

2024

# Formosa Petrochemical Corporation

Task Force on Climate-related  
Financial Disclosures  
(TCFD) Report



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## Introduction

Global warming caused by the emission of greenhouse gases (referred to as "GHG") has brought significant risks to the growth of the global economy in recent years and will affect a greater number of businesses in the future. However, it may be difficult for investors to learn which companies are susceptible to the risks of climate change, which companies are adequately prepared, and which ones are taking response actions. Accordingly, the Financial Stability Board (FSB) has assembled a special task force: the Task Force on Climate-related Financial Disclosures (TCFD). The Task Force published its "TCFD Recommendations Report" in June 2017 after spending 18 months gathering opinions from business and financial leaders. The Recommendations Report provides businesses and investors with a complete assessment framework for disclosing risks and opportunities associated with climate change and for reflecting risks in financial reports.

As a response to global trends, Formosa Petrochemical Corporation (FPCC) has disclosed risks and opportunities associated with climate change in accordance with the TCFD Recommendations Report and made a more reasonable and efficient allocation of resources with respect to the Company's responsibilities and strategies, in order to realize our vision toward low-carbon transition.



# CH1 Governance

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## 1.1 Company Profile

Formosa Petrochemical Corporation (FPCC), established in 1992, is a leading producer and supplier of petroleum products and basic petrochemical raw materials in Taiwan. As the country's only privately-owned petroleum refining enterprise, FPCC manufactures and markets a wide range of refined products, including gasoline and diesel. Our naphtha cracker facilities produce key petrochemical feedstocks such as ethylene, propylene, and butadiene, with the largest production capacity in Taiwan. In addition, FPCC operates a certified cogeneration system that supplies steam, electricity, and other utilities to manufacturing facilities across the Mailiao Industrial Complex.

**Table 1.1 Formosa Petrochemical Corporation - Company Overview**

Formosa Petrochemical Corporation	
	<p>Date of incorporation April 06, 1992</p> <p>Date of listed on TWSE December 26, 2003</p>
	<p>Capital NT\$95,259,596,520</p>
	<p>Number of employees in 2024 5,110</p> <p>Consolidated revenue in 2024 663.82 billion</p>
	<p>Credit ratings Taiwan Ratings: twAA Standard &amp; Poor's: BBB+</p>
	<p>Operating sites Headquarters: No. 1-1 Mailiao Industrial Park, Zhongxing Villiage, Mailiao Township, Yunlin County</p> <p>Taipei Office: 380 Section 6, Nanjing East Road, Neihs District, Taipei City (Formosa Plastic Neihs Building A2, 4F)</p>

Note: As of December, 31, 2024

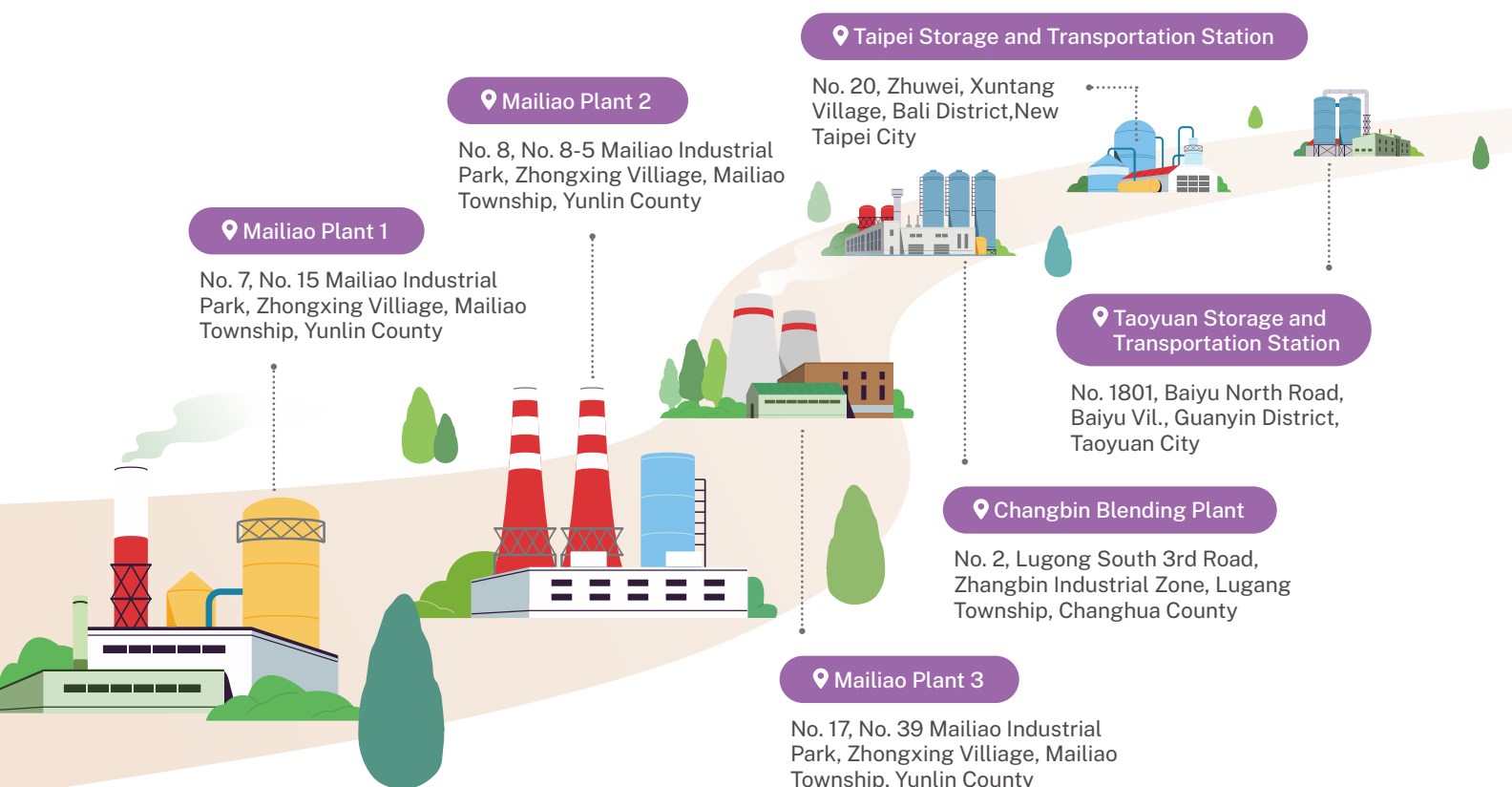
In the oil refining business, FPCC operates a refinery with a daily processing capacity of 540,000 barrels. The plant produces up to 3.75 million metric tons of naphtha annually, which is supplied to affiliated factories within the Mailiao Industrial Park. The refinery also produces a variety of petroleum products, including gasoline, diesel, aviation fuel, and liquefied petroleum gas (LPG).

In the olefins segment, FPCC operates three naphtha cracker plants with a combined annual ethylene production capacity of 2.935 million metric tons. For utilities, FPCC maintains a total self-owned power generation capacity of 2.75 million kilowatts (kW), including 2.15 million kW from certified cogeneration systems. All electricity and steam generated are supplied to factories within the industrial complex, with surplus electricity sold back to Taipower. Additional facilities, such as industrial water, ultrapure water, air compressors, and an oxygen generation plant, are also in place to meet utility demands throughout the Mailiao complex.

In 2024, the Company maintained stable production levels with no significant year-over-year changes. Petroleum products accounted for 75.5% of total revenue, while petrochemical products comprised 18.1%, reinforcing their status as FPCC's core business segments. Consolidated revenue for 2024 reached NT\$663.82305 billion, representing a 6.8% decrease from the previous year. Consolidated pre-tax net income was NT\$6.56711 billion, down 73.4% year-over-year. The decline was primarily attributable to oversupply in the market, leading to narrower spreads between key products and crude oil, which impacted overall profitability and return on equity compared to 2023.

## 1.2 Organizational Boundaries

Table 1.2 Organizational Boundary of Formosa Petrochemical Corporation



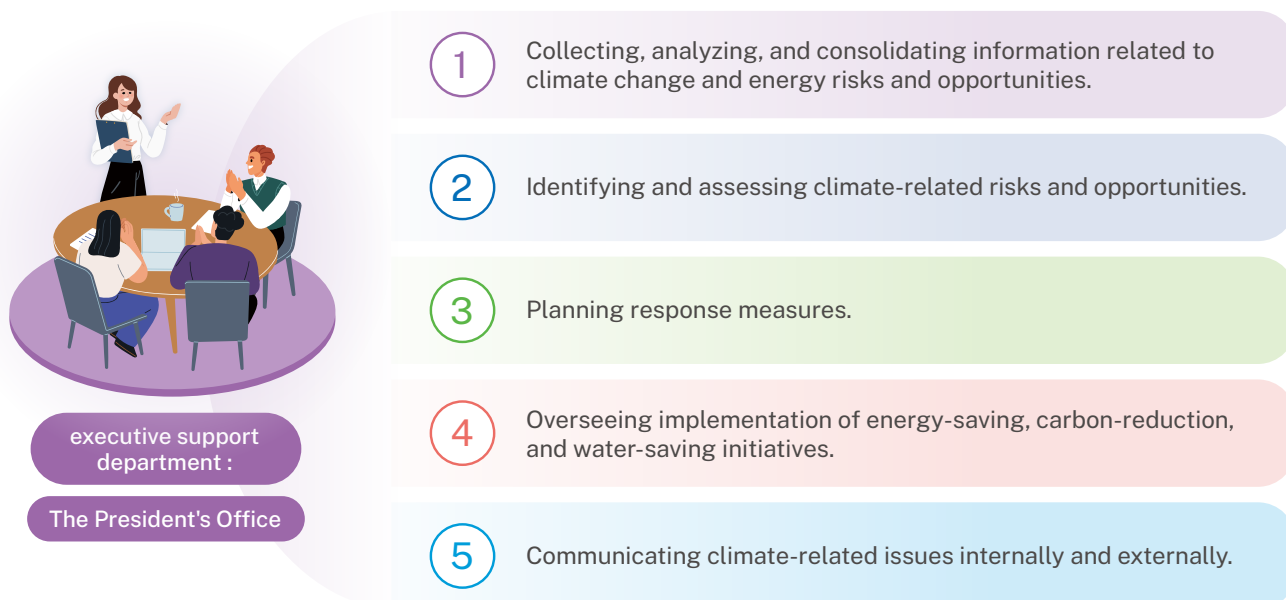
## 1.3 Organization and Responsibility

FPCC's Board of Directors serves as the highest governance body for overseeing climate-related issues. To strengthen the Board's supervisory role on sustainability matters and to advance the Company's sustainable development vision, FPCC formally established a Sustainable Development Committee in May 2022, following Board approval. The Committee is tasked with reviewing the Company's sustainability policies and management approaches, and supervising the implementation of related initiatives. In line with corporate governance evaluation requirements, the Committee comprises six members. The President's Office has been designated as the supporting administrative unit responsible for driving key sustainability functions, including enterprise risk management, corporate social responsibility, and climate change adaptation. Through diverse and effective communication channels, the Company actively engages with stakeholders to understand their concerns and expectations. These insights serve as a critical input in formulating FPCC's sustainability strategies and policies.





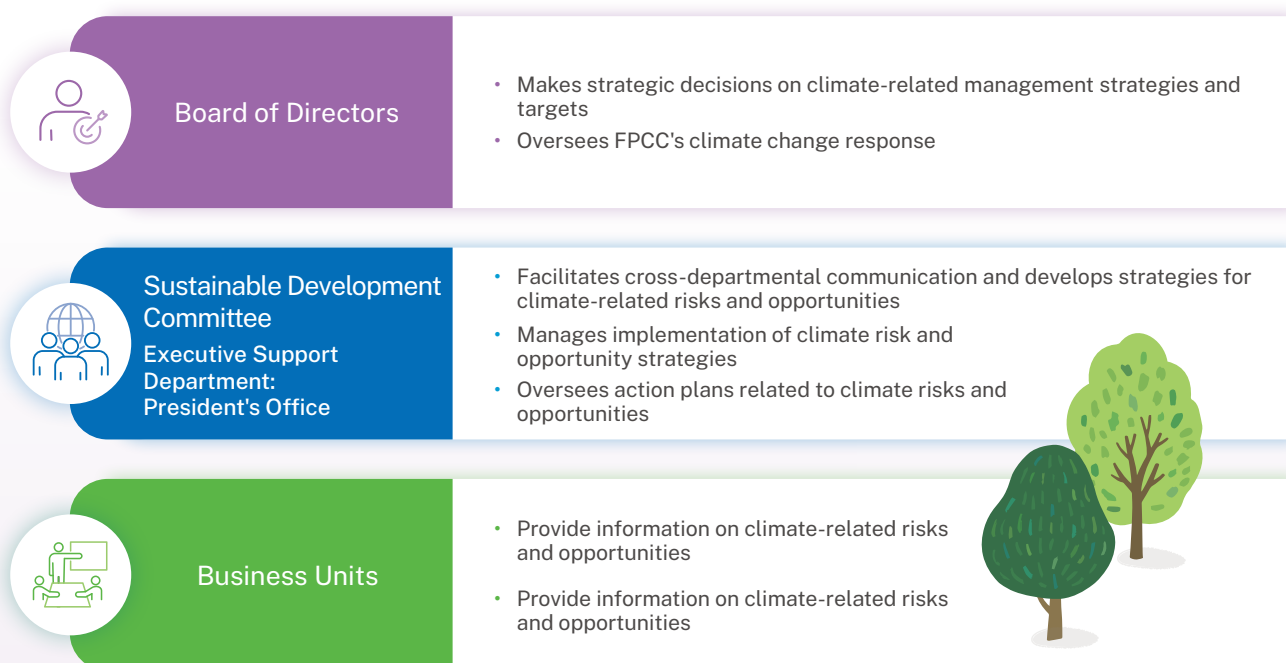
The Sustainable Development Committee is chaired by the Chairman of the Board, who serves as the convener. The President's Office acts as the executive support department, coordinating supervisors across business units to facilitate cross-departmental communication. With reference to the TCFD framework, the Company has identified climate-related risks, developed corresponding management strategies, and implemented strategic risk management practices. The President's Office, serving as the executive support department, is primarily responsible for:



The President convenes monthly working meetings to oversee and review the progress and goal achievement of energy-saving, carbon-reduction, and water-saving projects. On a quarterly basis, the President reports project implementation outcomes to the Chairman during the Company's weekly executive meetings. Relevant materials are compiled and included as attachments to Board meeting agendas for reference and discussion.

The Board of Directors convenes at least six times annually and regularly receives reports on climate-related issues. Topics reported to the Board include long-term strategic goals for addressing climate change, energy conservation and carbon reduction strategies, medium- and long-term visions, annual performance outcomes, as well as plans for green production and green products.

**Figure 1.3 Division of Responsibilities for Climate-Related Governance**



# CH2 Strategy





FPCC is committed to achieving carbon neutrality by 2050. To realize this goal and advance the transition to a low-carbon economy, the Company continues to implement a range of improvement measures, including low-carbon initiatives, reductions in energy intensity per unit of product, and investments in green energy generation facilities. The table below outlines FPCC's planned emissions reduction pathways across the short, medium, and long term.

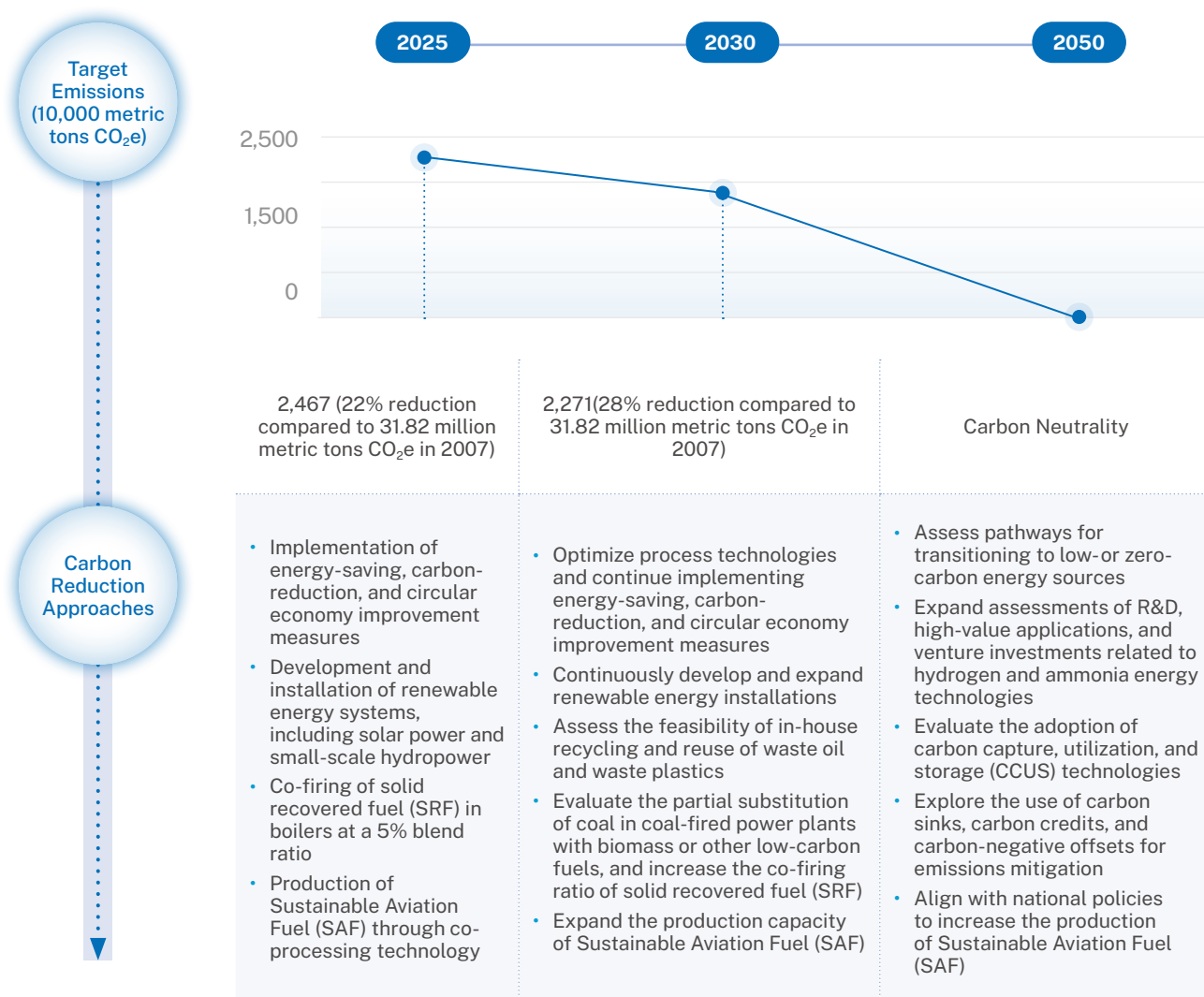


Figure 2.1 – GHG Emissions Trend of Formosa Petrochemical Corporation (2005–2030)



To support the goal of achieving carbon neutrality by 2050, FPCC has established five strategic pillars: process energy reduction, equipment efficiency improvement, heat recovery, energy management, and renewable energy development. These strategies guide the Company's short-term action plan from 2021 to 2025. As of 2024, the implementation of these strategies resulted in an estimated reduction of 189,132 metric tons of CO<sub>2</sub> emissions. The performance of each strategy is detailed in Table 2.2: Summary of 2024 Carbon Reduction Strategy Performance.



#### Process Energy Reduction Strategy

Focuses on optimizing process control systems and improving energy performance of related equipment.

#### Equipment Efficiency Improvement Strategy

Includes installing fluid couplings in rotating equipment, upgrading to energy-efficient motors, and deploying new-generation heat exchangers.

#### Heat Recovery Strategy

Involves recovering and utilizing various forms of waste heat, including low-grade heat sources, to reduce the consumption of steam and fuel gas.

#### Energy Management Strategy

Incorporates measures such as optimizing steam-to-amine ratios, lowering system pressure to conserve electricity, and replacing lighting systems with energy-efficient alternatives.

#### Renewable Energy Strategy

Involves identifying and assessing sites with potential for solar and wind energy installations, evaluating construction feasibility, and progressively expanding the installed capacity of renewable energy.

**Table 2.2: Summary of 2024 Carbon Reduction Strategy Performance**

Strategy	Major Project Description	Total Emissions Reduction (metric tons CO <sub>2</sub> e)	No. of Projects
Process Energy Use Reduction	UPA SCR Intelligent Ammonia Injection to Reduce GAH Differential Pressure and Save Electricity	64,678	72
	Steam-Saving Improvement by Overhead Water Injection on RDS2 Distillation Column (C-3300)		
	Energy-Saving Improvement by Installing Variable Frequency Drive (VFD) on Primary Air Fan at Utility Plant No. 4 CFB2		
Equipment Efficiency Improvement	Replacement of E-740B Heat Exchanger with Helical Baffle-Type Heat Exchanger	35,727	63
	Conversion of HPH Heating Steam Source in HP4 Boiler to Dual Source		
	Efficiency Improvement and Power Saving for Air Compressor B-5801B in RUA Unit		
Waste Heat Recovery	Flue Gas Waste Heat Recovery from MGGH System in UPB Unit	43,767	17
	Installation of Steam Generator for HCVGO Product in LHDC Unit to Recover Waste Heat		
	Heat Recovery from Absorber Oil in DCU Unit		
Energy Management	Power Saving by Converting RDS2 B-3811 from Dual to Single Compressor Operation	43,832	35
	Installation of Pipeline to Nan Ya Incinerator for Disposal of Surplus Fuel Gas		
Renewable Energy	Installed 1,053 kW of Solar PV; Expected Generation of 1.36 Million kWh per Year in 2024, Reducing 1,128 Metric Tons of CO <sub>2</sub> e Annually	1,128	2
Total		189,132	189



# CH3 Management of Climate Change

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## 3.1 Risk and opportunity identification and assessment process

In response to increasingly extreme climate events, FPCC recognizes the significant impact of climate change on both the planet and corporate operations. To mitigate these impacts, the Company has established a Sustainable Development Committee, chaired by the Chairman of the Board, as a functional committee under the Board of Directors (see Figure 1.3: Organizational Structure and Responsibilities). The President's Office serves as the executive support department, coordinating cross-departmental efforts among business unit leaders. With reference to the TCFD framework, FPCC identifies climate-related risks, formulates corresponding management strategies, and conducts strategic risk management planning.

When developing risk scenarios, FPCC considers both transition risks—including those related to policy and regulation, market dynamics, technology developments, and reputational factors—and physical risks, which include both chronic and acute climate impacts. For each potential event, the Company evaluates the level of financial impact, the expected timeframe (short-, medium-, or long-term), affected segments across the value chain and the likelihood of occurrence. In assessing climate-related opportunities, FPCC evaluates factors such as improvements in resource efficiency, energy use, product and service innovation, new market potential, and organizational adaptability. The following outlines FPCC's process for climate-related risk identification and assessment:



### Background Information Collection

- Collect relevant data from news sources, online platforms, and observed events in other countries or industries.
- Consider both transition risks (e.g., policies and regulations, market shifts, technological changes, reputational factors) and physical risks (acute and chronic climate events).

1



### Scope of Risk and Operational Assessment

- Conduct climate-related risk assessments across the entire value chain, including both upstream and downstream activities and evaluate risks associated with both direct and indirect operations (see Figures 3.1-1 and 3.1-2 for visual reference).

2



### Risk and Operational Impact Analysis

- Frequency: Risk analyses are conducted annually.
- Methodology: A risk mapping approach is used to visualize and assess risks.
- Risk Categorization and Materiality Thresholds: Financial impacts exceeding NT\$1 million are considered material. Risks are classified into 40 levels based on both financial impact and likelihood of occurrence. Risks with a financial impact exceeding NT\$1.8 billion and a probability greater than 80% are categorized as high risk. Those with a financial impact exceeding NT\$400 million and a probability greater than 50% are considered medium risk. All remaining risks fall under the low-risk category. Low risks are deemed acceptable, while medium risks do not require immediate action but should be continuously monitored. High-risk events, however, require the development of appropriate management plans to reduce potential losses. These may include strategies to lower the frequency of occurrence, minimize financial impact, transfer the risk, or avoid it entirely.

3



### Control Measures and Target Setting

- The President's Office, serving as the administrative operation department, assesses risk indices based on defined consequence and probability evaluation criteria. Once climate-related risks and opportunities have been identified, appropriate response strategies are developed. These may include measures to mitigate, transfer, control, or accept the risks. Based on these strategies, the Company establishes corresponding short-, medium-, and long-term targets to guide climate risk management and opportunity realization.

4

Figure 3.1-1 – Climate Change Risk Assessment Process

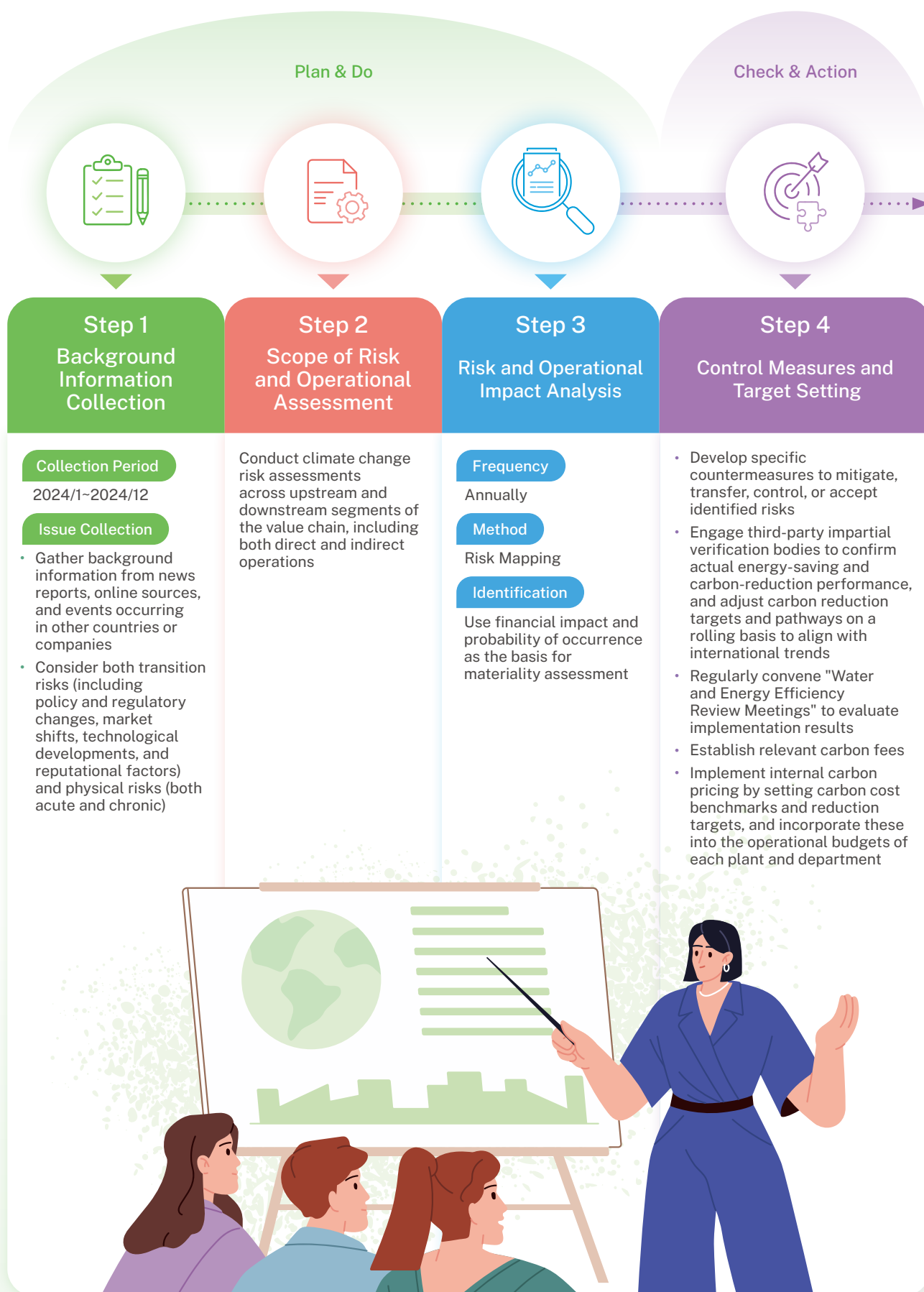
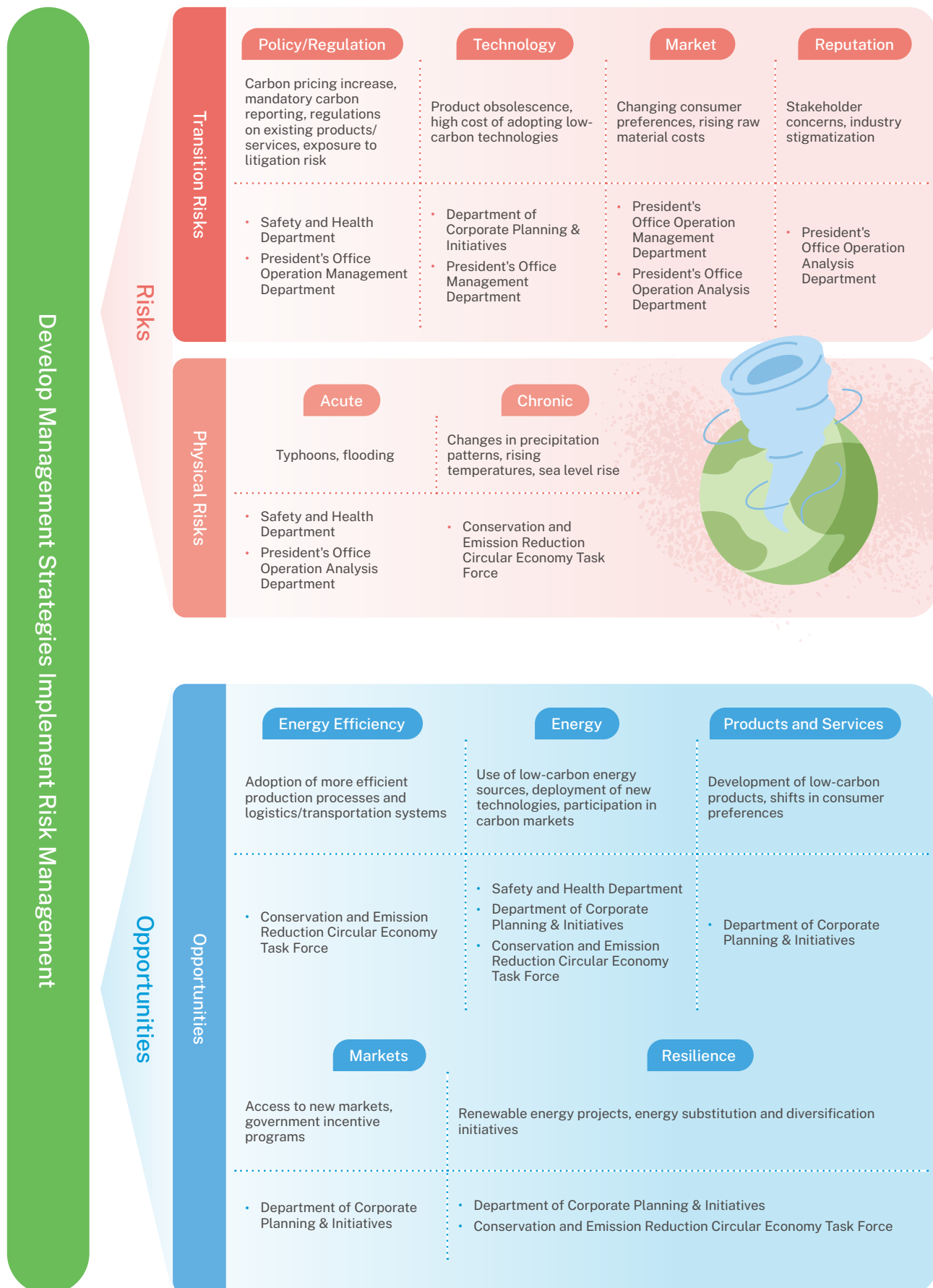




Figure 3.1-2 – Framework for Identifying and Analyzing Climate-Related Risks and Opportunities



## 3.2 Approach to Managing Risks and Opportunities

After identifying climate-related risks and opportunities, the Administrative Operation Department: President's Office evaluates the risk index based on defined consequence and probability assessment criteria. Once the risk and opportunity levels are confirmed, corresponding response strategies are developed to mitigate, transfer, control, or accept the identified risks. These strategies are used to establish short-, medium-, and long-term targets. To ensure effective implementation, the President's Office holds monthly working meetings to review progress and assess the status of target achievement. In parallel, it participates in the monthly enterprise-wide energy-saving and carbon-reduction review meetings. On a quarterly basis, implementation results are reported to the Chairman and President during the Company's weekly executive meetings, and the outcomes are compiled as reference materials in the Board meeting agenda for review and discussion.

In addition, FPCC conducts a comprehensive assessment of global sustainability trends alongside its own operational and development objectives. The Company analyzes key issues across governance, economic, environmental, and social dimensions. For issues identified as having a relatively significant impact, FPCC discloses the corresponding response measures, as detailed in Tables 3.2-1 and 3.2-2.

**Table 3.2-1 – Summary of Risk Issues with Material Financial Impact and Management Measures**

	Risk Issue	Risk Level	Anticipated Timeframe	Key Climate-Related Risk Drivers	Risk Management Measures
1	Transition Risk-Policy and Regulation	High	Short Term	<p>Climate Change Response Act – Carbon Fee Implications</p> <p>1. Without meeting benchmark carbon emissions: To enforce carbon reduction regulations, the government amended the "Greenhouse Gas Reduction and Management Act" to the "Climate Change Response Act" in 2023. Based on FPCC's estimated greenhouse gas emissions of approximately 23.42 million metric tons of CO<sub>2</sub>e in 2024, if no emissions reduction measures are implemented, and using the standard carbon fee rate of NT\$300 per metric ton, the Company would be required to pay an estimated NT\$4.45 billion in annual carbon fees.</p> <p>2. With benchmark carbon emissions achieved: FPCC plans to submit a voluntary emissions reduction plan and apply for preferential rates applicable to entities with high carbon leakage risk. Under the preferential rate of NT\$100 per metric ton and applying a carbon leakage risk factor of 0.2, the estimated annual carbon fee would be reduced to NT\$300 million. This would result in carbon cost savings of approximately NT\$4.15 billion per year compared to a scenario without a voluntary reduction plan.</p>	<p>1. To strengthen company-wide awareness and accountability in carbon reduction, FPCC implemented an internal carbon pricing mechanism in 2022. This mechanism is based on the carbon fee structure and surcharges for exceeding emission targets outlined in the draft Climate Change Response Act. Carbon emission costs are incorporated into internal profit and loss statements and serve as a foundation for managing carbon risks. In addition to guiding ongoing greenhouse gas (GHG) reduction initiatives, the internal carbon pricing data also functions as a key performance indicator for evaluating operational efficiency, product strategy, and investment decisions—ensuring FPCC maintains its long-term competitiveness.</p> <p>2. FPCC continues to promote energy-saving and carbon-reduction initiatives and is progressively advancing its transition toward a low-carbon business model. The Company makes annual investments in the following areas:</p> <ul style="list-style-type: none"> <li>Implementation of circular economy improvements focused on energy saving and carbon reduction</li> <li>Development and installation of renewable energy systems, such as solar power and small-scale hydropower</li> <li>Co-firing of solid recovered fuel (SRF) at a 5% blend ratio in boilers</li> </ul> <p>In 2024, total investment in these initiatives amounted to approximately NT\$880 million</p>
2	Transition Risk-Policy and Regulation	Low	Short Term	<p>The Ministry of Economic Affairs (MOEA) announced that, effective February 1, 2023, large water users consuming over 9,000 cubic meters of water in a single month during the dry season will be subject to a water conservation charge. The standard rate is NT\$3 per cubic meter. However, users that meet the required water reclamation rate may qualify for a reduced rate of NT\$2 or NT\$1 per cubic meter. A grace period is also in effect, under which water conservation charges will be collected at half the applicable rate until June 30, 2025. Based on FPCC's estimated water consumption of 18.92 million cubic meters during the 2023/11 to 2024/4 dry season, the annual financial impact from this policy is projected to be approximately NT\$8.04 million.</p>	<p>To address risks related to drought, water shortages, and water conservation charges, FPCC has developed two key strategies for water resource management: diversification of water sources and enhanced water-saving measures. The short-term plan focuses on constructing a seawater desalination plant and implementing annual water-saving projects. Details are as follows:</p> <p>1. Construction of a Seawater Desalination Plant To increase water supply resilience and reduce dependence on freshwater resources, FPCC is developing a seawater desalination plant with a planned daily output of 100,000 metric tons. The plant is expected to produce up to 17 million metric tons of water annually, thereby reducing an equivalent amount of freshwater usage. This initiative is projected to generate savings of approximately NT\$2.89 million per year in water conservation charges.</p> <p>2. Annual Implementation of Water-Saving Measures In 2024, FPCC invested NT\$60.08 million in a total of 26 water-saving improvement projects, achieving a daily water savings of 622 metric tons. The estimated annual benefit from these improvements is approximately NT\$3.87 million.</p>

	Risk Issue	Risk Level	Anticipated Timeframe	Key Climate-Related Risk Drivers	Risk Management Measures
3	Transition Risk-Change of Customer Behavior	Medium	Medium to Long Term	<p>The aviation industry accounts for approximately 2% to 3% of global carbon emissions and is one of the most difficult sectors to decarbonize. Starting in 2025, at least 2% of the aviation fuel supplied at EU airports must be sustainable aviation fuel (SAF). After that, the requirement will increase every five years: 20% by 2035, 42% by 2045. The target is for 70% of aviation fuel to be SAF by 2050. According to current agreements, only the following qualify as "sustainable aviation fuels": synthetic fuels; biofuels made from agricultural or forestry waste, algae, biogenic waste, used cooking oil, specific animal fats; and jet fuels produced from recycled waste gases or recycled plastics.</p> <p>Taiwan's Civil Aeronautics Administration has announced that in 2025, SAF will be added to domestic carriers' aircraft for the first time. Drawing on international practices, the government encourages airlines to aim for 5% SAF usage by 2030 (equivalent to 67,500 kiloliters of SAF). If the Company is unable to supply SAF, airlines will seek alternative SAF sources, which will reduce demand for the Company's conventional aviation fuel. Based on a price of USD 0.6404 per liter, this would result in a revenue loss of approximately NT\$1.345 billion.</p>	<p>In 2023, Formosa Petrochemical Corporation (FPCC) invested NT\$703 million in research and development, including the development of sustainable aviation fuel (SAF). To meet the growing demand for SAF in the aviation industry, the Company plans to begin SAF production in 2025. It is expected that SAF supply capacity will reach 5,500 metric tons per year during 2025–2026, increase to 15,000 metric tons per year during 2027–2029, and reach 50,000 metric tons per year from 2030 onward. As R&amp;D expenditures cannot be broken down by project, a total of 26 development projects were carried out in 2023, with an average investment of NT\$27.038 million per project.</p>

**Table 3.2-2 – Assessment and Management of Opportunity Categories with Material Financial Impact**

	Opportunity Issue	Opportunity Level	Anticipated Timeframe	Key Climate-Related Opportunity Drivers	Opportunity Realization Measures
1	Transition Opportunity-Transition to Low-Carbon Energy Technologies	Low	Short Term	<p>The Company recognizes that the low-carbon energy transition and circular economy present important opportunities for advancing transition technologies. In recent years, FPCC has pursued initiatives such as the development of a low-temperature waste heat recovery thermoelectric system and a refuse-derived fuel (RDF) program. These projects aim to significantly reduce fuel consumption and lower greenhouse gas (GHG) emissions, contributing to both environmental sustainability and operational efficiency.</p>	<p><b>Low-Temperature Waste Heat Recovery Thermoelectric System</b> FPCC is implementing a 10-year greenhouse gas (GHG) offset project using low-temperature waste heat recovery for power generation. The project is expected to generate approximately 13,220 metric tons of CO<sub>2</sub>e in carbon credits. At a projected carbon fee of NT\$300 per metric ton, the potential value of these credits is estimated at NT\$3.966 million. The system is capable of producing 1,559,160 kWh of electricity annually, which, at an average electricity rate of NT\$3.12 per kWh, translates to NT\$4.865 million in avoided electricity costs over ten years. On average, the system saves NT\$883,100 per year.</p> <p><b>Refuse-Derived Fuel (RDF) Program</b> Since 2019, FPCC has used refuse-derived fuel (RDF) to partially replace coal. The program allows for a maximum annual RDF usage of 49,932 metric tons, purchased at NT\$900 per ton, resulting in an estimated annual RDF cost of NT\$44.94 million. In return, it reduces 23,299 metric tons of coal consumption. Using the 2024 average coal price of US\$113 per ton, this results in energy cost savings of approximately NT\$41.94 million. Additionally, the shift is projected to reduce 13,000 metric tons of CO<sub>2</sub>e emissions annually. At a carbon fee of NT\$300 per ton, this results in a potential cost avoidance of NT\$3.9 million. The total estimated reduction in financial expenditure from this program is approximately NT\$45.84 million.</p> <p><b>Combined Impact</b> Together, the low-temperature waste heat recovery system and RDF program are projected to reduce FPCC's financial expenditures by approximately NT\$46.72 million.</p>

	Opportunity Issue	Opportunity Level	Anticipated Timeframe	Key Climate-Related Opportunity Drivers	Opportunity Realization Measures
2	Transition Opportunity-Improving Energy Efficiency	Low	Short Term	The Company embraces the concept of a circular economy and identifies opportunities for emissions reduction through enhanced energy efficiency. Tail gas generated during production processes is captured and recycled, helping to reduce air pollution. By converting this process tail gas into reusable fuel, the Company is able to significantly reduce overall fuel consumption and improve resource efficiency.	In 2024, FPCC recycled and reused approximately 33,000 metric tons of excess process gas, resulting in a reduction of around 26,000 metric tons of CO <sub>2</sub> e emissions. This initiative also replaced approximately 40,000 metric tons of coal consumption. Based on a coal price of US\$113 per metric ton and an exchange rate of NT\$33 per US dollar, the initiative generated estimated savings of NT\$149 million in coal procurement costs, thereby reducing financial expenditures by the same amount.
3	Transition Opportunity-Deployment of Low-Carbon and Renewable Energy	Medium	Short Term	As part of the Company's carbon reduction strategy, the installation and purchase of renewable energy are key opportunities for emissions reduction. Installing solar power systems helps reduce fuel consumption.	"Renewable Energy Power Generation System Development Plan": The Company has currently planned a total of 21 solar photovoltaic (PV) projects, with a combined installed capacity of 8.9 MW. By 2025, 6 sites are expected to be completed, with a total installed capacity of 5.5 MW and an investment of NT\$450 million. These projects are expected to generate 7.31 million kWh per year. Between 2026 and 2030, 15 additional sites are planned, with an installed capacity of 3.4 MW and an investment of NT\$230 million. These are expected to generate 4.51 million kWh per year. The total investment in solar PV projects amounts to NT\$680 million, with an estimated annual power generation of 11.82 million kWh. Based on a unit electricity price of NT\$3.12/kWh, this would save NT\$37 million in electricity costs annually. Thus, annual financial savings are estimated at NT\$37 million.

### 3.3 Integration of Climate-Related Issues

To ensure sustainable development, enterprises must assess a wide range of potential risk issues alongside their operational performance. FPCC continuously monitors global risk trends as part of its commitment to sustainability. While risk assessments were historically focused on economic factors alone, the scope has expanded to encompass environmental, social, technological, and geopolitical dimensions. Climate change-related risks have been integrated under the environmental category. The President's Office, acting as the administrative operation department, serves as the central body for risk management. It is responsible for identifying risks that may impact the Company's operations. Based on the nature of each risk, the President's Office collaborates with relevant business units to jointly evaluate the likelihood and potential impact. Findings are reported in a timely manner to senior management to support informed decision-making and adjustments to the Company's operational strategies.

In its risk management approach, FPCC classifies risks into two main categories: inherent operational risks and emerging risks. Inherent operational risks refer to the 12 risk items required to be disclosed under the Regulations Governing Information to be Published in Annual Reports of Public Companies. These are analyzed and assessed individually by the President's Office, which acts as the Company's administrative operation department. Emerging risks refer to potential risks the Company may face over the next five years. These risks are identified using the Enterprise Risk Management (ERM) Framework developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). To enhance the robustness of the evaluation, ESG experts are engaged to jointly assess and analyze emerging corporate risks. At present, most climate change-related issues are categorized as emerging risks.

According to FPCC's integrated risk analysis and assessment process, both inherent and emerging risks have been identified, as shown in Section 3.4. Climate-related risk topics include: changes in corporate image, technological shifts, physical impacts of climate change, stakeholder expectations for low-carbon energy, energy transition challenges, and compliance with both domestic and international energy regulations.

The President's Office, serving as the administrative operation department, has re-evaluated the physical risks associated with climate change. In terms of risk, the Company has identified both transition risks—including policy and legal, market, technological, and reputational factors—and physical risks, encompassing both chronic and acute climate impacts. On the opportunity side, the Company considers areas such as enhancing resource efficiency, adopting alternative energy sources, expanding low-carbon products and services, accessing low-carbon markets, and strengthening adaptability of low-carbon offerings.



After identifying and assessing climate-related risks and opportunities, FPCC defines a financial impact exceeding NT\$1 million as a material impact. As illustrated in Figure 3.3-1, all identified risks and opportunities are classified into one of four categories: i) high financial impact and high likelihood, ii) high financial impact but low likelihood, iii) low financial impact but high likelihood, and iv) low financial impact and low likelihood.

FPCC adopts a structured climate risk identification procedure that utilizes a risk matrix based on financial impact severity and risk occurrence probability to determine the level of climate-related risk. The likelihood of occurrence is categorized into eight levels: 5%, 5–20%, 20–35%, 35–50%, 50–65%, 65–80%, 80–95%, and above 95%. For financial impact, any impact exceeding NT\$1 million is considered financially material. Accordingly, financial severity is classified into five levels: over NT\$1.8 billion, between NT\$1.8 billion and NT\$900 million, between NT\$900 million and NT\$400 million, between NT\$400 million and NT\$20 million and between NT\$20 million and NT\$1 million. These two dimensions form the basis of FPCC's climate risk matrix, where the horizontal axis represents the likelihood of occurrence and the vertical axis represents the financial impact (as illustrated in Figure 3.3-2).

The completed risk matrix (Figure 3.3-3) defines 40 levels of risk. Risks with a financial impact over NT\$1.8 billion and a likelihood greater than 80% are classified as high risk. Risks with a financial impact over NT\$400 million and a likelihood greater than 50% are considered medium risk. All other risks fall under the low-risk category. Low risks are treated as acceptable and require no immediate action. Medium risks are subject to appropriate monitoring and management actions as needed. High-risk events require the development of corresponding risk mitigation plans, which may include reducing the likelihood of occurrence, minimizing financial losses, risk transfer, or risk avoidance.

**Figure 3.3-1 – Materiality Assessment Process for Climate-Related Issues**

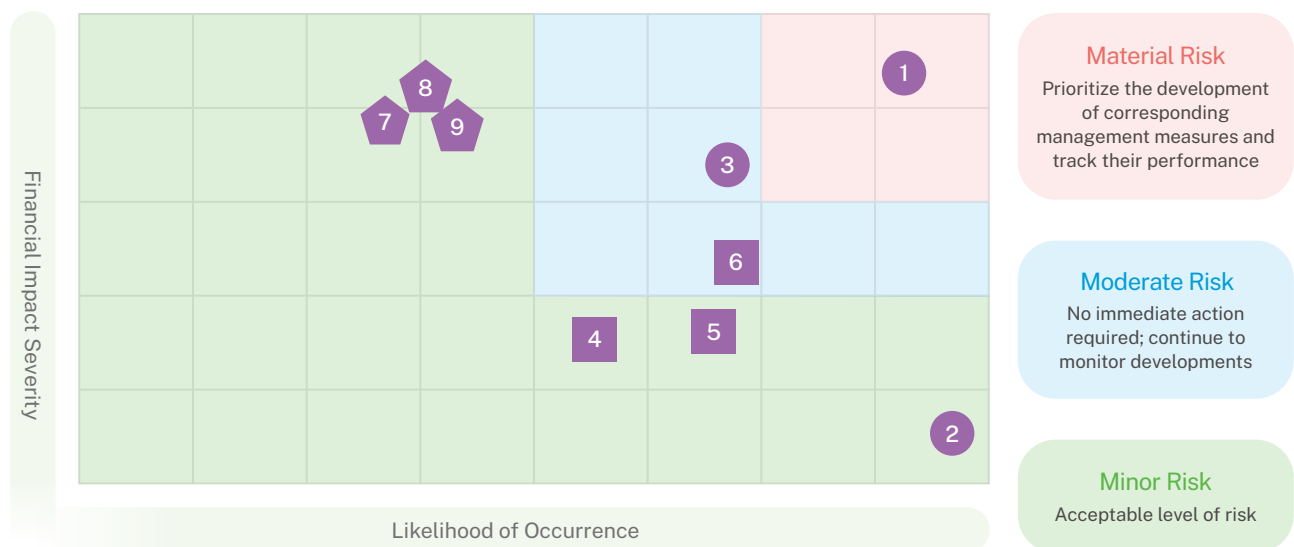


Figure 3.3-2 – Risk Matrix

● Low Risk / Opportunity   ■ Moderate Risk / Opportunity   ▲ Major Risk / Opportunity

Level of Financial Impact	Amount (TWD)	likelihood							
		Almost Impossible (<5%)	Highly Unlikely (5%<X<20%)	Unlikely (20%<X<35%)	Somewhat Unlikely (35%<X<50%)	Somewhat Likely (50%<X<65%)	Likely (65%<X<80%)	Highly Likely (80%<X<95%)	Almost Certain (>95%)
High	Over NT\$1.8 billion	●	●	●	●	■	■	▲	▲
Medium-High	Between NT\$1.8 billion and NT\$900 million	●	●	●	●	■	■	▲	▲
Medium	Between NT\$900 million and NT\$400 million	●	●	●	●	■	■	■	■
Medium-Low	Between NT\$400 million and NT\$20 million	●	●	●	●	●	●	●	●
Low	Between NT\$20 million and NT\$1 million	●	●	●	●	●	●	●	●

Figure 3.3-3 – Cross-Reference Table of Climate-Related Risks and Opportunities with Risk Map



- |   |   |  |
|---|---|--|
| 1 Transition Risk / Policy and Regulation – Carbon Fee                  | 4 Transition Opportunity / Resilience – Low-Carbon Energy Development | 7 Physical Risk / Seasonal – Heavy Rainfall / Typhoons   |
| 2 Transition Risk / Policy and Regulation – Water Usage Fee             | 5 Transition Opportunity / Resilience – Improving Energy Efficiency   | 8 Physical Risk / Seasonal – Water Shortage / Drought    |
| 3 Transition Risk / Market – Demand for Sustainable Aviation Fuel (SAF) | 6 Transition Opportunity / Resilience – Renewable Energy              | 9 Physical Risk / Seasonal – Intense Rainfall / Flooding |

## 3.4 Summary Table of Climate-Related Risks and Opportunities Impacting the Company

Climate-Related Issue	Impact Assessment	Risk / Opportunity Level
Potential Impact on the Company/Organization	Issue Category	Risk Level
Current Risk and Opportunity Analysis and Strategy		
On February 15, 2023, the government amended the "Greenhouse Gas Reduction and Management Act", renaming it the "Climate Change Response Act" and revising related provisions. The amendment was introduced in response to the escalating global climate crisis, the increasing decarbonization requirements of international supply chains, and the imminent implementation of stricter international carbon regulations. It aims to promote Taiwan's net-zero transition and enhance industrial competitiveness. Key revisions include the incorporation of the 2050 net-zero emissions target and the introduction of a carbon fee mechanism with earmarked funds. Under the new regulations, companies with annual emissions exceeding 25,000 metric tons of CO <sub>2</sub> e are subject to control by the Ministry of Environment. With annual emissions exceeding 20 million metric tons, Formosa Petrochemical Corporation (FPCC) is designated a major emitter and will be among the first companies regulated, with carbon fees expected to be levied starting in 2025.	Policy and Regulation	Material Risk
The Ministry of Economic Affairs announced that, effective February 1, 2023, a water usage fee would be imposed on major water users consuming more than 9,000 cubic meters per month during dry seasons, at a rate of NT\$3 per cubic meter. A preferential rate of NT\$2 or NT\$1 per cubic meter is available for users who meet specified water recycling targets. Additionally, a grace period has been granted, during which water usage fees will be halved until June 30, 2025. As a major water user with monthly consumption exceeding 1,000,000 cubic meters, FPCC's operations are directly affected by stable water quality and reliable water supply, both of which are critical for consistent production and product quality. To reduce product dependency on water and enhance competitiveness, FPCC continues to invest in energy- and water-saving initiatives, creating opportunities for cost reduction.	Policy and Regulation	Minor Risk
<p>The aviation industry accounts for approximately 2% to 3% of global carbon emissions and is considered one of the most difficult sectors to decarbonize. Starting in 2025, at least 2% of aviation fuel supplied at EU airports must be sustainable aviation fuel (SAF). This percentage will increase every five years — reaching 20% by 2035 and 42% by 2045. The ultimate target is for 70% of aviation fuel to be SAF by 2050. According to current agreements, only the following types of fuels are recognized as SAF: synthetic fuels; biofuels made from agricultural or forestry residues, algae, biogenic waste, used cooking oil, and specific animal fats; as well as jet fuel derived from recycled waste gases or recycled plastics.</p> <p>Taiwan's Civil Aeronautics Administration has announced that in 2025, SAF will be blended into aviation fuel for domestic carriers for the first time. Following international trends, the government encourages airlines to aim for 5% SAF usage by 2030, which is equivalent to 67,500 kiloliters of SAF.</p> <p>If the Company is unable to supply SAF, airlines will seek other sources, resulting in a decline in demand for the Company's conventional aviation fuel. Based on an average fuel price of USD 0.6404 per liter, this would lead to a revenue loss of approximately NT\$1.345 billion.</p>	Changes in Customer Behavior	Moderate Risk
The Glasgow Climate Pact, adopted at COP26, marked the first time a United Nations climate agreement explicitly called for a reduction in coal use. It commits to phasing down the use of unabated coal — coal usage not equipped with carbon capture technologies — and eliminating fossil fuel subsidies. This presents a medium- to long-term transition risk for Formosa Petrochemical Corporation (FPCC). In the context of climate-related risk and opportunity identification, particularly under the "Energy Supply" category, the Company recognizes that the transition to low-carbon energy and the development of a circular economy present technological transformation opportunities. In recent years, FPCC has initiated the development of low-temperature waste heat recovery thermoelectric systems and refuse-derived fuel (RDF) projects, which significantly reduce fuel consumption and lower greenhouse gas emissions.	Transition to Low-Carbon Energy Technologies	Minor Opportunity
The Company applies the concept of circular economy and identifies energy efficiency improvements as an opportunity for emissions reduction. By recovering and reusing process off-gas emitted during production, the Company is able to reduce air pollution. Additionally, converting recovered off-gas into fuel helps lower overall fuel consumption.	Improving Energy Efficiency	Minor Opportunity

Climate-Related Issue	Impact Assessment	Risk / Opportunity Level
Potential Impact on the Company/Organization	Issue Category	Risk Level
Current Risk and Opportunity Analysis and Strategy		
As part of the Company's carbon reduction strategy, both the installation and procurement of renewable energy are considered key decarbonization opportunities. Installing solar power systems helps reduce fuel consumption.	Improving Energy Efficiency	Moderate Opportunity
<p>Due to abnormal climate patterns, the frequency of extreme weather events such as heavy rainfall and typhoons has increased, leading to intensified storm events that exceed the drainage system's capacity and result in flooding or other incidents at plant sites.</p> <p>(According to the Central Weather Administration's definition: rainfall events with more than 80 mm accumulated over 24 hours or over 40 mm within one hour are classified as heavy rainfall.) Formosa Petrochemical Corporation (FPCC) requires a stable and large supply of high-quality water for its production processes. The Company's main production site is located in Mailiao, and industrial water is primarily sourced from the Chichi Weir. In early 2017, FPCC conducted a scenario analysis using the Representative Concentration Pathways (RCPs) to evaluate climate-related risks across four scenarios: RCP 2.6, RCP 4.5, RCP 6.0, and RCP 8.5. The analysis covered the period from 2021 to 2040, which FPCC defines as its medium- to long-term horizon. Under the most severe scenario, annual rainfall could decrease by 49.27%, significantly increasing the risk of water shortages at the plant site. To mitigate this risk, FPCC incorporated a comprehensive water resource management strategy from the early stages of site development. This strategy includes various water-saving programs, wastewater recycling and reuse initiatives, rainwater harvesting projects and the recent development of a 100,000-ton-per-day seawater desalination plant. These measures gradually reduce FPCC's dependency on freshwater resources at the Mailiao plant, lower production costs, create business opportunities, reduce operational risks, and enhance competitiveness.</p>	Physical Risk / Seasonal	Minor Risk
<p>Average Annual Rainfall Decline (2021–2040): Under RCP6.0, Yunlin County is projected to experience the most severe change, with a potential 49.27% decrease in annual rainfall.</p> <ol style="list-style-type: none"> <li>1. Water shortages may result in insufficient water supply for production processes, leading to reduced operating capacity.</li> <li>2. Decreased rainfall also reduces rainwater harvesting volumes, negatively impacting water use efficiency.</li> </ol> <p>According to FPCC's internal statistics, the Company withdraws approximately 1,847,733 kilotons of water annually and is classified as a major water user (over 1,000 tons per month) under the Water Resources Agency's water usage fee regulations. Water plays a critical role in FPCC's operations, particularly for process heat exchange systems, which require high-quality water to prevent equipment damage. Thus, stable and reliable access to clean water is essential for production continuity. As the frequency of extreme weather events such as heavy rainfall and droughts increases, the availability and quality of water resources may be adversely affected. In the event of water shortages, FPCC may face operational shutdowns, reduced production rates, or the need to procure water from other regions, resulting in declines in revenue or increased operating costs.</p>	Physical Risk / Chronic	Minor Risk
<p>Climate Scenario Assessment for Mailiao Site Based on 1986–2005 Baseline</p> <p>Under projections for the near term (2016–2035), using RCP4.5 and RCP8.5 scenarios, the maximum consecutive rainfall period is projected at 7.5 to 7.7 days, with total rainfall of 1,078 mm to 1,085 mm, representing a 15% increase over the historical average. Under the RCP8.5 scenario, Taiwan is expected to experience 15% fewer typhoons, a 100% increase in the proportion of severe typhoons, and a 20% increase in typhoon-associated rainfall.</p> <p>For the mid-century period (2041–2060), based on the SSP5-8.5 scenario, total rainfall is projected to increase by 8.8% over historical averages. FPCC has evaluated the risks of extreme rainfall and flooding due to abnormal weather, which may cause plant flooding and result in operational shutdowns and revenue losses.</p> <p>Climate change-induced heavy rain or strong winds could severely impact the Company's facilities, compromising operations. Specific examples include:</p> <ol style="list-style-type: none"> <li>1. Lightning strikes during intense rainfall damaging substations and triggering simultaneous shutdowns of three Mailiao power units.</li> <li>2. Frequent port congestion at Mailiao Harbor caused by strong northeasterly monsoons and adverse weather, delaying crude oil tanker unloading and increasing demurrage costs, thereby raising the Company's operational expenses.</li> </ol>	Physical Risk / Chronic	Minor Risk



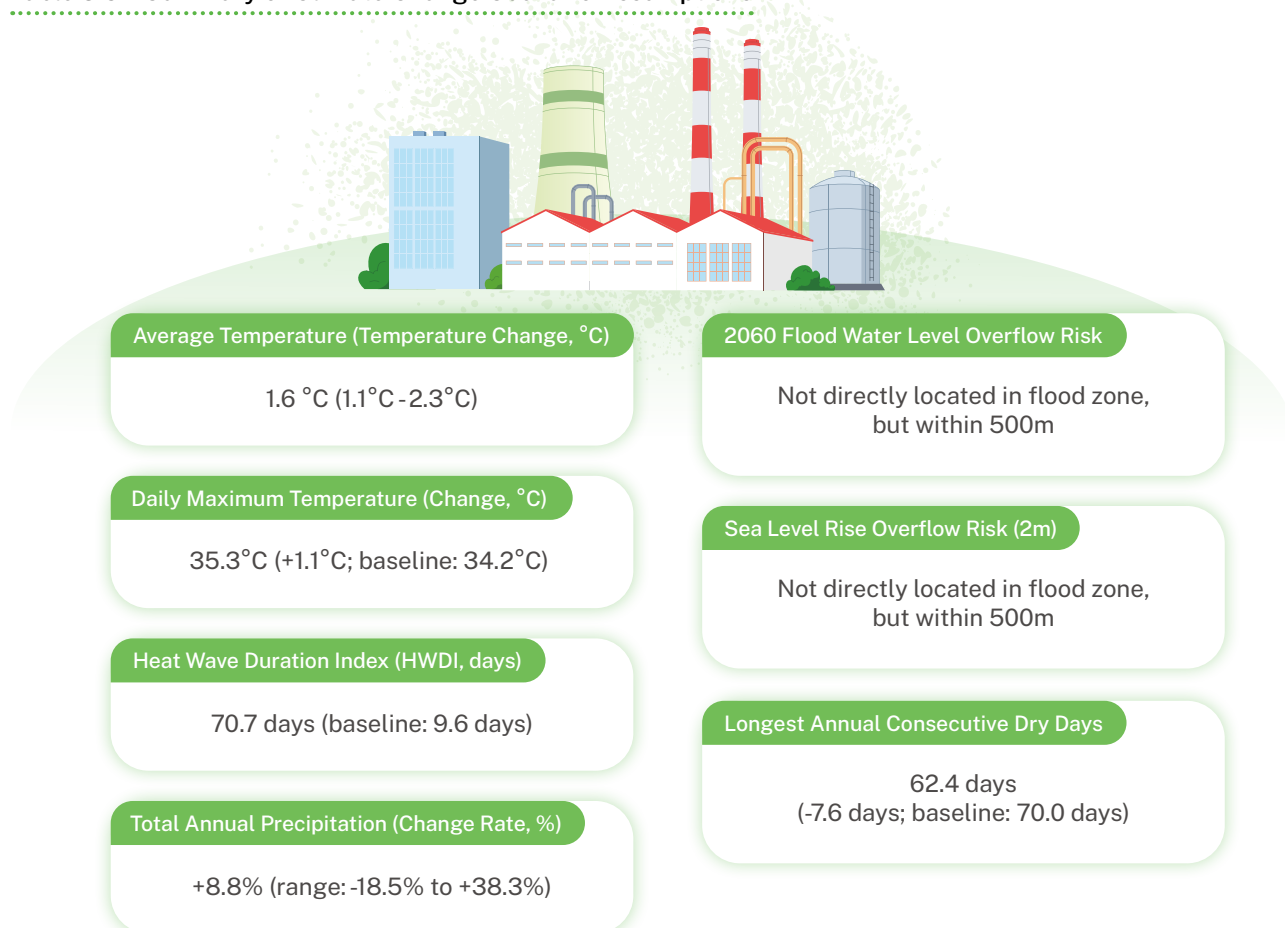
## 3.5 Climate Change Scenario Analysis

FPCC primarily adopts the Shared Socioeconomic Pathways (SSPs) defined in the IPCC Sixth Assessment Report (AR6) to project future greenhouse gas (GHG) emissions scenarios. These pathways reflect uncertainties in global socioeconomic development and offer comprehensive assessments of the potential impacts of GHG emissions, land use changes, and air pollutants on future climate conditions. FPCC uses four representative SSP scenarios in its emissions modeling. The low emissions scenario (SSP1-2.6) describes a future where the world gradually achieves sustainable development goals through coordinated global efforts. The medium emissions scenario (SSP2-4.5) envisions a world shaped by moderate regional competition, where countries prioritize domestic economic and security concerns, often at the expense of broader development needs. The high emissions scenario (SSP3-7.0) portrays an unequal world in which environmental policies are implemented primarily in medium- and high-income regions, while global energy systems remain reliant on carbon-intensive fuels. The extremely high emissions scenario (SSP5-8.5) assumes minimal climate policy action, leading to persistently high GHG emissions and heavy dependence on fossil fuels.

For the assessment of physical climate risks, FPCC applies the full spectrum of SSP scenarios (SSP1 through SSP5) to evaluate potential hazards at its domestic facilities. The analysis focuses on projected risks related to high temperatures, flooding, drought, and landslide events during the 2040–2060 period. These risks are assessed using key climate indicators such as temperature rise, total precipitation, flood intensity, and the number of consecutive dry days. Data sources for this analysis include the Climate Change Knowledge Portal (World Bank), the Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP), and the National Science and Technology Center for Disaster Reduction (NCDR). Based on the results of this scenario analysis, FPCC has determined that the Mailiao Plant faces low to moderate risk levels from high temperatures, flooding, and drought across the assessed SSP scenarios. Although landslide risk could not be quantitatively assessed due to incomplete reference data, it has been qualitatively classified as low, as the Mailiao Plant is located on reclaimed coastal land and is not near mountainous or sloped terrain.

FPCC remains committed to ongoing monitoring and evaluation of the evolving risks posed by climate change and will continue to adapt its strategies and operations accordingly to enhance long-term resilience.

**Table 3.5-1 Summary of Climate Change Scenario Assumptions**



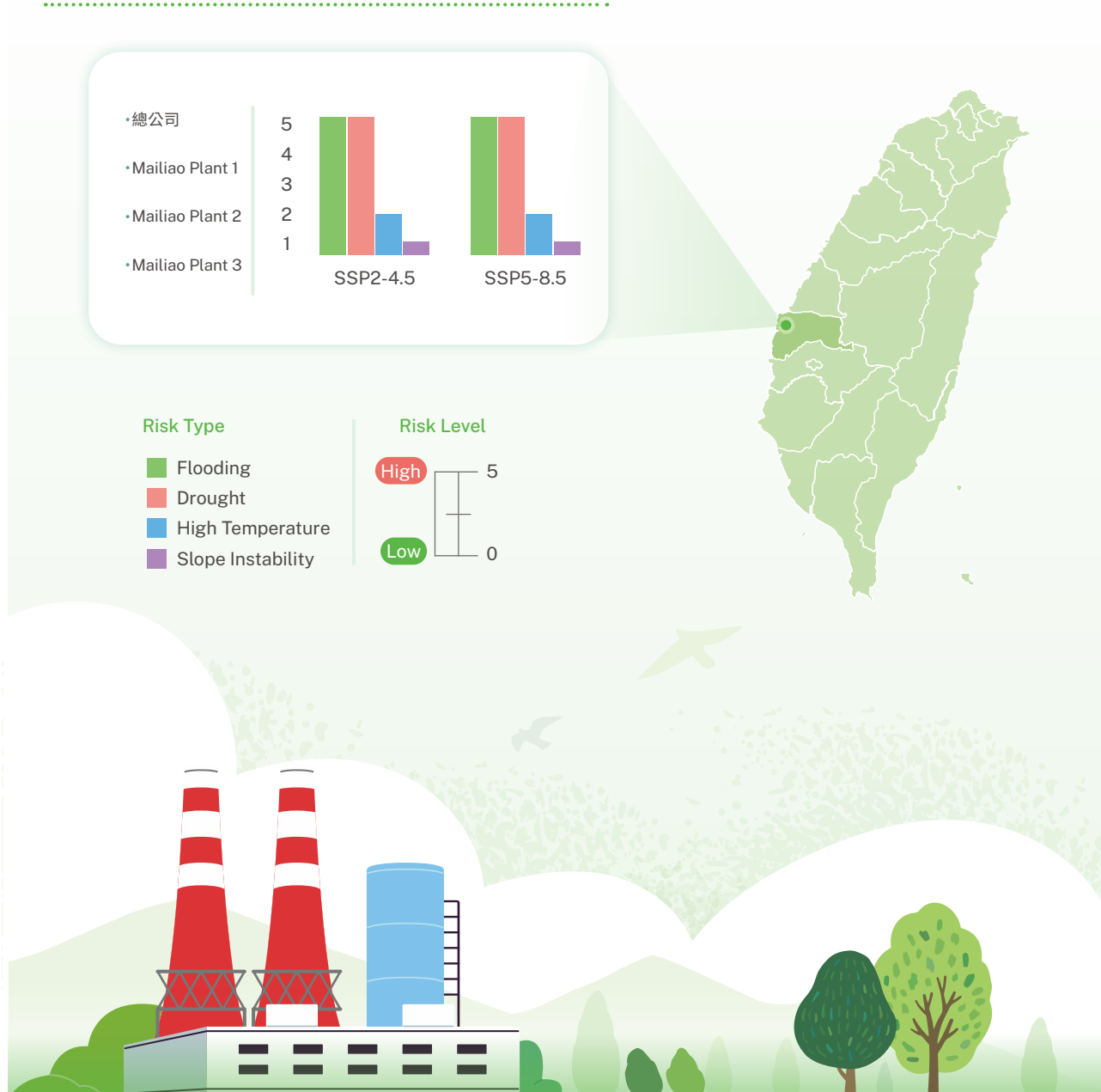
**Note:** Values in this table are based on the SSP5-8.5 scenario and represent mid-century (2050) projections for extreme climate risk management

### Summary Table of Physical Climate Risk Scenario Analysis (by Site and Scenario)

FPCC		Flooding			Drought			High Temperature			Slope Instability		
Risk Level		Short Term	Mid Term	Long Term	Short Term	Mid Term	Long Term	Short Term	Mid Term	Long Term	Short Term	Mid Term	Long Term
Head Office / Mailiao Complex	SSP1-2.6	1	1	1	1	1	1	1	1	1	1	1	1
	SSP2-4.5	1	1	1	1	1	1	1	1	2	1	1	1
	SSP3-7.0	1	1	1	1	1	2	1	1	3	1	1	1
	SSP5-8.5	1	1	1	1	1	2	1	1	3	1	1	1

### Projected Physical Risks by 2050 (by Site and Scenario)

### Mid-Term 2041–2060 Physical Risk Assessment



# CH<sub>4</sub> Metrics and Targets

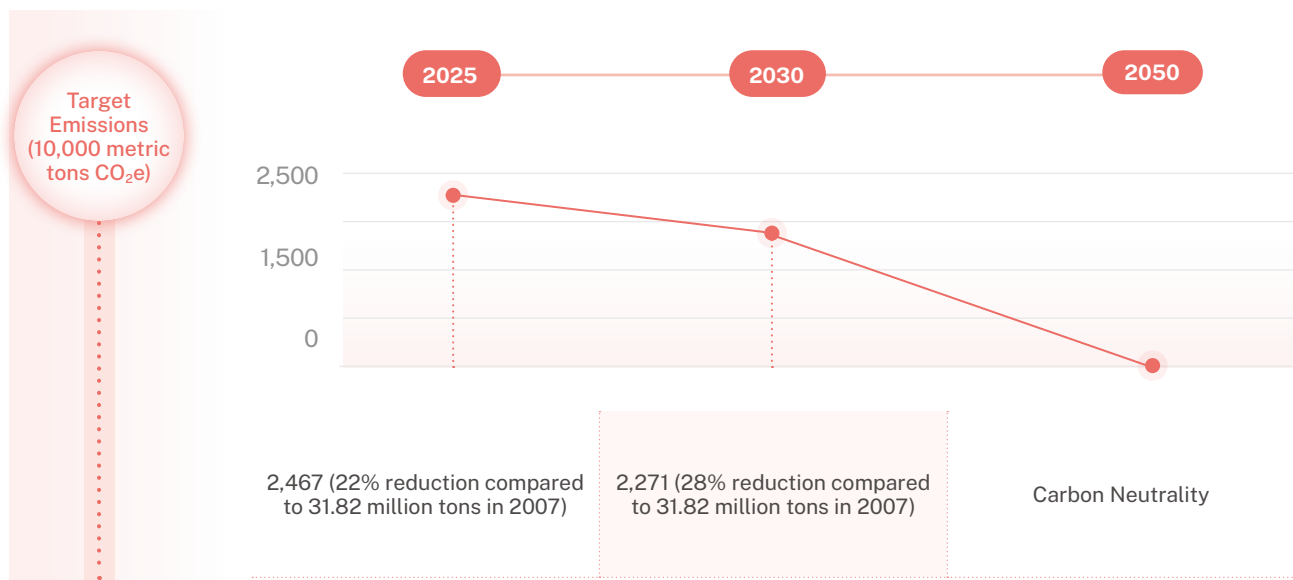
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4.2 Greenhouse Gas Emissions Disclosure	24



## 4.1 Carbon Neutrality by 2050

To realize the vision of a low-carbon economic transition, FPCC has set a long-term goal of achieving carbon neutrality by 2050. In addition, short-term (2025) and mid-term (2030) targets have been established internally to track progress toward this goal. The timeline and corresponding target emissions are shown in the table below:

**Table 4.1-1 Short-, Mid-, and Long-Term Carbon Reduction Targets**



## 4.2 Greenhouse Gas Emissions Disclosure

Since 2005, FPCC has conducted greenhouse gas (GHG) inventories in accordance with ISO 14064-1 and has commissioned BSI Taiwan to perform third-party verification. This report discloses the verified Scope 1 and Scope 2 GHG emissions for 2024, as shown in the table below:

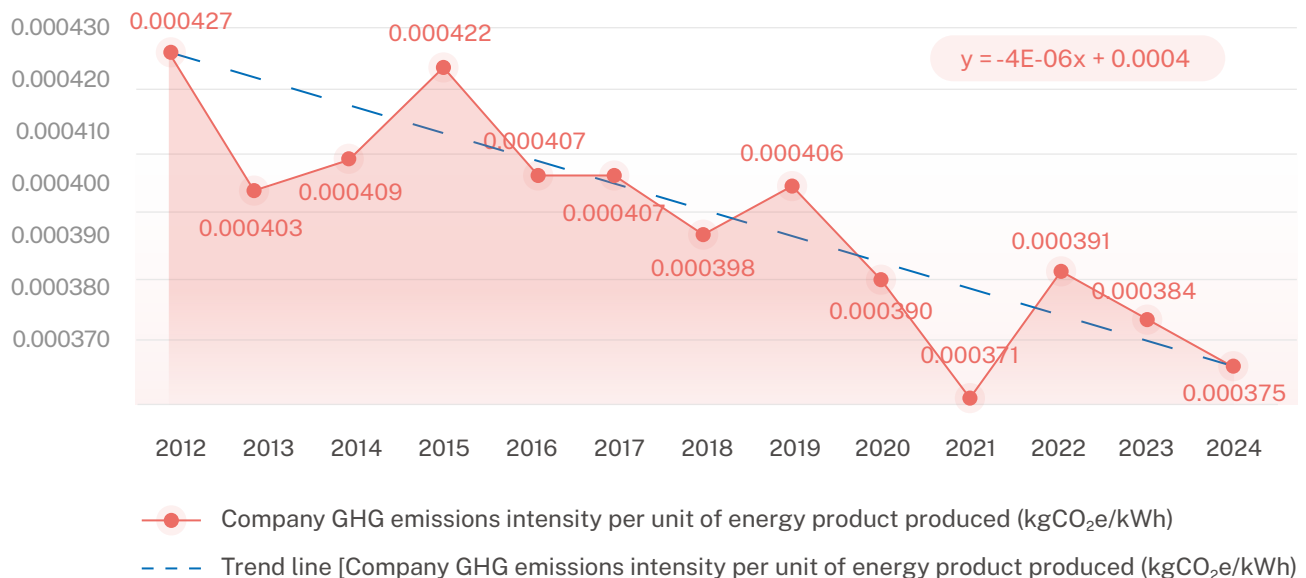
**Table 4.2-1 FPCC 2024 Greenhouse Gas Emissions**

Plant Site (metric tons CO <sub>2</sub> e/year)	Scope 1	Scope 2	Total Carbon Emissions
Mailiao Plant 1	14,432,481	0	14,432,481
Mailiao Plant 2	3,304,276	192,726	3,497,002
Mailiao Plant 3	5,484,810	44,238	5,529,048
Taipei Storage and Transportation Station	6	322	328
Taoyuan Storage and Transportation Station	50	1,263	1,313
Changbin Blending Plant	11	444	454
<b>Total</b>	<b>23,221,634</b>	<b>193,699</b>	<b>23,415,333</b>



In addition to disclosing absolute GHG emissions, the Company also follows practices adopted by leading international oil and gas companies by calculating the GHG emissions intensity per unit of product. This demonstrates that, through continuous efforts in energy conservation, carbon reduction, and process improvements at the production sites, the Company has achieved a downward trend in product-level emissions intensity:

#### Company GHG emissions intensity per unit of energy product produced (kgCO<sub>2</sub>e/kWh)



Since 2019, FPCC has conducted annual Scope 3 relevance assessments and emission inventories, which have been verified by a third party (see Table 4.2-2 for details). The Scope 3 GHG emissions for 2024 are still under inventory at the time of this report's publication (expected to be completed in July). Therefore, this report discloses the Scope 3 emissions data for the year 2023.

**Table 4.2-2 FPCC's GHG Emission in 2023**

Scope 3 Emission Sources	Relevance	GHG Emissions	Scope 3 Emission Sources
Purchased Goods and Services	Relevant and calculated	7,310,557	The current inventory covers manufacturing-related emissions from Tier 1 key raw material suppliers, accounting for 100% of such suppliers.
Capital Goods	Relevant and calculated	71,623	The current inventory covers 100% of capital goods procured in 2023.
Fuel-and Energy-Related Activities (not included in Scope 1 or Scope 2)	Relevant and calculated	1,377,969	The inventory includes 100% of fuel-and energy-related activities not included in Scope 1 or 2, such as extraction and transportation of fuels like coal, light cracked fuel oil, and natural gas.
Upstream Transportation and Distribution	Relevant and calculated	7,184,668	The inventory covers 100% of transportation emissions related to Tier 1 key raw materials.
Waste Generated in Operations	Relevant and calculated	11,026	The inventory covers 100% of emissions generated from the treatment of operational waste.
Business Travel	Relevant and calculated	998	The inventory covers 100% of business travel emissions from air travel.
Employee Commuting	Relevant and calculated	7,242	The inventory covers 100% of transportation service emissions from employee commuting via company shuttle buses.
Upstream Leased Assets	Not relevant	-	FPCC does not have upstream leased assets.
Downstream Transportation and Distribution	Relevant and calculated	2,146,874	The inventory covers 100% of product transportation emissions to the main customers' gates.

Scope 3 Emission Sources	Relevance	GHG Emissions	Scope 3 Emission Sources
Processing of Sold Products	Relevant and calculated	3,213,337	FPCC's products are typically upstream products. The company has identified its current products as naphtha, gasoline, diesel, jet fuel, and base oil. Among them, naphtha and base oil appear in products across various value chains such as food, medical, agriculture, automotive, and consumer goods. For example, our products serve over 20,000 customers across these sectors. These customers have vastly different GHG profiles and sell to an even wider variety of end users. Gasoline, diesel, and jet fuel are used in mobile transport vehicles. Based on our identification, gasoline, diesel, and jet fuel are used respectively in automobiles, motorcycles, and airplanes. There are no associated GHG emissions from further processing of sold gasoline, diesel, or jet fuel. Since naphtha is processed into a wide range of downstream products, emissions from its further processing cannot currently be identified or calculated. Base oil is mainly reprocessed into lubricants, and emissions from the processing of sold products are calculated primarily based on lubricant production.
Use of Sold Products	Relevant and calculated	41,998,169	FPCC's products are typically upstream products. The company has identified its current products as naphtha, gasoline, diesel, jet fuel, and base oil. Among them, naphtha and base oil appear in products across various value chains such as food, medical, agriculture, automotive, and consumer goods. For example, our products serve over 20,000 customers across these sectors. These customers have vastly different GHG profiles and sell to an even wider variety of end users. Gasoline, diesel, and jet fuel are used in mobile transport vehicles. Based on our identification, gasoline, diesel, and jet fuel are used respectively in automobiles, motorcycles, and airplanes. Emissions from the use of sold products are calculated based on emissions generated by the use of FPCC's products in automobiles, motorcycles, and airplanes.
End-of-Life Treatment of Sold Products	Not relevant	N/A	FPCC's products are typically upstream products. The company has identified its current products as naphtha, gasoline, diesel, jet fuel, and base oil. Among them, naphtha and base oil appear in products across various value chains such as food, medical, agriculture, automotive, and consumer goods. Due to the broad scope of end-use applications, it is currently not feasible to quantify the GHG emissions associated with the end-of-life treatment of these products.
Downstream Leased Assets	Not relevant	N/A	FPCC does not have downstream leased assets. In 2023, no downstream leased assets generated additional GHG emissions.
Franchises	Not relevant	N/A	FPCC does not hold any franchises.
Investments	Relevant and under calculation	1,088,062	Emissions from investments are calculated based on the GHG emissions of the investees disclosed in the consolidated financial report.
Other (Upstream)	Not relevant	N/A	FPCC's current GHG inventory does not yet account for other relevant upstream emission sources.
Other (Downstream)	Not relevant	N/A	FPCC's current GHG inventory does not yet account for other relevant downstream emission sources.
Total emissions (ton CO <sub>2</sub> e)		64,410,523	

# Appendix

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# Report Management

The data presented in this report covers the period from

January 1, 2024, to December 31, 2024

Frequency of Report Publication

Annually

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## TCFD Index

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	Describe the management's process in assessing and managing climate-related risks and opportunities.	P5-P6
Strategy	Describe the short, medium and long term climate-related risks and opportunities already identified by the organization.	P8-P9
	Describe the climate-related risks and opportunities that cause major impacts to the business, strategy, and financial planning of the organization.	P18-P20
	Describe the organization's strategy resilience incorporating the different scenarios of climate change, including 2° or a more severe scenario.	P21-P22
Risk Management	Describe the processes for the identification or assessment of climate-related risks by the organization.	P11-P12
	Describe the processes for managing climate-related risks by the organization.	P11-P12
	Describe the organization's procedures for identifying, assessing, and managing climate-related risks and how these are integrated and incorporated into the overall risk management.	P16-P17
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	Describe the organization goals for managing climate-related risks and opportunities and the performance of related goals.	P24-P26





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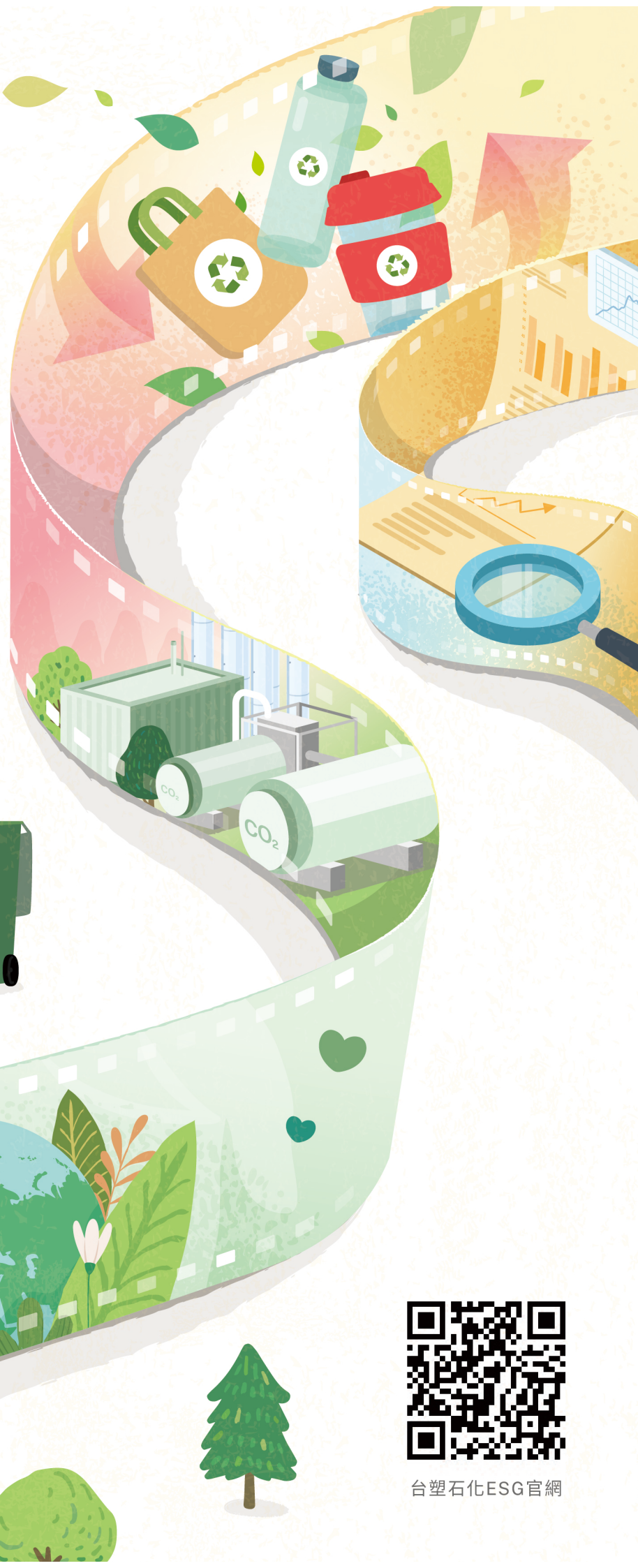
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