04 Task Force on Climate Related Financial Disclosures

(4.1) Climate Governance

4.1.1_Governance and Management's Structure and Responsibility

4.1.1.1_Board of Directors' Climate Governance Structure

The Board of Directors is TCC's highest decision-making body for climate issues, providing instructions and oversight regarding the status of the Company' s response to climate risks. In 2018, TCC' s Board of Directors established the Corporate Sustainable Development Committee, which is responsible for approval and oversight regarding the promotion of TCC' s sustainable development, including climate governance and low carbon issues. It shall hold meetings at least twice a year and report to the Board of Directors. Through the contents reported by the Corporate Sustainable Development Committee, the Board of Directors is able to confirm the Company' s sustainable development and ESG management measures, monitor and track the implementation of TCC' s sustainable development and the achievement of performance targets. In 2022, in order to further incorporate the Group' s resources to promote the sustainability project effectively, TCC established the Office of Responsibility and Sustainability, which is responsible for cross-department communication and negotiation and provides suggestions for improvement.

In order to strengthen risk management, TCC's Board of Directors resolved in May 2020 to establish a "Risk Management Executive Committee" with the President as the highest management level responsible for climate related issues. The Risk Management Executive Committee identifies and manages corporate operational risks, including emerging physical and transition risk brought by climate change, and guides the planning of relevant responding measures. The Risk Management Executive Committee shall, at least once a year, report to the Board of Directors regarding the implementation and risk control. The Committee also monitors and traces the management' s implementation of risk management. In 2023, TCC established the climate-related key performance indicators and targets, which were approved by the Board of Directors. The Risk Management Executive Committee will regularly report the status of achievement to the Board of Directors in the future.

Attendance of members of the Board of Directors and functional committees: 100% attendance in 2022. (including attendance by proxy)

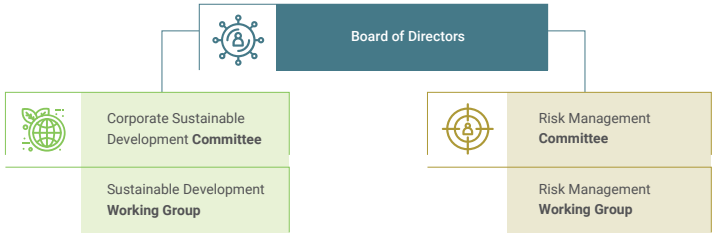
Climate-related courses taken by the Board of Directors: 86.5 hours of courses related to climate governance and sustainable development in 2022.

4.1.1.2_Management' s Climate Issue Management Structure

Under the Corporate Sustainable Development Committee of TCC's Board of Directors, the Corporate Sustainable Development Working Group consists of functional task forces, including "Corporate Integrity and Risk Management," "Eco-Manufacturing," "Sustainable Environment and Products," "Employee Care," and "Social Care." In response to the international trends, additional task forces were established for "Financial TCFD," "Information Security," and "Sustainable Supply Chain." The task forces are composed of first-level executives and senior staff from each relevant department and responsible for relevant businesses according to the functions of each department. The Corporate Sustainable Development Working Group monitors the implementation and future planning of climate issues and other sustainability aspects every year through meetings and written communication. It also optimizes strategies and puts them into practice. All of these will be reported to the Corporate Sustainable Development Committee by the Chief of Sustainability.

Under the Risk Management Executive Committee, a Risk Management Working Group is set up, with first-level executives from relevant departments as representatives, to identify risks in the seven major aspects of operations, finance, legal compliance, human resources, national security, information security, and ESG according to the functions of each department. They also discuss and formulate strategies by written communication every year, and implement them into practice. All of these will be reported to the Corporate Sustainable Development Committee by the first-level executives of each department.

4.1.1.2.1_Climate Governance and Management Structure



4.1.1.2.2_Meeting Frequency and Roles in Climate Issues of Each Unit Under Climate Governance Structure

Unit	Convener	Other Members	Meeting Times in 2022	Roles in Climate Issues
Board of Directors	Chairman An-Ping Chang	Composed of 14 members, 9 members are juristic person Director representatives, and the other 5 members are Independent Directors.	8 Times	TCC's highest decision-making unit monitoring climate change-related issues.
Corporate Sustainable Development Committee	Chairman An-Ping Chang	Composed of 2 members, Independent Director Victor Wang and President Roman Cheng.	2 Times	Oversee a series of sustainable development strategies and implementation plans drawn up under the Company's climate commitment, and approve the relevant targets and goals proposed by the executive team of the Sustainability Management Committee, track their implementation and review their effectiveness.

Unit	Convener	Other Members	Meeting Times in 2022	Roles in Climate Issues
Risk Management Executive Committee	Independent Director Sherry S. L. Lin	Composed of 2 members, Independent Director Victor Wang and Independent Director Lynette Ling-Tai Chou	1 Time	Identify and manage of the Company's climate risk controls and improvement mechanisms. Receive climate risk issues reported by the manager of each department in working groups, including identification of climate risks and opportunities, examination of climate risk control strategies, climate scenario analysis, and the establishment and achievement of climate-related key performance indicators and targets.
Corporate Sustainable Development Working Group	Chief of Sustainability	First-level executives from 11 departments, including Engineering Department, Human Resources Department, Business Department, Finance Department, Materials Department, General Affairs Department, Low-Carbon R&D Center, Legal Office, Internal Audit Office, Board Secretary Office, and Sustainability Office.	17 times	Responsible for the implementation of sustainability-related projects.
Risk Management Working Group	Chief Financial Officer	First-level executives from 10 departments, including the Sustainability Office, Finance Department, Engineering Department, Legal Office, Business Department, Low-Carbon R&D Center, Information Security Management Committee, Human Resources Department, Materials Department, and Board Secretary Office.	1 time	Responsible for assessment and analysis of climate-related risks and opportunities, as well as the implementation of climate-related strategies and actions.

4.1.2_Results of Oversight on Climate-Related Issues

TCC also takes concrete actions to implement of sustainable development and climate change adaptation. The Board of Directors reports annually on risk management and corporate sustainable development through the Risk Management Executive Committee and the Corporate Sustainable Development Committee to monitor and track the implementation of climate risk management and the achievement of performance targets.

The Corporate Sustainable Development Committee formulated the execution strategies and targets in accordance with the Sustainable Development Pathway of the Financial Supervisory Commission (FSC) in 2022. Also, the Committee defined the scope, timetable, and targets of greenhouse gas inventory for the TCC Group, which were submitted to the Board of Directors for presentation and adoption. In order to further implement the Risk Management Executive Committee's oversight over the Company's climate risks and opportunities, TCC submitted the establishment of climate-related performance indicators and targets to the Board of Directors in 2023. The achievement of each indicator and target will be reported to the Board of Directors on a regular basis in the future.

4.1.2.1_Oversight and Results of Implementation Regarding Climate Issues of Each Unit Under Climate Governance Structure

Board of Directors' Oversight Over Sustainability and Promotion Results of Climate Change Project

- Sustainable development pathway of FSC: The scope and schedule of GHG inventory for TCC and our 147 Subsidiaries
- Scientific carbon reduction and management: Renew SBT in 2024 and promote internal carbon trading
- Low-carbon and green products: TCC's cement has obtained the carbon reduction label from EPA. Furthermore, we are planning to apply for carbon labeling for our main concrete products, develop UHPC, and develop UHPC energy storage containers.
- Sustainable initiatives: TCC is the first large-scale manufacturing company in Taiwan to become a member of the EP100 initiative. Since March 2022, we have initiated the operation of next-generation charging stations and simultaneously launched the EARTH HELPER initiative.
- Sustainable trends assessment: Follow international trends to plan for TCC's future, such as EV100+ initiatives and TNFD structure.

Contents of the 2022 Review Meeting of the Committees

Corporate Sustainable Development Committee

- Promotion of sustainability projects from 2021 to 2022.
- The scope and schedule of GHG inventory for TCC Group.

Risk Management Working Group

- Annual update of the Company's seven major risk aspect identification matrices.
- Risk control report by each functional unit, including the following climate risk issues:
  - Report on carbon pricing and alternative raw materials and fuel price changing risk
  - Report on water resources risk management of RMC plants

Results of implementation by the Working Group in 2022

Corporate Sustainable Development Working Group

- Carbon emissions intensity of cement plants reduced by 5.40%, 0.8033 metric tons of CO_2e per metric tons of cementitious materials (base year 2016, scope 1 and 2).
- Water usage intensity of cement plants reduced by 38.54%, 0.00029 million liters per metric tons of cementitious materials.
- Carbon emissions intensity of RMC plants reduced by 8.88%, 8,346.6292 metric tons of CO_2e per metric tons (base year 2020, scope 1 and 2).
- The cement plants joined EP100, and its energy productivity increased by 59.6%.
- The benefit from power generated from waste heat of cement pants increased by 45.48% (compared with 2018).
- Self-consumption ratio of renewable energy generated by itself increased by 10% (base year 2021)
- Cement alternative resources recycled per metric ton reached 24.27%, with a total of 135,573 metric tons of carbon reduced.
- Assisted the industry in the treatment of nearly 1.101 million metric tons of waste, which is equivalent to 5.3% of total industrial waste in Taiwan.
- Installed capacity: Taiwan 656.1MWh, Global >1GWh (cumulatively as of 2023)

Risk Management Working Group

- Annual update of risk identification matrix for seven major aspects: operations, finance, national security, legal compliance, ESG, personnel and information security.

As for each climate-related issue, TCC engages in cross-department communication and negotiation on a regular basis. The participating departments include Engineering Department, Finance Department, Business Department, Materials Department, Low-Carbon R&D Center, Human Resources Department, cement plants, and RMC plants. Meetings are held at least biweekly or monthly to trace the implementation

of emission reduction actions and climate strategies. In order to have a timely grasp of progress on climate issues, the Chairman held irregular meetings with the president and vice presidents of functional units to monitor the climate issues.

Meeting Name	Participating Departments	Discussion Items	Major resolutions in 2022	Meeting Frequency
Interdepartmental Monthly Meeting	Senior executives of Engineering, Finance, Business, Human Resources Departments, cement plants, and RMC plants	■ Market operations, monthly profit and loss, material procurement, alternative raw materials and fuel use, carbon emission status	■ An internal management target for carbon emissions intensity of each cement plant was established in 2023 and included as part of each plant's quarterly bonus evaluation items ■ An internal management target for alternative fuel indicators of each cement plant was established in 2023 and included as one of the senior plant managers' bonus evaluation items	Times / Month
Biweekly Meeting on Environmental Protection	Engineering Department, Low-Carbon R&D Center, Finance Department, Mainland China Cement Plant, Suao Plant, and Hoping Plant	■ Survey on the types, sources and quantities of alternative raw materials and fuel, setting of disposal price mechanism, use of alternative materials and fuel, and construction of waste disposal projects ■ Ultra-High Performance Concrete (UHPC) Test Progress Report	■ Alternative raw materials and fuel market analysis, as well as alternative raw materials, reducing slag and calcium fluoride sludge, acceptance criteria and pricing ■ Matters regarding the development of material ration of UHPC for 3D printing ■ Matters regarding the design, the installation, and the materials of UHPC energy storage cabinet	Times / 2 Weeks
SBT Meeting	Cement plant senior level and middle managers, Engineering Department managers, Low-Carbon R&D Center managers	■ Cement plants carbon emission intensity tracking and analysis ■ Cement plants carbon reduction project implementation progress tracking ■ Tracking the use of alternative raw materials and fuel in cement plants ■ Planning of alternative fuel intake, storage and feeding process	■ Investment in the establishment of solar power plants in TCC's Mainland China Plants ■ Investment in the technical transformation of coolers in TCC's Mainland China Plants for capacity enhancement and consumption reduction. ■ Investment in the establishment of waste texture shredding systems in TCC's Mainland China Plants ■ Investment in the establishment of alternative fuel drying and transportation systems in TCC's Mainland China Plants ■ Investment in the technical transformation of cement mills in TCC's Mainland China Plants for capacity enhancement and consumption reduction ■ Examination and development of technological transformation of Taiwan Plants' oxygen-enriched combustion.	Times / 2 Weeks

4.1.2.2_ESG Performance-Linked Remuneration Policies

To implement and enforce ESG, TCC continues to track the mid- and long-term goals of its sustainability strategy and the performance of various non-financial indicators, which are subsequently incorporated into the performance evaluation system tied to the remuneration of senior executives. TCC also includes the performance results of the aspects of corporate governance, green finance, social care, and sustainable environment in the personal performance evaluation of the President. The Remuneration Committee reviews the contribution to the Company's operation and the reasonableness of the remuneration before resolution by the Board of Directors. In addition, TCC also links the internal carbon reduction target achievement rate of each plant to the performance evaluation and salary incentive of each respective plant's manager. For details, please refer to 4.4.2 Carbon Reduction Targets for Each Plant Linked to the Performance-Based Remuneration System

(4.2) Risks and Opportunities

4.2.1_Climate Risks and Opportunities Identification and Assessment

In response to the rapid changes in policies and markets and the high uncertainty of climate change, TCC identifies and assesses climate risks to control and estimate possible impacts on TCC, and formulates six climate actions in response proactively. The Board of Directors is TCC's highest decision-making unit for risk management, responsible for the review and approval of TCC's risk management policies and the oversight of the risk management operation. As for the risk issues, we conduct the risk identification and analysis of seven aspects, i.e., operations, finance, national security, legal compliance, ESG, personnel, and information security, according to the scope of business. The risk of climate change has been incorporated into TCC's procedures for overall risk management.
TCC assesses climate risks and opportunities based on the TCFD framework once every two years. The assessment scope covers TCC's cement business (including concrete) in Taiwan and Mainland China, considering that the carbon emissions of the TCC Group concentrate in the cement business, and that the revenue from abovementioned regions accounts for 68% of the Group's total revenue for 2022. Transformation risks, physical risks, and relevant opportunities derived from them are identified by the senior officers of each department of TCC and external consultants, based on the external changes and trends of policies/laws, markets, and climate disasters, as well as the strategic direction of internal operations.

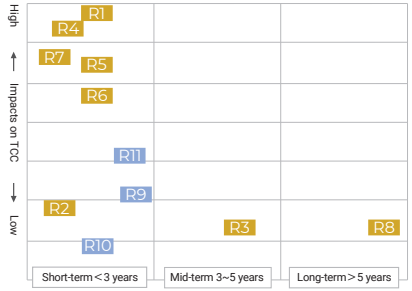
4.2.1.1_Climate Risks and Opportunities Management Procedures

Note 1: The financial impact materiality threshold adopts five levels to indicate TCC's risk tolerance capabilities: very high, high, medium, low, and very low. The financial materiality threshold is determined based on the impact on assets/revenue/costs to the average consolidated pre-tax net income over the past 3 years: >15%, 10%~15%, 5%~10%, 0.1%~5%, ≤0.1%.

4.2.1.2_Short-, Mid- and Long-Term Climate-Related Risks and Opportunities

In light of global warming and the possible operational impact of extreme weather patterns, TCC incorporates the climate risks into overall risk management policies and identifies 11 key climate risks and 7 derivative opportunities in accordance with TCFD guidelines and industry-specific recommendations. In addition to the inventory of existing responsive strategies and adaptation measures, TCC also, referring to the scope and time span of the impact of risks and opportunities, incorporates them into six climate actions, namely low-carbon circulation, natural disaster adaptation, supply chain mutual benefit, low-carbon products, R&D innovation and new energy business, to expand the arrangement of transformation and strengthen the operational resilience of the company.

4.2.1.2.1_Climate Risks Matrix



Transition Risks

R1 Carbon trading/carbon fee/carbon tax for total carbon emissions control
R2 Regulations and procurement of renewable energy
R3 Decommission of the coal-fired Hoping Plant
R4 Costs in the low-carbon technologies equipment and management
R5 Impacts to corporate reputation
R6 Impact on the strength of supports from financial institutions in investment, financing, and insurance
R7 Rising prices of raw materials and energy
R8 Breakthrough in the advanced technology of carbon capture and storage(CCS)

Physical Risks

R9 Flood(production)
R10 Changes in precipitation patterns and extreme changes in climate patterns(transportation)
R11 Drought(production)

4.2.1.2.2_Climate Opportunity Matrix

Opportunities

O1 Smart low-carbon production wand waste co-processing
O2 Involvement in the carbon trading market
O3 Installation of new energy projects
O4 Involvement in the electricity trading market
O5 Application of the oxygen enriched combustion and oxy-fuel combustion technologies to carbon capture and reuse
O6 Securing inventors' willingness for long-term investment
O7 Exploration of the market for low-carbon products

4.2.1.3_TCC's climate actions on climate risk and opportunities

※ Risk	◎Opportunity	Financial Impact (Including the influence arising from ※Risk and ◎Opportunity)		Climate Actions
※ Carbon trading/carbon fee/carbon tax for total carbon emissions control	◎ Involvement in the carbon trading market	※ Rising costs	◎ Increase revenue	■ Low-carbon cycling ■ New energy business development
※Regulations and procurement of renew-able energy	◎ Involvement in the electricity trading market	※ Capital expenditures ※ Rising costs	◎ Increase revenue ◎ Reduced cost	
※Decommission of the coal-fired Hoping Plant	◎ Installation of new energy projects	※ Decrease revenue ※ Rising costs	◎ Increase revenue ◎ Reduced cost	■ Low-carbon cycling ■ New energy business development
※ Breakthrough in the advanced technology of carbon capture and storage (CCS)	◎ Application of the oxygen en-riched combustion and oxy-fuel combustion technologies to carbon capture and reuse	※ Capital expenditures ※ Rising costs	◎ Reduced cost	■ R&D Innovation
※Costs in the low-carbon technologies, equipment and management ※Rising prices of raw materials and energy	◎ Smart low-carbon production and waste co-processing ◎ Exploration of the market for low-car-bon products	※ Capital expenditures ※ Rising costs	◎ Increase revenue ◎ Reduced cost	■ Low-carbon cycling ■ Low-carbon Products ■ Common good with supply chain
※Impacts to corporate reputation ※Impacts on the strength of supports from financial institutions in investment, financing, and insurance	◎ Securing inventors' willingness for long-term investment	※ Funds availablede-creased	◎ Funds available increased	■ Low-carbon cycling ■ Climate adaptation ■ Common good with supply chain ■ Low Carbon Products ■ R&D Innovation ■ New energy business development
※ Flood (production) ※Changes in precipitation patterns and extreme changes in climate patterns (transportation) ※ Drought (production)		※ Decrease revenue ※ Rising cost		■ Climate adaptation ■ Common good with supply chain

4.2.2_Climate Scenario Analysis

Based on the Materials and Buildings Group in the Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, TCC conducted a scenario analysis and assessment of climate risks, namely carbon price and emission control, and extreme climate events:

4.2.2.1_Climate risk scenarios of carbon price and carbon emissions regulation

The directions of the GHG laws and regulations in the countries where TCC mainly operates in are analyzed. The financial impacts arising from the carbon price trends in three scenarios, i.e., Stated Policies Scenario (STEPS), Announced Pledges Scenario (APS), and Net-Zero Emissions by 2050 Scenario (NZE2050), are assessed.

4.2.2.2_Climate risk scenarios of extreme weather

The possible risks of respective operating plants brought by floods, droughts, typhoons, and heatwaves are taken into consideration on the basis of the geographical locations where TCC operates. The low emissions mitigation scenario (SSP1-2.6) and the extremely high impact emissions scenario (SSP5-8.5) are further selected for assessment of the financial impacts on TCC. After consolidating the results of the aforementioned scenario analysis, TCC will take the resilience strategies into considerations, and actively adjusts mitigation and adaptation plans in response.

Consolidate the assumptions regarding risk types and different scenarios mentioned:

Risk Type	Scenario Selection	Key Parameters
Transition Greenhouse Gas Regulation and Carbon Pricing Policy	IEA Stated Policies Scenario (STEPS) Note 1 IEA Announced Pledges Scenario (APS) Note 1 IEA NZE2050 - Net Zero by 2050 Scenario	Hypothetical carbon prices of the locations or regions of operation in different scenarios Note 2 **Assessment Content** With the warming managed at 2.5°C, 1.7°C, and 1.5°C, the impacts to operation arising from emissions-related expenditures potentially incurred in 5-10 years from the corresponding carbon price trends and carbon management regulations in the operating sites are assessed respectively.
Risk Type	**Scenario Selection**	**Key Parameters**
Physical Floods, droughts and long-term climate pattern changes	IPCC - AR6 SSP1-2.6, SSP5-8.5 Note 3	Changes in drought duration and precipitation index arising from extreme weather. **Assessment Content** ▪ In the scenario of the highest warming level of temperature rise, the potential impacts to operation by the mid-century arising from increased costs in alternative transportation and equipment repair due to intensified droughts and increased number of typhoons brought by extreme weather are assessed. ▪ In the scenario of the ideal warming mitigation or the highest warming level of temperature rise, the changes in the risks of heatwaves, floods, and droughts brought about by extreme weather are assessed.

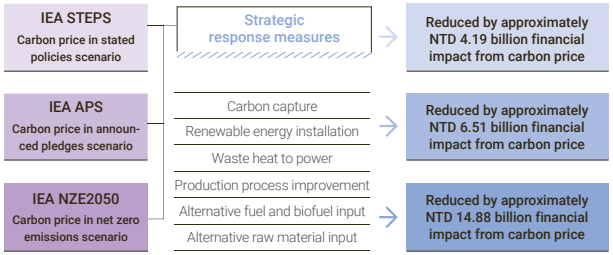
Note 1: The STEPS and APS in the World Energy Outlook (WEO) 2022 of the International Energy Agency (IEA) are cited, which respectively represent the carbon price trend and emissions reduction pathway for the global average temperature rise by approximately 2.5°C by the end of the century with the current policy formulation scenario and the specific policies and carbon emissions managed with policies enforced by governments included as well as the global average temperature rise by about 1.7°C with all the climate commitments of governments, including the Nationally Determined Contributions (NDCs) and long-term net-zero goals, fulfilled as scheduled by the end of this century.

Note 2: The references for the hypothetical prices are from World Energy Outlook 2022 and the carbon pricing options for Taiwan 2020 of the Environmental Protection Administration, Taiwan, without the preferential rate of carbon fee taken into consideration.

Note 3: The SSP1-2.6 and SSP5-8.5 scenarios in the 2021 Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) are cited. SSP1-2.6 represents a scenario of low greenhouse gas emissions. In this scenario, there will be a significant reduction in the global carbon dioxide emissions, the goal of net-zero emissions to be achieved after 2050, and a global temperature rise by 1.8°C by the end of this century. SSP5-8.5 is a scenario of very high greenhouse gas emissions with the assumption of high emissions and a significant increase in coal use in the future, rendering the impact pathway of a global temperature rise by 4.4°C by the end of this century.

Transformation Risk Scenario: Greenhouse Gas Regulation and Carbon Price Impact Analysis

For the cement industry with high carbon emissions, the impact of GHG emissions control regulations is evident. The most important cement production bases of TCC at this stage have been inventoried, which are located in Taiwan and Mainland China, respectively. In terms of carbon system planning in Taiwan, the Climate Change Response Act was passed in the third reading by the Legislative Yuan on January 10, 2023. The legal basis for the collection of carbon fees is introduced and is expected to come into force as early as 2024. The national carbon trading market in Mainland China has been formally established in 2021, and the cement industry has yet been included in the national carbon trading system. For the carbon emissions regulation of the cement industry in the region, a cap-and-trade system is in force via the local government of China and group's strategy to control, and parts of the region using carbon trading pilot.
Through TCC's assessment of the future changes in the yield of cementitious materials and the carbon emissions that meet the internal reduction targets, with the assumption of the enforcement of the carbon fee system in Taiwan and the inclusion of the cement industry in the national carbon trading system in Mainland China, combined with the three climate scenarios, i.e., STEPS, APS, and NZE2050, taken into account, the carbon prices analysis are as follows:



Note: Financial impact is the result of comparison with that of no carbon reduction measures were taken.

Faced with the major transition risk of "carbon trading/carbon fee/carbon tax for total carbon emissions control," TCC has initiated the transition as early as 2017, planning for the increase in the alternative raw materials and fuel, equipment and process enhancements, and ongoing research and development of carbon capture technology, renewable energy installation, improvement to the efficiency of power generation by waste heat recovery, among other mixed resilience strategies, so as to reduce carbon emissions generated from the cement process to increase the potential in operational reduction, effectively controlling the risks brought about by carbon pricing policies. Meanwhile, carbon emission intensity is incorporated as the key performance indicator (KPI) for plants in order to improve the reliability of internal carbon reduction targets. Moving forward, TCC shall not only continue to strengthen the carbon reduction efforts of the abovementioned strategies, but also consider moderate production reduction and cement price transfer, so as to minimize the financial impacts of such risk on TCC.

Physical Risk Scenarios

TCC has regularly reviewed the extreme climate events affecting the company' s operations and identified the physical risks with impacts on the company' s operations for a long time. TCC has conducted the physical risk scenario assessment on droughts and typhoons in 2021. In 2022, TCC continued to incorporate floods and heatwaves into physical risk items of the scenario analysis through internal discussion, inventory, and assessment. TCC analyzed the risk level of each extreme climate of TCC' s plants under future climate scenarios in Taiwan and Mainland China and formulated responsive adaptations to strengthen TCC' s climate resilience.

In order to obtain a comprehensive understanding of climates risks of each TCC' s operational base under various climate scenarios, TCC completed the establishment and the introduction of the climate physical risk database, which combines weather observation data[Note 1] and climate scenario information[Note 2]. TCC collects and studies the definition of disasters[Note 3] by domestic and foreign official institutes.

Taking into consideration the disaster tolerance capability of each site, TCC calculates the occurrence probability and severity of dtisaster with climate information and a scientific assessing method. The Company then analyzes the short-, mid-, and long-term[Note 4] disaster risk levels (high, medium, low) of 48 production bases in Taiwan and Mainland China through the risk matrix.

For the selection of scenarios, referring to the IPCC-AR6 climate change assessment report, TCC selected the ideal and extreme scenarios of the GHG emissions (SSP 1-2.6 and SSP 5-8.5, hereinafter referred to as 2.6 and 8.5 scenarios) for the physical risk scenario analysis. According to the results of the scenarios analysis, TCC established various strategies in response to each physical risk. Please refer to chapter 4.3.2 for more information.

Location analysis
TCC Factories

48 locations
Taiwan & Mainland China

Physical Risk Analysis
Climate Physical Risk Database

Quantify probability of occurrence and severity
Weather observation / Climate Scenario Disaster risk

Result of risk identification
Risk Matrix

High, medium, and low risks
Probability of occurrence x Severity

Note 1: Precipitation and temperature data from observation stations of the Central Weather Bureau and IPCC AR6-CMIP6 global climate simulation information
Note 2: Taiwan Plants use Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP) AR6 downscaling climate projection, while Mainland China Plants use IPCC AR6-CMIP6 climate simulation information.
Note 3: Definitions of official institutes and literature, for example, the maximum consecutive days without rainfall and SPI precipitation indicators for drought risk.
Note 4: Short-term is set as within 3 years, mid-term is 3 to 5 years, and long-term is more than 5 years. Since there is no apparent difference among short-term scenario information, the results of the analysis are not classifies by scenarios and are treated as base period data for the risk analysis.

(1) Floods risk - Scenario analysis
Description of risk materiality

There is often sudden rain brought by a stationary front, a typhoon, or a low-pressure belt in Taiwan and South China region, where TCC's production bases are located, during the flood season (usually April to September). In the past, there were damages to production or transportation equipment caused by heavy rain, which resulted in extra operating costs and risk of operation suspension. Considering its plants' flood tolerance capability, TCC obtains an understanding of the level of each production base's flood disaster risk level through the climate scenario analysis.

Result of Risk Analysis

Most of TCC' s operational bases are located in regions with low flood risks in short-term. Only few bases are located in high-risk regions. After the mid-term, there is no apparent difference between the numbers of high-risk bases under the two scenarios, but the number of bases located in medium-risk regions increases significantly. There is no apparent difference between the overall flood risk in the long-term and the mid-term under the 2.6 scenario. However, the flood risk is more significant under the extreme 8.5 scenario. There are 8 production bases located in high-risk regions, which are the Southern Taiwan, and the Provinces of Guangdong, Fujian, Hunan, and Liaoning in Mainland China.

According to the results of the scenario analysis, the frequency of extreme rainfall increased, and the overall flood risk of TCC's production bases increased accordingly. TCC will give priority to strengthening the adaptation and response measures for production bases with mid and high flood risk.

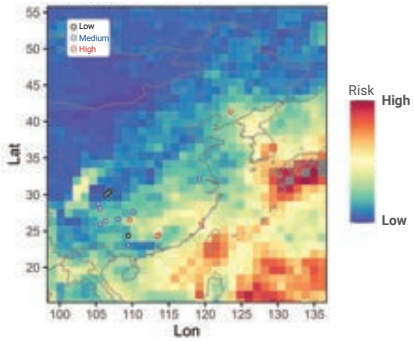
Number of Bases

Table Result of risk analysis of droughts

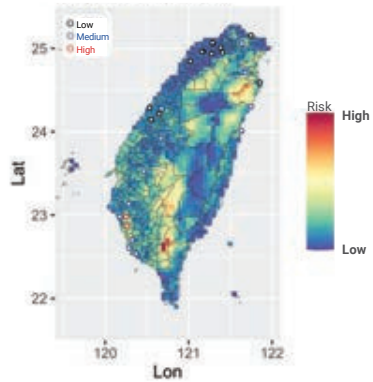
Time (Scenario)	Low Risk	Medium Risk	High Risk
Short-term	37	5	6
Mid-term(SSP1-2.6)	23	19	6
Mid-term(SSP5-8.5)	22	24	2
Long-term(SSP1-2.6)	22	20	6
Long-term(SSP5-8.5)	17	23	8

Image Distribution graph of risk of floods (Long-term 8.5 scenario)

— Mainland China



— Taiwan



(2)Droughts risk - Scenario analysis
Description of risk materiality

Droughts not only affect the normal water use of TCC' s production bases but also influence the operations of bases that rely on water transportation. During the serious drought in Central Taiwan in 2021, plants that were significantly influenced by the drought needed to purchase water for production to maintain their normal operations, which caused additional operating costs. TCC analyzes the drought risk level of each production base with the SPI-3 (Standard Precipitation Index), which is often used for drought analysis in the climate science, as well as climate scenario information.

Result of Risk Analysis

Only few bases are located in medium-risk regions according to the results of the short-term analysis. After the mid-term, the numbers of bases located in medium and high-risk regions increase significantly under the 2.6 and 8.5 scenarios. Especially, there are 14 bases at high risk of drought under the 8.5 scenario. Under the 2.6 and 8.5 scenarios, there is no significant difference between their overall drought risks in the long-term, which are mitigated compared to those in the mid-term, indicating that the overall drought risk in the mid-term is the most severe.

Observing the scattering of the high-risk regions with the map of drought risk under the long-term 8.5 scenario, most bases located in Mainland China are at medium or low risk, while most plants in Southern Taiwan are located in regions of high drought risk, and the drought risks of plants in Northern and Eastern Taiwan are low, in general.

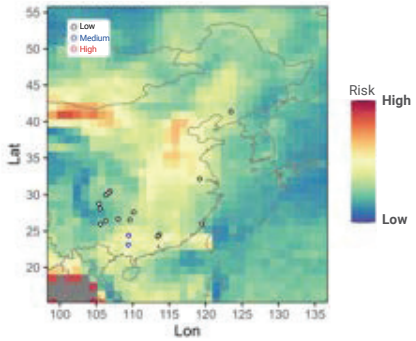
Number of Bases

Table Result of risk analysis of droughts

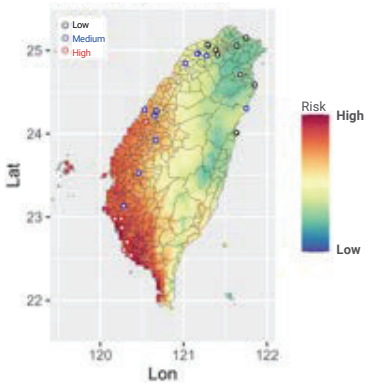
Time (Scenario)	Low Risk	Medium Risk	High Risk
Short-term	45	3	0
Mid-term (SSP1-2.6)	22	16	10
Mid-term (SSP5-8.5)	19	15	14
Long-term (SSP1-2.6)	25	14	9
Long-term (SSP5-8.5)	26	13	9

Image Distribution graph of risk of droughts
(Long-term 8.5 scenario)

— Mainland China



— Taiwan



(3)Heatwave risk - Scenario analysis
Description of risk materiality

Extreme high temperature may not only cause physical discomfort for employees when working on site but also result in the difficulty in product quality control and an increase in operating costs. In the summer of 2022, production and operations in some of the plants in Mainland China were also affected by the electricity limitation policy due to the extremely high temperature. TCC analyzed the severity of heatwaves in each production base with the climate scenario information, based on the standards for heat hazard of Taiwan and Mainland China.

Result of Risk Analysis

The results of the heatwave risk analysis tend to gradually intensify as time passes and scenarios progress. In the short-term, most of TCC' s production bases are located in low-risk regions, and some are located in medium-risk regions. In the mid and long-term, under the 2.6 and 8.5 scenarios, the numbers of bases at medium risk increase, and few bases are at high risk.

As a result of the tropical marine climate, there are few extremely high temperatures in Taiwan; only some bases in Northern and Western Taiwan are at medium risk of heatwaves. High-risk bases in Mainland China are located in areas like Guangxi and Sichuan. Although the high-risk bases are few in the short, mid, and long-term according to the current analysis, it is the long-term trends that extreme heat will occur more frequently in the future. Therefore, TCC will still establish comprehensive adaptations and response measures for heat hazards.

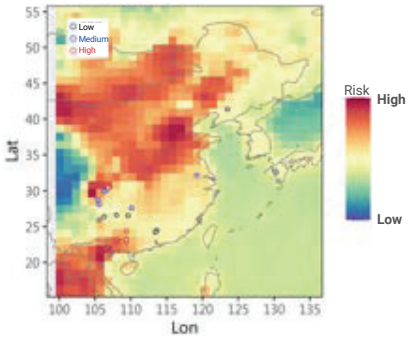
Number of Bases

Table Result of risk analysis of heatwaves

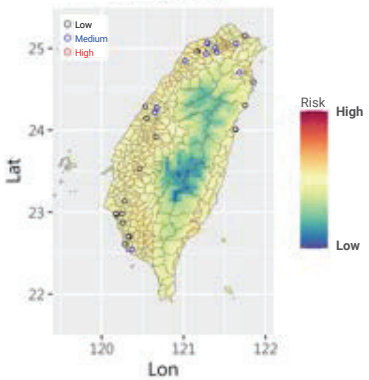
Time (Scenario)	Low Risk	Medium Risk	High Risk
Short-term	37	11	0
Mid-term (SSP1-2.6)	24	21	3
Mid-term (SSP5-8.5)	39	6	3
Long-term (SSP1-2.6)	24	21	3
Long-term (SSP5-8.5)	28	17	3

Image Distribution graph of risk of heatwaves
(Long-term 8.5 scenario)

— Mainland China



— Taiwan



(4)Typhoon risk - Scenario analysis
Description of risk materiality

Typhoon is a major natural disaster in Taiwan and the coastal area of Mainland China. It brings not only heavy rain, which causes floods, but also strong winds, which may lead to damage to plants and equipment, transportation suspension, or closure of offices and classes, resulting in losses due to operation suspension. TCC analyzes the frequency and severity of each production base hit by a typhoon and calculates typhoon risk by using information on typhoon track and intensity.

Result of Risk Analysis

According to the results of the analysis, about half of the bases are located in regions with medium or high risk of typhoon in the short term[Note 1]. Most of the high-risk regions are located in Eastern and Northern Taiwan, and the coastal area of Fujian and Guangdong in Mainland China.
According to the information of climate science reports consolidated by the TCCIP[Note 2], under the extreme scenario, in the middle and at the end of the next century, the number of typhoons influencing Taiwan will reduce by 15% and 55%, and the proportion of intensive typhoons will increase by 100% and 50%, respectively. The frequency of typhoons hitting Taiwan may decrease, while the intensity may increase, on the other hand. TCC still proactively respond and manage the risk of typhoons.

Number of Bases

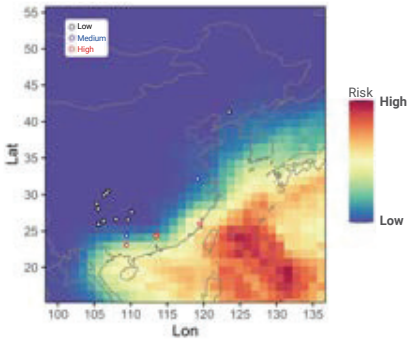
Table Result of risk analysis of typhoons

Time (Scenario)	Low Risk	Medium Risk	High Risk
Short-term	26	12	10

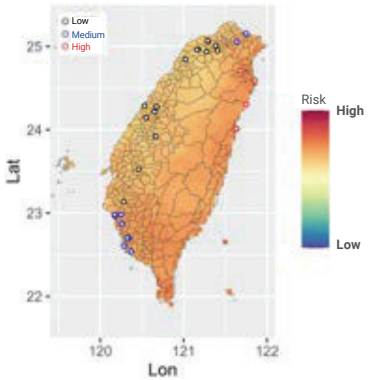
Note 1: There is no future scenario analysis information of typhoons. Therefore, there is only an analysis of risk in the short-term.
Note 2: https://tccip.ncdr.nat.gov.tw/km_abstract_one.aspx?kid=20210810134743

Image Distribution graph of risk of typhoons (Long-term 8.5 scenario)

— Mainland China



— Taiwan



(4.3) Climate Action

Based on six climate actions, i.e., low-carbon circulation, natural disaster adaptation, supply chain mutual benefit, low-carbon products, R&D innovation, and development of new energy business ventures, TCC responds to the climate risks and opportunities (please refer to 4. 2.1 Climate Risk Identification and Assessment of this report for more information) to reduce the potential impact of operations and finance.

4.3.1_Low-carbon circulation

4.3.1.1_Low-carbon circulation actions

1	Increase use of alternative raw materials	Continue to develop alternative raw materials to replace raw materials in the clinker process and clinker substitutes in the cement process, and maximize the external benefits of waste co-processing
2	Increase use of alternative fuel	Continue to expand alternative fuel sources, reduce coal use, and maximize the external benefits of waste co-processing.
3	Apply power generation by waste heat recovery	Improve heat recovery and power generation efficiency.
4	Equipment and process enhancements	Optimize manufacturing processes and energy-conserving equipment, introduce ISO international certification and join the EP100 Energy Productivity organization to continuously improve energy use efficiency.
5	Install renewable energy facilities in the factory	Instead of purchasing green power certificates as a means to reduce carbon emissions, we are developing green energy through a dual-track approach of self-generation and self-development.
6	Carbon-negative technology application	Proactively incorporate the result of research and development into production process to expand the application of carbon-negative technology.

4.3.1.2_Key Performance of Promotion

Proportion of Alternative Raw Materials Used in Taiwan cement plants and in Mainland China Plants were 23% and 25%, respectively.

Assisted the industry in Taiwan in the treatment of nearly 1.101 million metric tons of waste.

In 2022, The cement plants in Taiwan generated 108 million kWh of power from waste heat.

Equivalent to a 22% reduction in purchased electricity.

In 2022, the cement plants in Mainland China generated 811 million kWh of power from waste heat.

Equivalent to a 37% reduction in purchased electricity.

The improvement of energy-conserving measures has reduced 7.78 kWh of purchased electricity in 2022.

Which is equivalent to 3,850 metric tons of CO_2e emissions.

As a member of EP100, TCC set a targeted energy productivity increase of 50% by 2040 compared with the base year of 2016.

The 2022 energy productivity has reached 59.6%, ahead of target.

4.3.1.3_Management capital and investment cost

Unit: NT$ thousand

Project \ Year	2021	2022	2023 (including projected investments)
Alternative raw materials and fuel	2,845,025	1,649,965	4,840,095
Energy conserving and carbon reduction equipment	263,895	191,286	83,553
Equipment and process enhancements	2,362,635	1,338,983	2,636,862
Renewable energy equipment for self-consumption	23,327	546,875	939,105
Total	5,494,882	3,727,109	8,499,615

Note: The amount of investment in negative-carbon technology is described in chapter of R&D Innovation.

TCC assessed the maturity of carbon reduction technology and analyzed the proportion of greenhouse gas emissions in the production process. The carbon reduction strategy for the 2050 Cement and Concrete Industry Roadmap for Carbon Neutral is centered on using alternative raw materials and fuel to effectively reduce the major source of emissions in Scope 1. When the regulations on carbon fees and carbon trading become increasingly stringent in TCC's main markets, i.e., Taiwan, Mainland China, and Europe, it can mitigate the impact on operating costs effectively. Types of alternative raw materials and fuel are diversified, most of which are industrial or domestic waste. Introducing alternative raw materials and materials can not only reduce wastes effectively but also diversify the risk due to price fluctuations of a single raw fuel.

The World Business Council for Sustainable Development (WBCSD) stated that cement co-processing technology is the most scientific, safe and effective way to treat waste, because the cement kiln has the characteristics of three highs: "high temperature, high retention time and high turbulence", which can completely decompose the organic matter in the waste. This technology is safe, economical and can effectively convert waste into energy, which is conducive to sustainable urban development and helps industries deal with waste and urban waste that are difficult to decompose on their own, achieving waste and carbon reduction benefits, just like an "urban purifier." In 2022, TCC assisted the industry in Taiwan in the treatment of nearly 1.101 million metric tons of waste, which is equivalent to 5.3% of total industrial waste in Taiwan. Ratio of alternative raw materials for cement reached 23%, resulting in a total of 135,573 metric tons of CO2e being reduced. Carbon emissions intensity of cement plants has reduced by 5.4% compared with the base year of 2016. The total carbon emission of RMC Plants has reduced by 8.90% compared with the base year of 2020. In the future, TCC will expand the use of biofuel to achieve carbon reduction in its own operations and to contribute to a circular economy by recycling resource.

Profit seeking is not the only objective of TCC. TCC also invested more than NTD 4 billion in constructing the TCC DAKA Renewable Resource Recycling Center (hereinafter referred to as "RRRC"). RRRC is scheduled to begin trial runs in the third quarter of 2023 and to be officially completed in 2024. RRRC will address Hualien City's waste crisis by using high temperature to transform organic waste into flammable gas used in cement kiln. This can prevent methane greenhouse gas emissions from landfill, which is equivalent to an annual reduction of 40,000 metric tons of carbon and can replace part of the fuel. It is estimated to handle at most 200 metric tons of waste daily.

In order to reduce the impact of Ho-Ping Coal-Fired Power Plant on air quality and the greenhouse effect, TCC continues to invest in a series of energy transformation programs in three dimensions, including the improvement of existing equipment, energy conversion, and circular economy, investing in equipment renewal and reconstruction and maintaining financial stability by steady transformation. Please refer to 4.3.6 Development of New Energy Business - Energy Creation for relevant information.

100% of TCC's cement plants are equipped with power generation by waste heat recovery systems to address Scope 2 emissions. However, greenhouse gas emissions from electricity use account for about 4% of the total emissions from the cement production process. Nevertheless, TCC is still actively promoting energy-conserving measures to improve energy efficiency. In 2022, TCC generated 108 million kWh of waste heat in Taiwan, which is equivalent to a 22% reduction in purchased electricity; 811 million kWh was generated from waste heat in Mainland China cement plants, which is equivalent to a 37% reduction in purchased electricity.

As a result of the improvement of energy-conserving measures, including the retirement of lighting equipment in Suao Plant, Hoping Plant, Bade Plant, Guishan Plant, Dadu Plant, Tainan Plant, and the Operation Headquarters, the technological transformation of raw mill's triple flap valve, process equipment retrofitting, and conveying equipment retrofitting, 7.78 million kWh of purchased electricity has been reduced in 2022, which is equivalent to a reduction of 3,850 metric tons of CO2e emissions. All TCC cement plants have obtained ISO 50001 energy management system certifications. RMC plants and the Operation Headquarters are in the certification process and expected to be certified in September 2023. As a member of EP100, TCC set a targeted energy productivity increase of 50% by 2040 compared with the base year of 2016. The 2022 energy productivity has reached 59.6%, ahead of target. In the future, TCC will continue to improve its performance in energy conservation with high standards to create value of low-carbon and energy conservation.

TCC actively takes inventory of places for the establishment of renewable energy equipment within the Group, covering cement plants, mines, RMC plants, and Operation Headquarters. TCC gradually installs solar power generation facilities and energy storage systems, developing green energy by a dual-track approach of self-generation and self-development. In 2022, the renewable energy generation for self-consumption reached 307,683 kWh. In the aspect of transportation, as of the first half of 2023, TCC has replaced 363 concrete mixer trucks (including leased trucks) to meet the emission standards of the Phase V environmental protection regulations, which accounts for 76% of all concrete mixer trucks. In addition, TCC also plans to procure electric vehicles for company use. All cars are replaced with electric vehicles in the Operation Headquarters and the Low-carbon R&D Center; other plants and affiliates are replaced successively to speed up the transformation for low-carbon transportation.

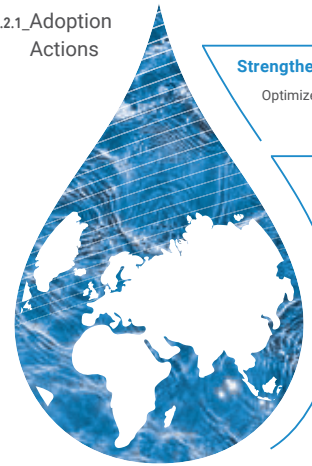
4.3.1.4_Establishing an Internal Carbon Pricing Mechanism and Introducing AI to Accelerate Carbon Reduction and Transformation

To strengthen the promotion and management of each plant' s carbon reduction targets, based on the research by the London School of Economics and Political Science, commissioned by the EPA Taiwan in 2020, TCC set an internal carbon price (ICP) per metric ton at NT$300 as a reference for capital investment, operational transformation actions, and major decision-making. Taking the investment planning of equipment for adding fly ash to cement mill in Hoping Cement Plant as an example, its benefit on carbon reduction will reach NTD 9 million per year based on the internal carbon pricing. In addition, TCC implemented an internal carbon trading platform for the Group's cement plants on a pilot basis from July 2022 onwards, with reference to the Guangdong Carbon Emissions Trading Scheme and the EU Emissions Trading System (ETS). By means of the Group's carbon emission control measures, the Group HQ issues annual carbon emission credits to each cement plant based on the quarterly bonus assessment target of each plant and imports them into the internal carbon trading information platform. This provides short-term reference to the daily carbon trading price in Guangdong Province, while in the long run provides internal carbon price reference for pricing offers and matching trading, as well as contract performance at the end of the year. Group HQ will regularly review the transaction price, volume and remaining quota to optimize the operation of the relevant mechanisms. Through the internal carbon pricing and carbon trading management mechanism, the Group motivates each plant to achieve carbon reduction targets and promote the Group's sound carbon management.

Every year, through the AI carbon reduction management platform, TCC uses the production data from the plants to make an automated calculation of carbon emissions generated from raw materials and energy used, and analyzes the emission hot spots to provide suggestions for carbon reduction. The platform can further manage the connection between the carbon reduction KPI of each plant and its remuneration, influencing the bonus of senior managers and staff. In the future, it will expand gradually to connect with the core business and manage the Group's overall greenhouse gas emissions.

4.3.2_Natural Disaster Adaptation

4.3.2.1_Adoption Actions



Strengthen Water Resource Management 1

Optimize process water conservation, recycle, and reuse water resources.

Enhance the Climate Resilience of Plants 2

Grasp real-time information on climate change and optimize preventive measures and emergency response mechanisms. As for the impact on transportation and operations that might be brought by climate change, TCC establishes disaster adaptation facilities to mitigate the risk of operation suspension.

Water Footprint Labels 3

Through the water footprint certification, TCC discloses the amount of water used in its plants, demonstrating the performance of water conservation in its plants.

4.3.2.2_Key Performance of Promotion

Water usage intensity of cement plants in Taiwan and Mainland China was 293 liters and 308 liters per metric ton of cementitious materials, respectively.

ISO 14046 water footprint and ISO 46001 water resources efficiency management system certification were introduced to 100% of TCC's cement plants in Taiwan.

16,000 metric tons of water was conserved cumulatively in 2021 after the completion of a new shaft water reclamation system at the Hoping Mine.

240,000 metric tons of water was conserved in 2021 after the completion of pipe renovation and a discharge water reclamation project at the Suao Plant.

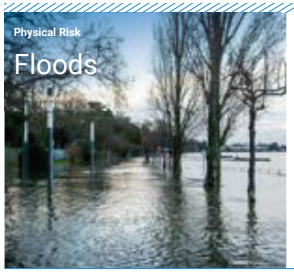
4.3.2.3_Management capital and investment cost

Unit: NT$ thousand

Project \ Year	2021	2022	2023 (including projected investments)
Water recycling-related facilities	244,728	45,539	76,521
Climate resilience enhancing facilities	16,723	47,744	4,727
Typhoon additional insured	18,186	19,092	25,763
Water footprint and water resources efficiency management certification	1,634	3,006	1,650
Total	281,271	115,381	108,661

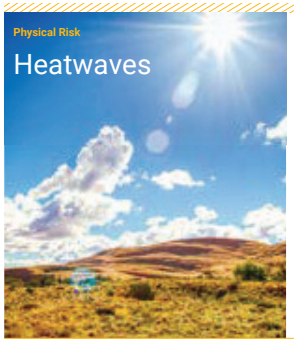
Global extreme climate events are becoming more frequent, and the impact intensity and occurrence frequency increase day after day. TCC has many production bases. Plants that might be affected by typhoons are all insured against natural disasters in response to potential losses. Although there have been few typhoons affecting Taiwan since 2020, the annual premium of insurance against natural disasters has been increasing, which indicates that the plant's ability to cope with climate disasters is more and more important for the risk management of financial institutes. As for climate disasters, all TCC's RMC plants have established regulations for emergency response. Cement plants have even further established response plan for typhoons and floods in full response to possible future disasters.

Extreme weather events are growing infrequency around the world and resulting in increased impact. TCC operates many production sites and relies on a strong upstream and downstream supply chain for the transportation of raw materials and products, as well as the deployment of a multinational supply chain. Therefore, the Company needs to implement adaptation actions to strengthen its operational resilience and its ability to respond to climate disasters. TCC monitors changes in water resources at each production site through government websites to strengthen its ability to prevent and respond to floods and droughts, and includes an optimal inventory and transportation flexibility adjustment mechanisms. TCC also reviews the extreme climate risks and take resilient measures to improve them through the most severe SSP8.5 scenario in the Sixth Assessment Report 3 published by the Intergovernmental Panel on Climate Change (IPCC). This time, TCC incorporated floods, droughts, heatwaves, and typhoons into risk scenario simulations, the results of which are described in chapter 4.3.2 Each plant's measures against the physical risks are as follows:



Description of Risk	Responding Measure
Damaged equipment	▪ Insure the high-risk and important equipment. ▪ Make inventory before the flood season to ensure the safety stock of raw materials and products. ▪ Actively strengthen the flood control facilities of the plants.

Description of Risk	Responding Measure
Shortage of water for production	▪ Continuously reduce the water usage intensity for cement production. ▪ Establish water storage facilities in medium and high-risk plants. ▪ Introduce ISO 14046 water footprint and ISO 46001 water resources efficiency management system certification. ▪ Rainwater and process water recycling and purification facilities have been established at 24 RMC plants. ▪ Establish a water footprint management platform to timely monitor the water usage of each plant.
Suspension of river transportation	▪ Guigang Plant is planning to transport raw materials by rail. ▪ Enhance transportation capacity with the canal infrastructure of the local government in Mainland China. ▪ Proactively schedule the production of each plant to avoid the transportation of material or products being obstructed.



Description of Risk	Responding Measure
Overheated hydration of RMC	▪ Using the cooling facilities produce icy water to cool off RMC in the plant to maintain the yield rate.
Blackout due to grid overload	▪ Keep in close contact with Power Corporation to ensure that important facilities can be shut down before the electricity suspension and resume production timely when the electricity is restored.
Employee safety	▪ Implement policies related to ISO 14001, ISO 45001 environmental and occupational health and safety. ▪ Avoid outdoor work during high-temperature period, or suspend work if the when the high-temperature threshold is reached. ▪ Provide employees with high-temperature allowance and cooling accessories in summer.

Description of Risk	Responding Measure
Damaged equipment	▪ Purchase insurance products to reduce disaster damages. ▪ Establish instructions for emergency responses to typhoons that are applicable to all plants, follow the strengthening and responding measures of the SOP before and during a typhoon, and report to the headquarters regularly. ▪ Set up a typhoon response team for each base to conduct typhoon preparation measures before the typhoon warning is announced. Examine and maintain the equipment, buildings, doors, windows, and slopes. Prepare flood control measures and substitute water and power supply equipment. Follow the office closure announcement by local governments, and continue to pay attention to the latest status of the typhoon.

4.3.3_Supply Chain Mutual Benefit

4.3.3.1_Supply Chain Carbon Reduction Action

Strengthen suppliers' carbon management

Require suppliers to collect data of carbon emissions and recognize excellent supplier partners, while requiring them to implement carbon reduction measures in the future.

Electrification of public transport and concrete mixer vehicles

TCC has set EV100 as the target direction and installed electric vehicle charging piles at major operating bases to replace traditional gas-powered company vehicles, and continues to evaluate the feasibility of introducing electric concrete mixers.

Establishment of logistic fleet of electronic vehicles

Electrification of large transportation vehicles to reduce carbon emissions from transportation and create credits for carbon reduction in the transportation sector.

Alternative Maritime Power and eco-friendly fleet of vessels

Use Alternative Maritime Power during vessel operation at ports to reduce the use of onboard generated power, and procure highly effective eco-friendly vessels to improve fuel oil consumption efficiency.

4.3.3.2_Key Performance of Promotion

The carbon data collection from 64.6% of the critical tier-1 suppliers in Taiwan has been completed. Conduct annual fieldwork to improve the suppliers' ability to collect carbon emissions data and reduce carbon.

After the Alternative Maritime Power system was installed in the existing cement carriers, fuel oil usage during loading and unloading can be reduced. As the Alternative Maritime Power facilities improve gradually, carbon emissions will be reduced by more than 2% compared to that before the improvement.

As of the first half of 2023, TCC has replaced 363 concrete mixer trucks (including leased trucks) to meet the emission standards of the Phase V environmental protection regulations, which account for 76% of all concrete mixer trucks. A total of 81 concrete mixer trucks that meet the Phase VI environmental protection regulations have been leased.

Taiwan Transport & Storage Corp., TCC's subsidiary, procured two electronic trucks, making it the first company in Asia-Pacific region to introduce Europe's most advanced electric trucks.

After a once-in-2.5-year docking overhaul, cement carrier fuel consumption decreased by about 3%.

4.3.3.3_Management capital and investment cost

Unit: NT$ thousand

Proect \ Year	2021	2022	2023 (including projected investments)
Procurement of new eco-friendly bulk carriers (Note1)	466,732	1,723,390	-
Procurement of new eco-friendly cement vessels (Note2)	-	290,292	-
Docking overhaul of cement carriers	-	40,369	26,098
Transformation of existing cement carriers (Installation of Alternative Maritime Power system)	30,602	24,435	10,547
Construction of Alternative Maritime Power systems	14,549	20,154	6,916
Electrification of large transportation vehicles	-	17,400	17,400
Carbon data collection and fieldwork by third-party consultants	300	700	700
Total	512,183	2,116,740	61,661

Note1: The project of procurement of new eco-friendly bulk carriers ended in 2022. No new project in 2023.
Note2: The rest payments of new eco-friendly bulk carriers plans finish in 2024 and 2025. No payment in 2023 based on the payment schedule.

In order to expand the influence of the green supply chain, TCC incorporates the concept of the product lifecycle and, with reference to the Greenhouse Gas Management Document4 released by SBT in 2018, plans the short-term emissions inventory data collection, together with mid- and long-term reduction, as well as ongoing information disclosures and supply chain communication to reduce carbon emissions. TCC has been requesting suppliers to collect carbon emissions data since 2021, annually distributing carbon questionnaires to suppliers for a survey. Consultants will conduct a review and calculation after the data collection and carry out fieldwork on 10 suppliers every year to complete the mentoring of the overall supply chain. The carbon data collection from 64.6% of the critical tier-1 suppliers in Taiwan has been completed in 2022. Annual fieldwork will be conducted to improve the suppliers' ability to collect carbon emissions data and reduce carbon. The data coverage rate is expected to reach 90% of the critical tier-1 suppliers in Taiwan by 2030, providing a thorough understanding of the status of suppliers' carbon emissions. Subsequently, TCC is planning to request suppliers to implement carbon reduction in the future. If the supplier does not conform to the requirement and still has no improvement after the assistance and mentoring, TCC will terminate the cooperation with the supplier. A total of 331 suppliers participated in the 2022 Supplier Conference, which not only announced the target policy of requiring first-tier key suppliers to collect data of carbon emissions, third-party consultants were invited to provide education and training on carbon management and supplier practices related to carbon inventories. The company also recognized five suppliers for their excellent sustainability performance. The chairman of the Group personally expressed to suppliers the expectation of jointly implementing a green supply chain, which is also the standard of TCC's future green procurement, and invited the supply chain partners to join hands and reduce carbon emissions.

The transportation of TCC's upstream and downstream supply chain mainly relies on shipping and truck transportation. In the aspect of transportation, as of the first half of 2023, TCC has replaced 363 concrete mixer trucks (including leased trucks) to meet the emission standards of the Phase V environmental protection regulations, which accounts for 76% of all concrete mixer trucks. TCC is planning to increase the eco-friendly concrete mixer vehicles in the future and continue the feasibility assessment of introducing electronic concrete mixer vehicles based on the development of the market and techniques. TCC's subsidiaries, Ta-Ho Maritime Corporation and Taiwan Transport & Storage Corp., use self-owned carriers to carry out logistics and transportation. In order to develop the green logistics services, Ta-Ho Maritime Corporation improves oil efficiency and transportation capacity through vessels replacements and the Alternative Maritime Power system transformation of the existing vessels. Currently, it has procured 2 eco-friendly cement carriers. After a once-in-2.5-year docking overhaul in 2022, cement carrier fuel consumption decreased by about 3%. Ta-Ho also works with a renowned Japanese shipbuilder to design the third generation high-efficiency carriers which will start operation in the first quarter of 2025. Carbon emissions are expected to be reduced by 24.2%.

Since 2020, TCC has required all carrier vessels to switch to low-sulfur fuel oil, which is better than the emission standard regulated by the International Maritime Organization (IMO). Furthermore, the ports of Taichung, Kaohsiung and Hoping have been gradually equipped with an Alternative Maritime Power system. After the Alternative Maritime Power system was installed in the existing cement carriers, fuel oil usage during loading and unloading can be reduced. As the Alternative Maritime Power facilities improve gradually, carbon emissions will be reduced by more than 2% compared to that before the improvement.

In addition, the Group's subsidiary, Taiwan Transport & Storage Corp., purchased two new electric trucks in 2022, making it the first company in the Asia-Pacific region to introduce Europe's most advanced electric trucks. TCC plans to purchase at least three more electric trucks in 2023, gradually establishing carbon reduction credits for a fleet of electric trucks for the clients' deduction. It plans to introduce electric tractor heads in the future to provide more choices for low-carbon transportation.

4.3.4_Low Carbon Products

4.3.4.1_Low-carbon products and services action

Obtain recognition for low environmental impact products

Continuously promote cement products to obtain gold environmental labels.

Obtain recognition for low-carbon cement products and low environmental impact products

Taiwan Plants continuously promote cement products to obtain gold environmental labels. Mainland China Plants obtained local recognition for low-carbon cement products.

Promote carbon footprint system for cement and concrete

Continuously expand the number of products with carbon footprint certification and pursue carbon reduction label certifications, which is to be reviewed and implemented every two years.

Commitment to Carbon Neutral Concrete

Implement the 2050 Cement and Concrete Industry Roadmap for Carbon Neutral.

4.3.4.2_Key performance

Portland Type I Cement is the only cement product that obtained the Environmental Protection Administration (EPA) "Product Carbon Footprint Reduction Label" in the cement industry of Taiwan.

PII, PO, and PC Cement that are produced by Mainland China Plants obtained low-carbon labels, accounting for 79% of the total shipments.

All RMC plants in Taiwan have obtained carbon labels from the Environmental Protection Agency for their concrete intensity specifications of 280kgf/cm², 350kgf/cm², and 420kgf/cm².

4.3.4.3_Management capital and investment cost

Unit: NT$ thousand

Project \ Year	2021	2022	2023 (including projected investments)
Consultancy and verification of the carbon footprint of Portland Cement Type I (bulk)	-	1,007	265
BS 8001 Circular Economy Renewal Certification Checking Operation	-	150	-
RMC ISO 14064 & ISO 14067 project consulting and certification	-	7,384	1,737
Maintenance of Carbon Reduction Label of Taiwan Cement Plants	780	-	1,575
Maintenance of Carbon Label of Taiwan RMC Plants	-	1,620	3,640
Application of Carbon Reduction Label of Taiwan RMC Plants	-	-	3,270
Low-Carbon Cement Label certification of Mainland China Plants	1,540	869	1,605
Total	2,320	11,030	12,092

TCC is committed to developing environmentally friendly products. In addition to setting up a low-carbon building material R&D center to develop new types of concrete that can replace limestone as the main ingredient, and explores the legal issues of low-carbon emissions concrete at GCCA expert meetings. All of TCC's Portland I, II, IV, and I (low alkali) cements manufactured in Taiwan have already obtained the environmental labels. Since 2019, TCC has commenced product carbon footprint initiatives. In 2020, TCC took the initiative to apply to the Environmental Protection Administration (EPA) for the establishment of Product Category Rules (PCR), and obtained the first EPA "Product Carbon Footprint Label" in the cement industry with the highest market share and the gold-level environmental label certification for Portland Type I Cement. In 2021, it was verified that the carbon footprint reduction of the Suao Plant and the Hoping Plant was 11% and 5.5% respectively, both meeting the 3% standard set by the Environmental Protection Administration (EPA). TCC was subsequently awarded the first EPA "Product Carbon Footprint Reduction Label" in Taiwan's cement industry. In the future, TCC will gradually expand the carbon label and the carbon reduction label to Portland Type II, III, IV, and V Cement. PII, PO, and PC Cement, which are produced by Mainland China Plants, have obtained the low-carbon labels and can be supplied according to customers' demand. The shipment of cement with low-carbon label accounted for 79% of the total shipments in 2022, seizing opportunities in low-carbon cement market.

All RMC Plants in Taiwan have obtained carbon footprint labels from the Environmental Protection Agency for their concrete intensity specifications of 280kgf/cm2, 350kgf/cm2, and 420kgf/cm2 at the end of 2022. TCC will further obtain carbon labels 5 according to the carbon reduction performance in the future. Also, TCC will gradually expand ISO 14067 carbon footprint certification of concrete products. TCC helps customers to create a comfortable building environment while providing low-carbon emissions products to reduce the impact on the environment, and encourages concrete customers to apply for green building certification to expand sustainable construction and sustainable urban infrastructure, and to gradually fulfill the commitment to concrete carbon neutrality.

EPA Carbon Label Certification

- Portland Cement Type I
- Portland Cement Type II to V (planned to be obtained)
- Three concrete specifications of Taiwan RMC Plants
- 280 kgf/cm2 （4,000 psi）
- 350 kgf/cm2 （5,000 psi）
- 420 kgf/cm2 （6,000 psi）

EPA Carbon Reduction Label Certification

- Portland Cement Type I
- Three concrete specifications of Taiwan RMC Plants (planned to be obtained)
- 210 kgf/cm2 （3,000 psi）

ISO 14067 Carbon Footprint Certification

- Full lineup of concrete products between 1,000 - 10,000 psi

Establishing the Standard for the Cement Industry in Taiwan

The 1st Carbon Footprint Label & Carbon Reduction Label

Carbon footprint is defined as the greenhouse gases of an activity or product directly and indirectly generated from its while life cycle, including raw material procurement, manufacturing, distribution and sales, use, and disposal or recycling in the end. To effectively capture the GHG emissions from its products, TCC launched the product carbon footprint Label from EPA Taiwan. In 2021, the carbon footprint of bagged cement by the Suao and Hoping Plant was verified as reduction of 11% and the carbon footprint from the Hoping Plant by 5.5% respectively, both way above the 3% reduction standard for the Carbon Reduction Label issued by the EPA Taiwan. TCC thus became the first cement company with products labeled with the "green footprint" in Taiwan.

4.3.5_R&D Innovation

4.3.5.1_R&D actions

Development of UHPC green building materials

Develop cement building materials with high intensity to extend lifecycle and reduce carbon emissions.

Oxygen-enriched and pure oxygen carbon capture techniques

Continue to break through the threshold of carbon capture technology and develop negative carbon techniques.

Application of AI smart kiln optimization

Establish a smart model for consumption reduction, analyzing and forecasting the optimized operation with sensors in the workplace.

3D printing cementitious materials

Develop building materials that can be printed on a larger scale and have commercialization potential.

High efficiency combustion with alternative fuel

As part of the industrial low-carbon transformation promotion program, alternative fuel is introduced to Suao Plant to improve combustion efficiency.

4.3.5.2_Key Performance of Promotion

TCC is planning the construction of an oxygen-enriched (liquid oxygen) combustion system at the Suao Plant, which is estimated to save 8,967 tons of coal per year upon completion, equivalent to a reduction of 26,870 tCO_2e.

The 3m*3m large printing test for 3D printing cementitious materials has been completed.

The Suao Plant is also planning a high efficiency combustion program with alternative fuel to further reduce greenhouse gas emissions by substituting coals with biofuel.

The walls and curtain walls of the DAKA Renewable Resource Recycling Center (RRRC) are made of UHPC materials, whose characteristics of high intensity that enables them to replace rebars and longer product lifecycles reduce product carbon footprint by more than 60%.

4.3.5.3_Management Capital and Investment Cost

Unit: NT$ thousand

Project \ Year	2021	2022	2023 (including projected investments)
Ultra-High Performance Concrete (UHPC)[Note1]	4,658	304,614	22,950
Low-Carbon 3D Printing Materials Research and Development Project	-	2,006	
ITRI - Calcium Loop Carbon Capture Techniques (including industrialization cooperative research)	11,239		The research project has been completed and closed.
Development of Efficient Biological Carbon Sequestration and Utilization Techniques	2,250		
ITRI - Indirect Carbonation Techniques for Basic Oxygen Furnace Slag (BOFS)	-	400	The research project has been completed and closed.
High efficiency combustion with alternative fuel project	-	-	50,000
Oxygen-enriched and pure oxygen carbon capture techniques	-	-	13,171
Total	18,147	307,020	86,121

Note1 :The capital and investment cost are mainly in 2022, cause the estimated investment significant decline in 2023.

In order to enhance the efficiency of alternative fuel use, TCC is planning add an oxygen-enriched (liquid oxygen) combustion system at the Hoping Plant, which is estimated to save 8,967 tons of coal per year upon completion, equivalent to a reduction of 26,870 tCO2e. The Suao Plant is also planning a high efficiency combustion program with alternative fuel to further reduce greenhouse gas emissions by substituting coals with biofuel.

With the increasing demand for resilience in the built environment, TCC has combined its unique techniques, determination in low-carbon development, leadership position in innovation, and commitment to the mutual benefit of the earth to invest in a full range of low-carbon techniques and product development. Low-carbon emissions development is identified as the core objective from production process carbon reduction, recycling to product life cycle.

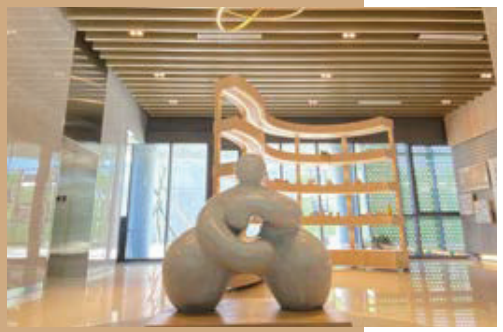
Since 2011, TCC has been actively investing in the research and development of carbon capture technology, having partnered with ITRI to develop the 1st generation of 1.9MWt and new generation of 500KWt pilot plant CO_2 carbon capture system over the years. It will be first applied to the oxy-calcination scale-up process planning (designed to capture 100,000 tCO_2 per year) at the #1K production line of the Hoping Plant, thus accelerating the progress of commercial operations. This technology was awarded the R&D 100 Award for Industry Innovation by The Oscars of Invention - The Chicago Tribune. Based on the carbon capture techniques in the past, TCC is planning to apply oxygen-enriched and oxy-fuel combustion techniques to the carbon capture and recycling system. It will enhance fuel combustion efficiency and store concentrated CO_2 at the same time, making it the latest carbon capture technique.

Ultra-High Performance Concrete (UHPC) has explosion-proof properties that can be utilized to make energy storage cabinets. Additionally, the walls and curtain walls of the DAKA Renewable Resource Recycling Center (RRRC) are made of this material. UHPC has high intensity characteristics that enable it to replace rebars and provide longer product lifecycles, reducing weight when used as a PC plate building material and decreasing the product's carbon footprint by more than 60%. There is potential for its application to general construction and demand for special functions. UHPC does not need rebars and features fast prototyping, making it an excellent base for 3D printing materials. Among the many large-scale 3D printing materials, UHPC is cost-effective, strong, colorful and suitable for large-scale printing, with commercial potential for supporting the development of low-carbon architecture techniques. Through innovative research and development, TCC is committed to exploring low-carbon solutions for the cement industry, and harnessing carbon reduction technologies and green building materials development that are superior to those of the industry, so as to serve as a benchmark for the manufacturing industry to achieve net-zero transformation.

Ultra-High Performance Concrete (UHPC)

Whole New Applications of Low-Carbon Building Materials

Ultra-High Performance Concrete (UHPC) is the most innovative cementitious engineering material developed over the past 30 years. It was formulated by TCC's Low-Carbon R&D Center. Compared with conventional concrete, UHPC has ultra-high performance in mechanical properties, high mechanical compressive strength, and outstanding durability, marking a significant engineering advancement. Buildings made of traditional concrete offer a life span of 50 to 70 years, yet UHPC buildings can last for 100 to 120 years, reducing building reconstruction and the resulting waste, which puts carbon reduction into practice. TCC plans to complete the UHPC mass production plant in 2023 and take advantage of the material' s fireproof and explosion-proof properties to develop patented energy storage cabinets, with mass production commencing in 2023.



| UHPC太極無盡藏

4.3.6_Development of New Energy Business

4,3,6.1_Five Energy activities

1 Energy Creation

Development of Diversified Renewable Energy

Develop diversified sources of green energy, and continue to develop new renewable energy plants.

2 Energy Storage

Investment in Smart Energy Storage Business

Enhance energy storage technology and applications, and strengthen electric power auxiliary service capabilities.

3 Energy Transmission

Development of High-Power Cells

Integrate the advantages of energy creation and storage, and upgrade battery R&D and the electric transportation market.

4 Energy Supply

Low-Carbon Lifestyle with Energy Storage Integrated Charging Products

Develop the low-carbon energy storage integrated charging station to improve the efficiency of power system.

5 Energy Solution

Supporting Enterprise to Obtain Green Energy

Establish one-station energy management services, providing priority access to renewable energy for small and medium-sized enterprises.

4.3.6.2_Key Performance of Promotion

The targeted renewable energy installed capacity is 198 MW by the end of 2024 (including Taiwan and Mainland China).

The power generated from renewable energy sources was 212 million kWh (from 2020 to 2022), equivalent to a reduction of more than 106 thousand tCO_2e.

The cumulative installed capacity of energy storage is 796.5 MWh as of the end of 2023 (including Taiwan and Mainland China).

1,311 charging stations were established as of the end of 2022 (Global).

4.3.6.3_Management Capital and Investment Cost

Unit: NT$ ten thousand

Project \ Year	2021	2022	Including projected investments 2023	---------- projected investments ---------- 2024	2025
Solar power project sites	195,429	40,362	18,204	37,890	13,455
Fishery and electricity symbiosis project sites	1,205,494	738,454	1,988,589	2,863,797	357,975
Wind farms	50,357	82,691	246,493	1,184,407	-
Geothermal energy development	300	6,504	381,572	147,921	63,395
Ocean energy development	5,225	18,443	33,811	1,623,431	1,000,000
Energy storage	116,569	2,658,684	9,031,314	-	-
Green buildings	1,289,007	5,441,368	3,006,000	59,000	-
Super Battery machine and equipment	105,870	5,574,632	4,477,000	1,448,000	1,050,000
Charging stations (Taiwan)	-	72,157	12,000	-	-
Feasibility research on small hydropower	-	1,417	3,306	-	-
Total	2,968,251	14,634,712	19,198,289	7,364,446	2,484,825

Renewable energy plays an indispensable role in the global trends of net-zero transformation. The application of new energy is the theme for TCC's industrial development in the future. TCC is moving toward the target of becoming an all-round energy group, covering the development of renewable energy with smart energy storage system, high-power cells, charging services that connect to the generation of electric transportation, and green energy trading in recent years. TCC looks forward to providing all-round energy solutions to assist enterprises with energy transformation.

4.3.6.4_Energy Creation - Development of Diversified Renewable Energy

TCC is devoted to the development and investment in renewable energy, expanding with approaches of self-consumption and self-development. Following the government's pace for energy transformation, TCC is also proactively conducting the development of solar power, wind power, geothermal and ocean thermal energy conversion. TCC promotes the establishment of solar and wind power plants in Changhua, Yunlin, Chiayi, Tainan, Pingtung city, etc., among which the first fishery and electricity symbiosis is one of the main development projects, combining fishery and solar power equipment and making the most efficient use of land resources. On the other hand, TCC explores the possibility of diversified renewable energy. TCC has been working with CPC Corporation for the drilling of wells for the Vakangan Geothermal project in Taitung since 2022. In 2023, TCC worked with ITRI on capacity testing and geothermal turbine planning. They will establish a 1 MW geo thermal power plant in a 3-hectare area. The geothermal power plant construction is expected to be completed in the fourth quarter of 2024, promoting local potential for green energy.

4.3.6.4.1_TCC Hoping Power Plant Energy Transformation Plan

TCC Hoping Power Plant is undergoing energy transformation. In addition to the solar power for self-consumption on the roofs of the buildings at the plant site, there are bio alternative fuel, small hydropower, and ocean thermal energy conversion systems for renewable energy as well.

1 Bioenergy

The pre-planning assessment was completed in 2022, including a survey on the biomass sources, means of access, transportation, and storage, the selection of gasification system, economic benefit analysis, and an analysis of pertaining laws and regulations. In 2023, TCC will continue further feasibility assessment and research for biofuel, looking forward to replacing and reducing coal usage.

2 Small hydropower project

TCC plans to set up small hydropower units at the existing warm water discharge canals of Ho-Ping Power Plant, generating power from potential energy provided by cofferdams. The hydraulic model tests and hydraulic analyses for the small hydropower installation at the discharge canals on the south and north side were completed in December 2022. In 2023, the feasibility research and analysis report of small hydropower will be obtained, and its results will serve as a reference for the subsequent planning.

3 Ocean thermal energy conversion system

In order to speed up the development of renewable energy and the potential of the rich energy resources in the eastern ocean, TCC will promote the world's first MW-level ocean thermal energy conversion system in Hualien County. This system will generate energy from the temperature differences between the warm waste water from Ho-Ping Power Plant and the cold deep ocean waters. The preliminary feasibility assessment, including the deployment of underwater pipelines, water wells, generators, and the economic return rate on investment, for the ocean thermal energy conversion system was completed in October, 2022. In 2023, in response to the ocean thermal energy conversion system construction, TCC will commence procedures for environmental impact assessment. It is expected to become the base load green energy for Taiwan upon its completion and operation.

4.3.6.4.2_Renewable Energy Capacity

Scope covers Taiwan and China

Unit kW

Item		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total (As of 2024)
		Operational				Under Construction / Under Development						
Self-developed and self-used	Solar	43	-	106	363	3,233	24,567	183	684	207	-	28,495
	Wind Power	-	-	-	-	-	-	11	-	-	-	11
Bulk tariff Note 1	Solar	1,999	10,078	2,102	-	43,433	24,472	55,850	10.000	-	-	137,934
	Geo-thermal Energy	-	-	-	-	-	-	1,000	-	-	-	1,000
	Wind Power	-	7,200	14,400	-	-	-	9,000	-	6,000	1,500	30,600
	Ocean Energy	-	-	-	-	-	-	-	-	-	2,000	-
Total installed capacity		2,042	17,278	16,608	363	46,666	49,039	66,044	10,684	6,207	17,000	198,040

Note 1: Bulk tariff includes Corporate renewable power purchase agreements (CPPA).
Note 2: The estimated installed capacity information after 2023 of this table is presented by the latest information that we have before the issuance of this report. The actual status is subject to the rolling adjustments based on the progress of each project site.

- **Renewable energy installed capacity Estimated by end of 2024**
  >190 MW
- **Self-generation and self-used capacity By the end of 2024**
  28,506 kW
- **Renewable energy generation in the past three years (from 2020 to 2022)**
  >212 million kWh Reduction of over 106,000 tCO_2
- **Renewable energy generation Estimated accumulation by end of 2024**
  >659 million kWh Reduction of over 330,000 tCO_2

4.3.6.5_Energy Storage - Investment in Smart Energy Storage Business

Using renewable energy has become a common approach for carbon reduction adopted by companies. Since the intermittency of renewable energy makes energy storage technology wait for a breakthrough, a comprehensive energy storage system will become the key to stable energy supply. In 2021, TCC acquired Engie EPS, an European energy storage company, and renamed it NHOA, whose project sites cover Europe, America, Oceania, and Africa. With the latest technologies and the techniques communication of NHOA, to expand its energy storage business, TCC entered the global market of energy storage and charging station and became the fourth largest energy storage company in the world. Its business scope ranges from energy storage systems, microgrids, to electronic vehicle charging stations.TCC has developed diversified energy storage applications. For example, in 2021, TCC launched the first 5 MW large scale AFC (Automated Frequency Control) smart energy storage system in Changhua Coastal area. The revenue from sales of energy for 2022 is nearly NTD 29 million. It has also helped Taipower improve power supply stability. During the blackout incidents in 2021 and 2022, energy storage sent out electricity to support Taipower and stabilized the frequency of the regional grids. Furthermore, the 10 MW E-dReg smart energy storage system installed in the Hoping Plant passed Taipower's performance test and joined the energy trading platform in March 2023. There are also other large-scale project sites under construction, such as energy storage systems like the 35 MW E-dReg of Suao Plant, the 100 MW E-dReg of TCC LIEN-HSIN Green Energy Corporation LTD. in Hoping, the 50 MW E-dReg of Hualien Plant, all of which have passed the grid connection review of Taipower. All will be completed successively in 2023.

4.3.6.5.1_Cumulative Energy Storage Capacity

Scope covers Taiwan and China

Unit MWh

2021	2022	2023
Operational	Under construction (including operational)	
5.1	8.7	796.5

In response to the trends of the low-carbon transportation vehicle, it is expected that the laws and regulations of the government will focus on the parking spaces dedicated to the electric vehicle and the installation of charging facilities and further regulate specific areas. As the demand for charging increases, the installation of energy storage equipment will become more important. Please refer to chapter 4.3.5 R&D Innovation for more information on the application of UHPC. TCC launched Ultra-High Performance Concrete (UHPC) energy storage cabinets in July 2022, making it the world's first energy storage facility that focuses on both environmental protection and fire and explosion resistance. It reduces carbon emissions by 50% compared to a common metal energy storage cabinet. We are looking to optimize it by offering different sizes to enhance the flexibility in the deployment of energy storage and its application fields, providing customers with energy storage solutions that are more low-carbon, safer, and more reliable. Additionally, TCC also continues to develop the application of UHPC on low-carbon sustainable building materials. Since UHPC has the plasticity of concrete materials, it can extend the lifecycle of the building material and reduce carbon by at least 60% compared to traditional concrete.

4.3.6.5.2_UHPC Energy Storage Cabinet World's First Low-Carbon Fire-Proof Energy Storage Cabinet

TCC is devoted to R&D innovation of new techniques and low-carbon products. Its UHPC energy storage cabinet obtained the innovation patent for "portable cabinet and energy storage equipment" in 2022. Compared to the standard metal cabinet, it can reduce carbon by 50% while having the same volume capacity and offering other advantages:
In general, the metal energy storage cabinet must be placed outdoors and keep at a distance from the building, as mandated by the applicable Fire Services Act, which restricts its placement inside buildings. Harnessing the properties of UHPC, the UHPC energy storage cabinet of TCC passed the certification of CNS 12514-1/-8 and comes with three-staged fire-extinguishing devices. It is certified for fire safety and can serve as indoor energy storage system, functioning as an emergency power supply for business offices or apartments. This technology reduces the reliance on generators, leading to improved carbon reduction. As a result, it has high potential in the market.

Fire Resistance & Flame Retardancy	Impermeability & Weather Resistance	High Compressive Strength
It has passed the 2-hour fire-resistance certification of CNS12514-1/-8 and the flame retardancy test.	It can bear 2 metric tons per square meter of water pressure and prevent disasters completely.	Compressive strength of over 17,000 psi.

The First UHPC Energy Storage Cabinet Application Case

In July 2022, TCC launched the world's first UHPC energy storage cabinet that is safe and low-carbon at 7-11 Yawan Branch. Using the high-performance battery cells of E-One Moli under the TCC Group, TCC created Taiwan's first DC-DC charging station at a convenience store. The new energy model established at 7-11 Yawan Branch will first use solar power and a small energy storage system. When there is a blackout, the microgrid will automatically switch from the grid connection mode to using solar power and energy storage batteries to provide a power supply under emergencies.

UHPC儲能櫃

4.3.6.6_Energy Transmission - Development of High-Power Cells

能元與國際航空公司
共同開發電動垂直起降飛行器

In order to achieve the goals of net-zero emissions through low-carbon transportation, many countries establish policies regarding electric vehicles, which accelerates the development of electric vehicles, and pay attention to the advancements of battery techniques. E-One Moli of the TCC Group is dedicated to the development of the rechargeable lithium-ion battery and the mass production of the ultra-high power cylindrical cells. Its battery cells continue to be applied to the high-performance products of the next generation, including markets of high-class super cars, high-class heavy electric bikes, and off road electric bikes. It also successfully enters the field of electric vertical take-off and landing (eVTOL) aircraft and gets involved in the development of transportation electrification, creating the brand image of providing advanced lithium-ion batteries that are safe, high-energy, and high-power. E-One Moli not only continuously refines the base for high-power battery cells but also proactively improves their cycle life to stabilize its market position and realize the circular concept of battery reuse.

In 2021, TCC announced a NTD 12 billion investment in the construction of a super battery factory in Kaohsiung, which is expected to be put into production in the second half of 2023. It will produce ternary Nickel batteries that are high-capacity and high-C-rate. The production capacity will be 1.8 GWh, providing the long-range battery capacity required for 24,000 electric vehicles for one year. Besides, E-One Moli's production equipment at plants in Tainan Science Park is under improvement. From 2021 to 2023, the energy conservation and carbon reduction project has been implemented. The cumulative energy-conserving result was 2.88 million kWh per year, which accounts for 5% of the electricity consumption of the whole plant and improves the energy efficiency during the process of battery production. TCC's overall production capacity of batteries is expected to reach 3.3 GWh per year by 2024. In the future, TCC will continue to pay attention to the global demand for power cell services, proactively develop and grasp the emerging niche market in the low-carbon economy.

4.3.6.7_Energy Supply - Low-Carbon Lifestyle with Energy Storage Integrated Charging Products

In response to energy transformation, TCC fully understood that the energy storage system is the key to stable energy supply; therefore, TCC developed an energy storage integrated charging combination to meet the needs of the market. TCC's energy storage integrated charging station adopts a DC-DC design. Energy will first be stored in the energy storage system and then be provided to the electric vehicle by the energy storage system. As controlled by the program, the energy storage system will automatically save the energy during the off-peak period and charge the electric vehicle during the peak period, which can significantly mitigate the burden on the grid during the peak hours. Take the 180 kW charging station as an example, incorporated with TCC's 145 kW small energy storage facilities, only 40 kW power from the grid is required, and the rest is provided by the energy storage system, which can reduce the occurrence of instant overload of the grid.

In March 2022, NHOA.TCC launched Taiwan's first green-energy-only charging station "24K Green" at TCC DAKA in Hualien, which is 100% supplied by solar power. Currently, TCC has 9 charging stations being launched or under construction in Taiwan, 6 of which are energy storage integrated charging stations. The use of electric vehicles is expected to increase gradually due to the relevant laws and regulations and carbon reduction trends, such as the requirement of arrangement of parking spaces dedicated to the electric vehicle and its charging facilities at public parking lots, which further increases the demand for the establishment of charging facilities. TCC will continue to seize the opportunities in the market of new energy business, strengthen multiple applications of the techniques, and improve the convenience of the charging process to make new energy fit in the lifestyle of the public.

TCC expands its charging business in Europe Target of 5,000 to 10,000 charging stations by 2025

Atlante, under NHOA.TCC, which develops electric vehicle fast charging infrastructure, received a EUR 22.70 million sponsoring project from the Connecting Europe Facility Fund (CEF Fund) in September 2022. It is expected to install 215 electric vehicle fast charging stations, which use 100% green energy and are integrated with an energy storage function, in Italy, France, Spain, and Portugal.

NHΩA

Completed

Atlante has more than 1,300 fast and ultra-fast charging stations that have been inaugurated or under construction.

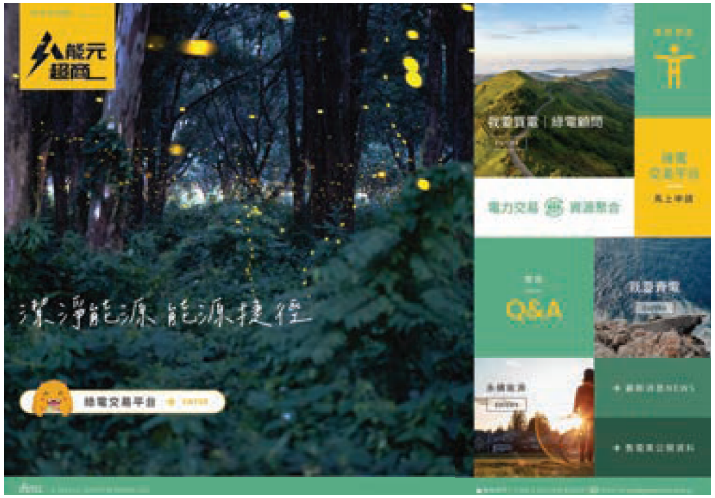
Target

5,000 installations in Italy, France, Spain, and Portugal by 2025. More than 35,000 installations by 2030.

In order to control the operation in European market and accelerate the increase in charging stations, Atlante acquired the department of charging station establishment of Kilometer Low Cost, S.A., a Portuguese company, for EUR 4.50 million in December 2022, aiming to create the Group's largest fast charging network in South Europe.

atlante

4.3.6.8_Energy Solution - Supporting Enterprise to Obtain Green Energy



In November 2022, TCC Group entered the green energy trading market and officially inaugurated the "Energy Helper TCC Corporation Green Energy Trading Platform." This platform incorporates diversified renewable energy sources and resources from each subsidiary of the Group, including energy generated from wind, solar, geothermal, and ocean sources. Through the integration of TCC's charging devices, green energy trading, and power trading resources, new energy business will come to birth, providing more all-round energy services. Currently, there are more than 200 members on the platform. The platform provides online green energy counseling, which enables the companies with a demand for green energy to conduct self-assessment by using big data analysis. The access to the green energy consultant has occurred nearly 1,200 times since the launch. Furthermore, the green energy supply not only incorporates the green energy sources of the Group but also discusses with offshore wind power corporations, expecting better deployment of green energy resources in the market.

As for the future plan regarding the green energy trading platform, the target for 2023 to 2025 of the energy supply matchmaking by the platform is expected to be nearly 175 MW, with estimated sales of green energy of 54,500 MWh, 34,500MWh, and 161,000MWh, respectively, and cumulative sales of 250,000 MWh by 2025. Energy Helper TCC Corporation Trading Platform will continue to optimize the processes for green energy procurement to provide more convenient ordering methods for accessing green energy to customers with needs. Energy Helper TCC Corporation has also proactively participated in the external relevant SMEs matchmaking events since 2023. We hope that the precious green energy can become a strong support for the implementation of SMEs' sustainability development and the achievement of goals of RE100.

(4.4) Indicators and Objectives

4.4.1_Greenhouse Gas Emissions Indicators and Targets

TCC makes climate commitments under the most stringent scientific standards. With the 2050 net-zero target, the concrete carbon neutral target, and the 2025 Science Based Targets (SBT), TCC formulates all-round carbon reduction strategies to implement carbon reduction in cement business operations and products. In addition, TCC also expands its green energy business, providing various green energy solutions to national energy, cities, enterprises, electric vehicles consumers as a driving force for society as a whole towards energy transition. Therefore, TCC formulates appropriate indicators in diversified strategic aspects and sets proactive targets. TCC continues to track the progress of the targets annually and review the results rigorously to manage climate-related risks and opportunities. For the GHG emissions target, the 2022 carbon emissions intensity of cementitious materials in Taiwan and Mainland China reduced by 5.4% and 5.6%, respectively, compared to 2016, steadily moving forward towards net-zero.

4.4.1.1_Climate Related Indicators and Targets

Indicators		Status of Achievement	Performance in 2022	Target by 2025	Target by 2030	Target by 2050	Matching with 6 climate actions
GHG Reduction Base year 2016 | tCO_2e/ton of cementitious material	Taiwan	Achievement rate 97%	0.803	0.758 (SBT -11%)	0.585 (-31%)	Carbon Neutral Concrete	Low-carbon circulation
	Mainland China	V	0.690	0.651 (-11%)	0.585 (-20%)		
	Taiwan & Mainland China (weighted average)	▲	0.707	0.663	0.585		
Water Intensity Reduction Base year 2016 | million liters/ metric ton of cementitious material	Taiwan	Achievement rate 99%	0.000293	0.000264	0.000240	0.000192	Natural Disaster Adaptation
	Mainland China	V	0.000308	0.000263	0.000245	0.000192	
Thermal Substitution Rate of Alternative Fuel	Taiwan	▲	4%	35%	45%	50%	Low-carbon circulation
	Mainland China	▲	8%	35%	45%	50%	
Ratio of Alternative Raw Materials	Taiwan	▲	23%	28%	35%	40%	Low-carbon circulation
	Mainland China	▲	25%	30%	40%	45%	
Cumulative Renewable Energy Installed Capacity	Taiwan & Mainland China (weighted average)	198 MW under constitution (by the end of 2024)		500 MW under management	700 MW under management	1 GW under management	Development of New Energy Business
Carbon Capture R&D Budget (since 2011 | Unit NT$)		V	Cumulative investment of NT$165 million	Cumulative investment of NT$1.3 billion	–	–	R&DInnovation
Carbon capture (Ten thousand tons/year)		Carbon capture technology scale-up verification measures under development		–	10	160	R&D Innovation
Valid Data of Carbon Emissions Collected from Critical Tier-1 Suppliers		▲	64.6%	–	90%	–	Supply Chain

Note: V Achieved targets ▲ New indicators

4.4.1.2_Greenhouse Gas Emissions

Absolute Gross Greenhouse Gas Emissions (Unit: tCO_2e)		2019	2020	2021	2022
Scope 1	Cement Plants | Taiwan	4,266,390	4,411,086	4,797,296	4,312,390
	RMC Plants | Taiwan	2,088	2,059	1,517	1,776
	Group Operation Headquarters | Taiwan	142	140	132	146
	Subtotal | Taiwan	**4,268,620**	**4,413,285**	**4,798,945**	**4,314,312**
	Cement Plants | Mainland China	31,362,071	31,255,633	25,867,678	20,715,305
	Grinding Stations | Mainland China	–	–	–	2,815
	Subtotal | Mainland China	**31,362,071**	**31,255,633**	**25,867,678**	**20,718,120**
	Total | Taiwan and Mainland China	**35,630,691**	**35,668,918**	**30,666,623**	**25,032,432**
Scope 2	Cement Plants | Taiwan	223,096	202,312	212,407	210,273
	RMC Plants | Taiwan	5,010	7,101	6,866	6,571
	Group Operation Headquarters | Taiwan	1,240	1,199	1,119	1,636
	Subtotal | Taiwan	**229,346**	**210,612**	**220,392**	**218,480**
	Cement Plants | Mainland China	1,313,966	1,257,882	1,094,397	846,574
	Grinding Stations | Mainland China	–	–	–	6,487
	Subtotal | Mainland China	**1,313,966**	**1,257,882**	**1,094,397**	**853,061**
	Total | Taiwan and Mainland China	**1,543,312**	**1,468,494**	**1,314,789**	**1,071,541**
Scope 1 & 2	Cement Plants | Taiwan	4,489,486	4,613,398	5,009,703	4,522,663
	RMC Plants | Taiwan	7,098	9,160	8,383	8,347
	Group Operation Headquarters | Taiwan	1,382	1,339	1,251	1,782
	Subtotal | Taiwan	**4,497,966**	**4,623,897**	**5,019,337**	**4,532,792**
	Cement Plants | Mainland China	32,676,037	32,513,515	26,962,075	21,561,879
	Grinding Stations | Mainland China	–	–	–	9,302
	Subtotal | Mainland China	**32,676,037**	**32,513,515**	**26,962,075**	**21,571,181**
	Total | Taiwan and Mainland China	**37,174,003**	**37,137,412**	**31,981,412**	**26,103,973**
Scope 3	Cement Plants | Taiwan	21,083	22,427	28,761	16,709
	Group Operation	942	907	814	719
	Total | Taiwan	**22,025**	**23,334**	**29,575**	**17,428**
Emissions Intensity		**2019**	**2020**	**2021**	**2022**
Scope 1 & 2	Cement Plants | Taiwan (tCO_2e/ metric ton of cementitious material)	0.814	0.813	0.806	0.803
	RMC Plants | Taiwan (tCO_2e/m^3 of concrete)	0.0015	0.0018	0.0016	0.0016
	Cement Plants | Mainland China (tCO_2e/ metric ton of cementitious material)	0.728	0.723	0.709	0.690

Note 1: The most significant Scope 3 emissions of cement plants inventoried since 2018 are "upstream transportation and distribution," and the upstream indirect emissions and downstream leasing of purchased electricity of the Operation Headquarters.
Note 2: The types of GHG emissions from Taiwan RMC Plants only include CO_2 emissions from gasoline, diesel (added in 2022), and electricity purchased.
Note 3: Scope 2 emissions of Taiwan are calculated with reference to the 2021 electricity emissions coefficient of 0.509 kg CO_2e/kWh announced by the Bureau of Energy, Ministry of Economic Affairs; the electricity emissions coefficient of Mainland China adopts the latest data announced by the local government of the region where each plant operates.
Note 4: Grinding stations in Mainland China were included into the calculation of GHG emissions from 2022; therefore, there is no data for the previous 3 years.
Note 5: The Taiwan plants conducts third-party audits annually, and the Mainland China Plants cooperate with respective local governments in arranging third-party audits on a uniform basis.
Note 6: Because the Low-Carbon R&D Center was added into the scope of inventory, the GHG emissions of the headquarters in Taiwan for 2022 increased compared to 2021.

4.4.2_Other Climate-related Key Indicators

4.4.2.1_Energy use

Unit GJ

		2019	2020	2021	2022
Energy Used Directly	Cement Plants | Taiwan (including coals, diesel fuel, and gasoline)	16,190,492	16,316,761	17,667,458	16,399,565
	RMC Plants | Taiwan (including diesel fuel and gasoline)	28,507	28,170	20,786	24,308
	Group Operation Headquarters | Taiwan (including diesel fuel, gasoline, and natural gas)	261	251	354	4,209 Note3
	Subtotal | Taiwan	**16,219,260**	**16,345,182**	**17,688,598**	**16,428,082**
	Cement Plants | Mainland China (including coals, diesel fuel, and gasoline)	127,483,380	125,512,147	102,964,854	78,040,601
	Grinding Stations | Mainland China (including diesel fuel and gasoline)	1,651	1,519	1,583	836
	Subtotal | Mainland China	**127,485,031**	**125,513,636**	**102,966,437**	**78,041,437**
	Total | Taiwan and Mainland China	**143,704,291**	**141,858,818**	**120,655,035**	**94,469,519**
Energy Used Indirectly	Cement Plants | Taiwan (purchased electricity)	1,558,800	1,481,726	1,580,660	1,539,058
	RMC Plants | Taiwan (purchased electricity)	33,696	50,219	48,636	46,474
	Group Operation Headquarters | Taiwan (purchased electricity)	13,064	12,420	11,700	14,184
	Subtotal | Taiwan	**1,605,560**	**1,544,365**	**1,640,996**	**1,599,716**
	Cement Plants | Mainland China (purchased electricity)	9,756,450	9,303,773	8,179,002	5,763,730
	Grinding Stations | Mainland China (purchased electricity)	–	–	–	53,515
	Subtotal | Mainland China	**9,756,450**	**9,303,773**	**8,179,002**	**5,817,245**
	Total | Taiwan and Mainland China	**11,362,010**	**10,848,138**	**9,819,998**	**7,416,961**
Energy Recovery and Recycling	Cement Plants | Taiwan (waste heat to power)	361,206	428,486	497,725	388,047
	Cement Plants | Mainland China (waste heat to power)	4,600,887	4,620,139	3,723,552	2,918,273
	Total | Taiwan and Mainland China	**4,962,093**	**5,048,625**	**4,221,277**	**3,306,320**
Total	Cement Plants | Taiwan	18,110,498	18,226,973	19,745,843	18,326,670
	RMC Plants | Taiwan	62,203	78,389	69,422	70,782
	Group Operation Headquarters | Taiwan	13,325	12,671	12,054	18,393
	Subtotal | Taiwan	18,186,026	18,318,033	19,827,319	18,415,845
	Cement Plants | Mainland China	141,840,717	139,436,059	114,867,408	86,722,604
	Grinding Stations | Mainland China	1,651	1,519	1,583	54,351
	Subtotal | Mainland China	**141,842,368**	**139,437,578**	**114,868,991**	**86,776,955**
	Total | Taiwan and Mainland China	**160,028,394**	**157,755,581**	**134,696,310**	**105,192,800**

Note 1: Cement Plants in Taiwan began collecting gasoline data of company vehicles from 2022.
Note 2: Electricity purchased by cement plants in Taiwan includes electricity consumption of the mining system. However, the mining system belongs to the subsidiary Ho Sheng Mining Co., Ltd. and is not included in the scope of ISO 14064-1 GHG inventory.
Note 3: Diesel for the direct energy use of the Operation Headquarters during 2019 to 2021 only includes the procurement of diesel purchased for emergency generators. However, diesel used in company vehicles for managers was included in 2022. As a result, the data increased significantly compared to the previous 3 years.
Note 4: For the consumption of each type of energy use, please refer to the chapter on ESG Key Indicators in TCC's 2022 Sustainability Report.

4.4.2.2_Renewable energy use

Unit kWh

		2019	2020	2021	2022
Self-generated and self-used	Group Operation Headquarters | Taiwan	46,275	48,371	50,114	45,000
	Cement Plants | Taiwan	–	30,987	68,940	63,136
	RMC Plants | Taiwan	–	–	47,044	192,705
	Ho-Ping Power Company Note 1 | Taiwan	–	12,300	134,041	397,719
	NHOA.TCC | Taiwan	–	–	–	3,059
	Subtotal | Taiwan	**46,275**	**91,658**	**300,139**	**701,619**
	Cement Plants | Mainland China	–	–	–	889,310
	Total | Taiwan and Mainland China	**46,275**	**91,658**	**300,139**	**1,590,929**

Note 1: Ho-Ping Power Company and NHOA.TCC are subsidiaries of TCC.
Note 2: Self-generated and self-used renewable energy had not been activated at Mainland China Plants for 2019 - 2021.

4.4.2.3_Energy Use Efficiency

		2019	2020	2021	2022
Energy Intensity	Cement Plants | Taiwan (Unit GJ/metric ton of cementitious material)	3.219	3.137	3.097	3.186
	RMC Plants | Taiwan (Unit GJ/m3 of concrete)	0.0128	0.0150	0.0124	0.0140
	Cement Plants | Mainland China (Unit GJ/metric ton of cementitious material)	2.975	2.924	2.819	2.682

4.4.2.4_Energy Use Performance

		2019	2020	2021	2022
Waste heat to power	Equivalent percentage of annual electricity purchased Cement Plants | Taiwan	-21%	-29%	-31%	-22%
	Improvement in waste heat to power performance Cement Plants | Taiwan (2018 base year)	+35.41%	+60.64%	+86.60%	+45.48%
	Equivalent percentage of annual electricity purchased Cement Plants | Mainland China	-38%	-39%	37%	37%
Renewable energy generated for self-consumption	Self-consumption ratio of renewable energy generated by itself increased | Taiwan (2021 base year)	-	-	-	+10%
Energy conservation projects	Total energy saved | Taiwan (Unit ten thousand kWh)	3,084	1,157	2,313	778

Note: Electricity-saving statistics from energy conserving initiatives cover the main promotion schemes with higher electricity savings.

4.4.2.5_Alternative raw fuel related ratios

		2019	2020	2021	2022
Percentage of use of alternative raw materials	Cement Plants | Taiwan	19%	22%	24%	23%
	Cement Plants | Mainland China	17%	22%	23%	25%
Thermal substitution rate of alternative fuel	Cement Plants | Taiwan	0.01%	0.14%	0.91%	4%
	Cement Plants | Mainland China	0.05%	0.18%	1.25%	8%

Note: For the consumption of each type of resources, including alternative raw materials, adjuncts, fuel, and clinkers, please refer to the chapter on ESG Key Indicators in TCC's 2022 Sustainability Report.

4.4.2.6_Water Resources Used

Unit million liters

		2019	2020	2021	2022
Freshwater	Cement Plants | Taiwan (including groundwater and industrial water)	2,100.23	2,065.35	1,861.55	1,648.81
	RMC Plants | Taiwan (including municipal water and groundwater)	402.56	580.90	589.56	638.34
	Group Operation Headquarters | Taiwan (including municipal water and groundwater)	17.28	14.96	12.69	13.60
	Cement Plants | Mainland China (including municipal water, groundwater, industrial water, surface water of rivers, lake / reservoir, and rain)	17,754.20	18,107.02	14,109.44	9,635.54
	Grinding Stations | Mainland China (including municipal water and industrial water)	68.59	62.68	75.67	46.46
Recycled water from manufacturing process	Cement Plants | Taiwan	23.22	93.48	102.43	112.81
	RMC Plants | Taiwan	247.28	307.39	430.20	448.61
	Cement Plants | Mainland China	14,926.16	15,510.87	11,773.31	9,609.60
Total	Cement Plants | Taiwan	2,123.45	2,158.83	1,963.98	1,761.62
	RMC Plants | Taiwan	649.84	888.29	1,019.76	1,086.95
	Group Operation	17.28	14.96	12.69	13.60
	Subtotal | Taiwan	**2,790.57**	**3,062.08**	**2,996.43**	**2,862.17**
	Cement Plants | Mainland China	32,680.35	33,617.88	25,882.75	19,245.15
	Grinding Stations | Mainland China	68.59	62.68	75.67	46.45
	Subtotal | Mainland China	**32,748.94**	**33,680.56**	**25,958.42**	**19,291.60**
	Total | Taiwan and Mainland China	**35,539.51**	**36,742.64**	**28,954.85**	**22,153.77**

Note 1: Since the Hualien Plant did not operate in 2022, the scope of data disclosure for 2022 covers Suao Plant and Hoping Plant.
Note 2: The amount of water used in Taiwan RMC Plants increased in 2022 compared to 2021, due to the additional scope.
Note 3: For the consumption of each type of water use, please refer to the chapter on ESG Key Indicators in TCC's 2022 Sustainability Report.

4.4.2.7_Water Resources Use Efficiency

		2019	2020	2021	2022
Water usage intensity	Cement Plants | Taiwan (Unit million liters/metric ton of cementitious material)	0.000381	0.000364	0.000300	0.000293
	Cement Plants | Mainland China (Unit million liters/metric ton of cementitious material)	0.000336	0.000333	0.000324	0.000308
Water conserving projects	Total water saved | Taiwan (Unit m3)	–	–	246,841	36,957

4.4.2.8_Low Carbon Products

		2019	2020	2021	2022
Concrete Products	Percentage of green building material applications | Taiwan	–	7%	11.2%	7%

Note: The percentage of green building material applications is defined as the percentage of TCC's sales of concrete products sold to customers for green building applications to the total concrete revenue.

4.4.2.9_Carbon Reduction Targets for Each Plant Linked to the Remuneration and Reward System

TCC implements a carbon reduction performance system, connecting the results of carbon reduction with the annual performance review, remuneration, and reward, to strengthen motivation and effectiveness of mid and long-term targets and climate-related indicator performance tracking. TCC sets carbon reduction targets for cement plants in Taiwan and Mainland China annually since 2019. Mainland China Plants also set KPIs when the finance department determines the budget, including the consumption intensity of electricity and coal during production process. The improvement targets are then distributed according to the characteristics of cement plants. TCC reviews the progress through the AI carbon reduction management platform. The platform demonstrates daily real-time data and the status of achievement, including the emission intensity, the progress of carbon reduction construction, and the status of alternative raw materials and fuel use. The performance tracking of each plant is reviewed at the biweekly SBT Meeting. TCC promotes the low-carbon transformation with an all-employees accountability mechanism, connecting the performance on carbon reduction at each plant to the bonuses of senior officers and staff. At the end of each quarter and the year, quarterly bonuses and annual performance bonuses are calculated, taking each plant's EPS and the achievement ratio of carbon reduction target into account. TCC implemented a trial internal carbon pricing mechanism for the Group's cement plants on a pilot basis from July 2022, allocating an emission quota each plant based on its production capacity. Each plant raises its trading demand for the emission quota through the platform. The platform conducts the price matchmaking. The status of internal carbon trading is planning to settle with the price of the Guangdong Carbon Emissions Trading Scheme at the end of the year and linked with the variable remuneration and reward. In 2023, TCC will continue to optimize the promotion of the internal carbon trading mechanism and the establishment of a relevant indicator review system. TCC links the binding of the quota trading among each plant and the plant's performance with the remuneration and reward of all employees of that plant as a driving force for internal mutual carbon reduction to promote the Group's net-zero roadmap at full speed.