initiatives include: recycling calcium fluoride sludge with cement manufacturers, crushing waste glass for reuse, recovering noble metals from electronic waste, and working with vendors to distill waste liquids into raw materials—such as banana oil—for use in industries like paint manufacturing.

- **Waste Reduction**
- **Lower Energy Consumption and Reduced Waste Treatment Costs**
- **Benefits of Waste Recycling and Resource Regeneration**

Yilan Site

The Yilan Site previously incinerated large volumes of packaging waste—such as wooden pallets and crates—generated from equipment and material purchases. To reduce waste, the site now collaborates with external vendors and partners from other industries to promote recycling and resource reuse.

Moving forward, the site will continue exploring reuse opportunities, such as converting waste plastic strips into eco-friendly bricks through vendor partnerships.

Reduction and Reuse of Waste Plastics and Waste Wood

- **Yilan Site**

In response to climate change, resource depletion, and stakeholder expectations, the Yilan Site has promoted the Waste Plastics and Waste Wood Reuse Project. This initiative focuses on source reduction and recycling to lower GHG emissions, reduce disposal costs, and achieve a balance between environmental and economic benefits.

Waste Wood: Increasing the reuse rate to support the transition to green energy

Through collaboration with waste clearance and transportation vendors, wood waste is collected, processed, and reconstituted into a new form of renewable energy. Compared to traditional fossil fuels such as diesel or heavy oil, biofuels derived from waste wood offer higher calorific value and **improve energy conversion efficiency by approximately 50%, while reducing waste processing costs by about 30%.**

Improve energy conversion efficiency by 50%

Reducing waste processing costs 30%

Waste Plastics: Recycling and pelletizing to extend material lifecycle

Plastic waste is also collected, broken down, and reprocessed into recycled plastic pellets through cooperation with qualified vendors. The recycling treatment costs are **reduced by 75%** compared to incineration, effectively minimizing resource waste. The reuse mechanism is estimated to **reduce plastic waste emissions at the Yilan Site by approximately 10–20 metric tons per year**, thereby lowering the environmental impact.

Recycling treatment costs are reduced by 75% compared to incineration

Reduce plastic waste emissions at the Yilan Site 10-20 metric tons per year

The Yilan Site will continue expanding waste reduction efforts and exploring diversified reuse models. A new initiative—Eco-Brick from Mixed Plastics—is being planned in collaboration with vendors to develop eco-bricks using mixed plastic waste, such as discarded plastic strips. The project is expected to reuse 20–30 metric tons of plastic waste annually, reducing incineration volume.

- **Shandong Site**

To enhance resource efficiency, the Shandong Site continued to strengthen its packaging material reduction program in 2024, focusing on optimizing the management of cardboard boxes and plastic packaging materials to effectively reduce waste generation.

Results of Reducing Waste Cardboard Packaging

By controlling the use of cardboard boxes at the source, the amount of waste cardboard packaging generated per NT$ 10,000 of production value was maintained at less than 1 kilogram, **achieving a 66% reduction.** This outcome not only reduced resource consumption but also demonstrated the effectiveness of waste reduction practices.

Reducing Waste Cardboard Packaging
66%

Results of Replacing Heat-Shrink Plastic Films

In 2024, the Shandong Site fully eliminated the use of heat-shrink plastic films by improving transportation and packaging processes. **This initiative resulted in a reduction of more than 6 metric tons of plastic waste**, effectively preventing single-use plastic materials from entering the waste stream and significantly reducing potential environmental impacts.

Plastic Waste Reduction
> 6 metric tons

Waste Clearance and Transportation Management

Waste types vary by production site due to variations in manufacturing processes. To strengthen waste management,Taiwan and Shandong sites established waste clearance and transport procedures, including regulatory monitoring, periodic reviews, and continuous improvements. The Tianjin Site signed a government contract for centralized waste handling, while office locations had domestic waste managed by the property services.

Waste Clearance and Transportation Methods

Waste generated from production activities at TSC is categorized into non-hazardous industrial waste and hazardous industrial waste. The waste clearance and transportation process at Taiwan sites is outsourced to external vendors, following the procedures of the external waste clearance and transportation vendors, with all activities meticulously documented as follows:

- **General industrial waste**

On-site

Contact vendor for quotation → arrange waste clearance with vendor → issue clearance and transportation document → execute waste clearance and transportation

Off-site

Track vendor and vehicle until the vendor completes weighing and photo-taking procedures

- **Hazardous industrial waste**

On-site

Contact vendor to arrange clearance → issue waste clearance and transportation document → proceed with clearance → issue a three-part clearance document

Off-site

Modify the actual weight and verify the document → download and archive GPS tracking map → file triplicate form and related documents

Vendor Management for Waste Clearance and Transportation

For contracted waste treatment, TSC requires vendors to maintain valid licenses, comply with legal requirements, and undergo regular audits. Contracts are renewed periodically, and violations may lead to termination. To ensure proper oversight, TSC uses a GPS real-time tracking system, archives vehicle maps, and performs spot inspections. All supporting documents and equipment scrap reports are retained. The Lije Site audits vendors annually, while the Yilan Site audits them bi-monthly. Vendors are scored on a 5-point scale, with 90+ considered qualified. In 2024, all vendors were compliant.

Contractor Waste Assessment Items

Waste clearance and transportation	• Regular maintenance of clearance equipment • Pollution prevention and safety equipment for clearance operations • Assessment of the suitability and capacity of waste clearance and transportation equipment • Management of driver licenses and certification for hazardous goods transport personnel • Emergency response equipment, procedures, and manuals
Storage	• Compliance of on-site temporary storage quantities with permitted processing capacity • Compatibility of stored chemicals and proper regional classification • Groundwater/rainwater infiltration prevention measures • Response to abnormal spills in storage areas • Proper documentation of hazardous and non-hazardous waste clearance records
Industrial safety and fire protection	• Documentation for protective equipment • Feasibility of PPE usage and operational compliance • Inspection of fire safety equipment and maintenance of audit records • Implementation of security protocols and installation of fire protection systems • Other industrial safety management systems
Other	• Organizational structure and professional competence • Accuracy and completeness of online reporting and document handling • Relevant industry experience and performance history • Accuracy of submitted written information • Establishment of ISO 14001 system or equivalent operational standards

5.4.2 Air Pollution Prevention and Control

GRI 305-6 305-7

TSC is committed to air pollution prevention and environmental protection. All of our production sites comply with local environmental laws and regulations and undergo regular gas testing. The primary types of gases generated in the production process at our production sites include acid waste gas and volatile organic compounds (VOCs). In addition, a small amount of flue gas is emitted from the solid crystal welding process, which is treated by the acid-alkali scrubbers, ionization decomposition, fume filtration, and VOCs adsorption treatment systems, while a third-party inspection organization is commissioned to conduct regular inspections to ensure that the emission standards are met. Due to differences in the nature of wafer fabrication and assembly/testing processes at each plant, the types of air pollutants generated vary slightly. In 2024, all of TSC's production sites complied with local environmental regulations, with no violations related to air pollution control.

Air Pollutant Emissions

Unit: metric tons

	2022	2023	2024
Nitrogen Oxides (NOx)	2.596	6.382	1.125
Sulfur Oxides (SOx)	0.000	0.000	0.000
Persistent Organic Pollutants (POP)	0.000	0.000	0.000
Volatile Organic Compounds (VOC)	9.664	3.203	3.923
Hazardous Air Pollutants (HAP)	0.000	0.000	0.000
Particulate Matter (PM)	2.007	2.069	1.702
Ozone-depleting substances (ODS)	0.000	0.000	0.000
Other	1.651	0.556	0.241
Total hazardous gas emissions	15.918	12.210	6.991

Note:
1. The data presented above is based on the average of monitoring data from the Site Affairs Department and three sets of inspection data from external inspection units. The real-time monitoring data is primarily sourced from our Lije and Yilan sites. On the other hand, the Shandong Site engages external inspection units to conduct regular inspections, while the Tianjin Site engages third-party inspection units to conduct three inspections, whose data was averaged.
2. There were no emissions of sulfur oxides (SOx), ozone-depleting substances, persistent organic pollutants (POPs), particulate matter (PM), or hazardous air pollutants(HAP).
3. In line with the 2023 amendments to the Air Pollution Control and Emission Standards for the Semiconductor Industry, issued by the Ministry of Environment, the source of statistics on VOCs at TSC's production sites in Taiwan was revised to the Report on Volatile Organic Substance and Inorganic Acids Pollution Control in the Semiconductor Manufacturing Industry.
4. "Other" refers to three specific gas types—xylene, ethylbenzene, and non-methane hydrocarbons—monitored at the Tianjin Site, which require mandatory testing in accordance with the Atmospheric Pollutant Discharge Standards, where the emissions of these three types of gases meet the requirements of the local government.

Monitoring of Air Pollution Prevention and Control

The manufacturing sites in Taiwan comply with the Air Pollution Control and Emissions Standards for the Semiconductor Industry. Regular monitoring is carried out through air pollution prevention equipment in parallel with both Treatment Methods for Different Types of Air Pollutants Acidic and alkaline waste gases are collected in an acidic or alkaline waste scrubbing tower for appropriate treatment, ensuring that the resulting wastes comply with emission standards. internal and external audits at TSC's Acidic or alkaline waste gas in mainland China, namely the Shandong and Tianjin sites, The average values and emissions rates are calculated based on the results of inspections conducted three times by a qualified third-party organization engaged by the Tianjin Site.

Waste Gas Treatment

TSC's primary air pollutants include acidic/alkaline exhaust gases and volatile organic compounds (VOCs). To mitigate pollution, TSC employs treatment equipment and processes corresponding to the type and properties of waste gases. Acidic and alkaline waste gas, as well as VOCs, are effectively managed through various control equipment, including acid and alkaline scrubbing towers, and zeolite rotor incineration systems, while continuous monitoring is conducted using the gas chromatography-flame ionization detector(GC-FID) system to ensure that the control equipment operates efficiently and meets regulatory standards.

Treatment Methods for Different Types of Air Pollutants

Type of air pollutant	Treatment Method
Acidic/Alkaline Exhaust GasesType of air pollutant	Acidic and alkaline waste gases are collected in an acidic or alkaline waste scrubbing tower for appropriate treatment, ensuring that the resulting wastes comply with emission standards.
VOCs	Lije Site Volatile organic compounds (VOCs) are adsorbed and concentrated using a zeolite rotor. This is followed by a continuous high-temperature desorption process and catalytic incineration. Yilan Site VOCs are treated using scrubbing towers to remove VOCs from the waste gas. The resulting waste liquid is then discharged into the wastewater system. Since the concentration of VOCs is lower at the Yilan Site compared to the Lije Site, scrubbing is the preferred treatment method. This eliminates the need for concentrated purification using zeolite rotor adsorption.

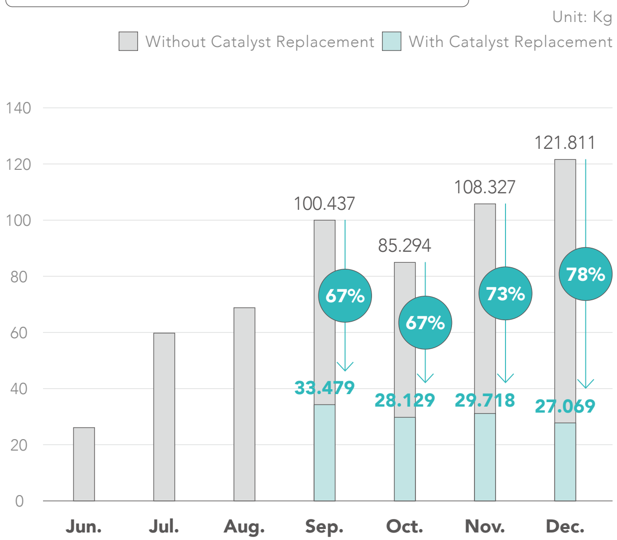
At the Lije Site, the scrubber tower utilizes a parallel method to process both acidic and alkaline waste gases. In the event of an emergency, the remaining equipment can be adjusted to handle the target exhaust treatment, while also coordinating with the production line to prevent air pollution. Furthermore, the zeolite rotor continuous incineration (RCO) system, which is employed to treat volatile organic exhaust gases, can be switched to an activated carbon tower as a parallel backup system during emergencies. This allows for simultaneous coordination with the production line to minimize environmental impact.

In 2020, the Shandong Site invested over NT$4 million to upgrade its exhaust gas treatment facilities, which enable the purification and treatment of acidic gases, flue gas particulate matters, and VOCs using acid and alkali scrubbers, a filtration system, ionization decomposition, and an activated carbon adsorption system according to the properties of exhaust gas from different manufacturing processes. The filtration system adopts a two-stage approach: primary filtration using filter cotton and medium-efficiency filtration using filter bags, achieving a 93% removal rate for dust particles. The activated carbon adsorption system utilizes molecular sieve technology, with approximately 18m^3 of activated carbon inside the adsorption chamber effectively adsorbing and purifying VOC emissions, ensuring stable and compliant discharge.

VOC Emission Reduction - Lije Site

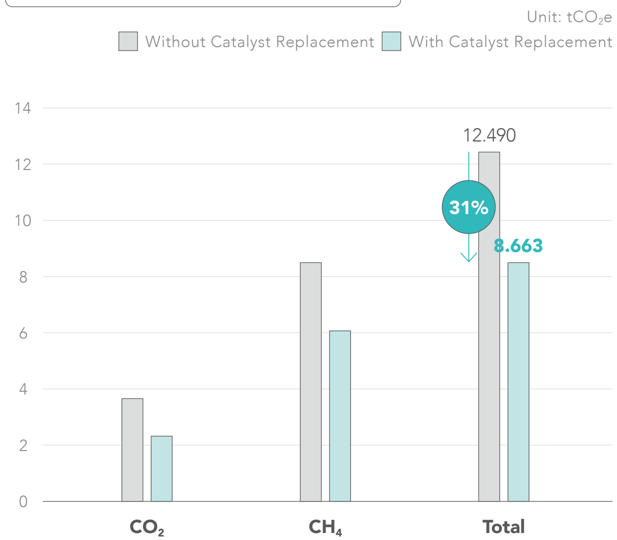
To integrate environmental management into daily operations, the Site Affairs Department at the Lije Site launched a VOC emission reduction project for the 4-inch organic exhaust treatment system in 2024. By utilizing automated GC-FID reporting for data analysis, the team, with its strong data sensitivity and system familiarity, identified emission reduction potential in the catalytic oxidizer of the 4-inch plant. System efficiency monitoring and optimization were carried out, effectively reducing VOC emissions from production and minimizing environmental impact.

Comparison of VOC Emissions in 2024



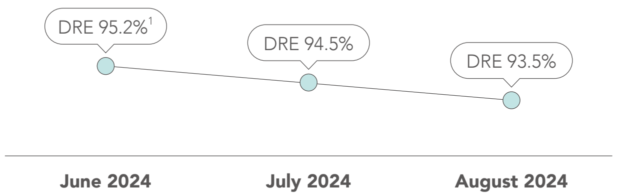
- From June to August 2024, monthly VOC emissions showed a continuous upward trend.
- If the catalyst bed had not been replaced, estimated VOC emissions (Kg)
- **The average emission reduction efficiency reached 71%.**

GHG Reduction Benefits in 2024



- Before the catalyst bed replacement, the greenhouse gas (GHG) emissions totaled 12.49 tCO_2e.
- After the replacement, emissions were reduced to 8.66 tCO_2e, resulting in a reduction of 3.83 tCO_2e.
- **The emission reduction efficiency reached 31%.**

1. Using Gas Chromatography–Flame Ionization Detector (GC-FID) to automatically generate reports for catalyst treatment efficiency analysis, it was observed that the catalyst performance was gradually declining:



Note:1.DRE (Destruction and Removal Efficiency)

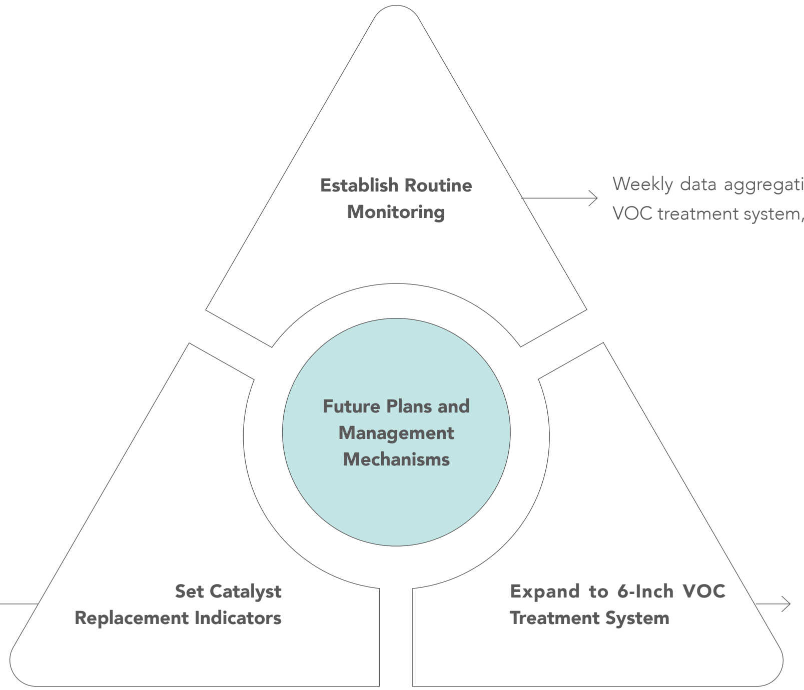
2. Catalyst Replacement and Equipment Optimization

- The catalytic incinerator originally housed four catalyst modules. During the project, one module was replaced without disrupting production. The total replacement time was approximately 0.5 days, during which the system was switched to an activated carbon tower to ensure continuous VOC adsorption and emission control.

3. Project Results and Reduction Benefits

- After the catalyst replacement in September 2024, the DRE significantly improved to **97.4%**.
- From September to December 2024, **the average VOC reduction efficiency was 71%.**
- For the entire year in 2024, **greenhouse gas (GHG) emissions were reduced by 31%**, contributing to a notable decrease in carbon emissions.

Future Plans and Management Mechanisms - Lije Site



Establish Routine Monitoring: Weekly data aggregation from GC-FID reports will be used to create trend charts for the VOC treatment system, ensuring stable system performance.

Set Catalyst Replacement Indicators: Catalyst replacement standards will be developed based on DRE trends to maintain optimal system performance.

Expand to 6-Inch VOC Treatment System: VOC emissions from the 6-inch production line will be monitored to estimate treatment efficiency under mass production conditions. Preventive catalyst replacement will be scheduled in advance to further enhance emission reduction.