TCC

GROUP HOLDINGS

Cross Boundaries

Diversity Equity Inclusion

2023 TCC GROUP HOLDINGS SUSTAINABILITY REPORT

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About the Report

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This is the 2023 Sustainability Report (hereinafter referred to as the "Report") of the TCC Group Holdings (hereinafter referred to as "TCC" or the "Company"). Upholding the principle of openness, transparency, and good faith, the Report discloses TCC's engagements in stakeholders and sustainability issues. Through this Report, TCC endeavors to live up to the business philosophy of reciprocity with stakeholders, realizing "In Service of Life."

→ Reporting Period

TCC publishes Sustainability Report on an annual basis. This Report covers the reporting period from January 1 to December 31, 2023, available in Chinese and English.
Publication date of the previous issue: June 2023
Publication date of the current issue: August 2024
Publication date of the next issue: August 2025

→ Boundaries and Scope of Disclosure

The operations of TCC include low-carbon construction materials, resource recycling, and green energy. The Report discloses information from TCC's key operations, accounting for more than 90% of the operating revenues in the consolidated financial statements. If the scope of quantitative information has any other significance, it will be footnoted for clarity.

The scope of disclosure | TCC's key operating bases

- Low-carbon construction materials business：Cement business: cement plants and RMC plants in Taiwan and Mainland China; E.G.C. CEMENT CORP; Hong Kong Cement.
- Resource recycling business：environmental technology companies
- Green energy business：TCC Green Energy Corporation, TCC Energy Storage Technology Corporation, NHOA Group, and MOLICEL
- Mining business: Ho Sheng Mining Co., Ltd. and TCC Jiangsu Mining Industrial Company Limited
- Others:The Operation Headquarters in Taiwan and Hangzhou and the Low-carbon R&D Center,etc

→ Reference Guidelines for the Report

Publisher/	Guidelines/Regulations
Global Reporting Initiative, GRI	GRI Universal Standard 2021
Sustainability Accounting Standards Board, SASB	Construction Materials
Global Cement and Concrete Association, GCCA	GCCA Sustainability Guidelines
International Sustainability Standards Board, ISSB	IFRS Sustainability Disclosure Standards, i.e., IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures
Financial Stability Board(FSB)	TCFD recommendations on climate-related financial disclosures
United Nations, UN	Sustainable Development Goals (SDGs)
Taiwan Stock Exchange (TWSE)	Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies

→ Information Disclosure

Information of financial performance disclosed in this Report shall be subject to the published consolidated financial statements certified by a certified public accountant. The financial figures are indicated in New Taiwan Dollars (NT$). All TWSE-listed and TPEx-listed companies are required to adopt the International Financial Reporting Standards (IFRSs) in financial statements preparation since 2013. All TCC's financial data are thus disclosed in line with IFRSs. Other data are aggregated and calculated by TCC and are demonstrated in common values that are rounded. This Report is also available on the TCC corporate website.

→ Internal Audits

The data in this Report is sourced from the Corporate Sustainable Development Committee taskforce and relevant departments, compiled by the Office of Responsibility and Sustainability, confirmed by department heads, externally assured and verified, and published post Board of Directors approval.

→ External Assurance

Deloitte, an independent third-party, offers limited assurance following "Assurance Engagements other than Audits or Reviews of Historical Financial Information," formulated and issued by the Accounting Research and Development Foundation with reference to the International Standard on Assurance Engagements 3000 (Revised) (ISAE 3000 Revised).

→ External Verification

BSI Taiwan, an independent third-party, conducted the verification following GRI Standards at a "Moderate" assurance level, Type 1 in the AA1000 Assurance Standard (AA1000AS v3). For detailed methodologies and results, see the Appendix.

→ Contact Information

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TCC OFFICIAL WEBSITE | ESG SECTION | TCC FACEBOOK | TCC INSTAGRAM

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A Moment That Shook Us

At 7:58 AM on April 3, 2024, we collectively experienced a reality-shaking tremor.

The Earth was merely releasing its energy as usual, just as it routinely absorbs the scorching sun, and endures the baptism of wind, rain, thunder, and lightning. For the Earth, it was merely shedding excess energy. The various releases it has made around the world over the past 50 years. It might have been just minor trembles or gentle sneezes.

However, all of this, for humanity, has been a testament to earthquakes, volcanic eruptions, floods, forest fires, tsunamis, hurricanes, heatwaves, and droughts, all underscoring the consensus on abnormal climate patterns and extreme weather conditions.

In the past, these large abnormal releases were occasional, perhaps happening once every few decades or even centuries. This time, it took just 50 years to increase the disasters brought about by global warming by fivefold. Taiwan Cement Corporation's Hoping cement plant, harbor, and Hoping power plant is located in the area of Taiwan that experienced the highest seismic intensity this time around. The magnitude of the disaster (nature's force) has left a profound impact on us.

The Adhesive of Civilization

To the Earth, what significance do humans, in all their minuteness, hold?

25 years, 50 years, these are but human constructs of time. To the Earth, which has existed for billions of years, we are not a necessity; it is we who need the Earth. Humanity relies on the Earth and must take responsibility for our way of life on this planet, continuously seeking sustainable modes of existence.

This year marks the 200th anniversary of the invention of Portland cement. Today, after a magnitude 7+ earthquake, as we look to rebuild roads and homes, we still rely heavily on cement, just as humans did 12,000 years ago (a particular mixture of lime). From 12,000 years ago to the present day in 2024, cement remains the adhesive of human civilization, firmly securing the ever-progressing realities of human life upon the Earth.

12,000 years ago, when humans used limestone, the population was one million; 2,000 years ago, with the use of volcanic ash cement, the population reached two hundred million; 200 years ago, with the advent of Portland cement, the population was one billion. This year, as we celebrate the bicentennial of Portland cement, the global population has reached over eight billion.

As we move into 2024, 200 years after the introduction of Portland cement, we finally enter an era of new low-carbon cement and new energy sources. Another new civilization for humanity is about to unfold. Entering the era of low carbon and green energy, Taiwan Cement has developed Ultra-High Performance Concrete (UHPC) energy storage cabinets that bridge low-carbon cement and new energy sources. Taiwan Cement's "Energy Ark" storage cabinets become the link between low-carbon cement and green energy, weaving a tangible cement fantasy. This is our concrete response to entering a new era of low-carbon and green energy.

The Challenge of Time vs. The Trajectory of Response

Humans are born, and they die. So it is with civilizations, nations, societies, and corporations.

But the Earth does not measure time in the same way; time is but the mark of human civilization deliberately sculpted in response to natural changes and challenges.

In 1983, MOTOROLA launched the world's first handheld mobile phone, and in 2011, the company was split and sold. One of Taiwan's first publicly listed companies, "Taiwan Industrial and Mining," after 40 years of operation, was delisted in 2001, marking the end of a 40-year era. Japan's TOSHIBA Corporation, just last year in 2023, ended its 74-year listing on the Tokyo Stock Exchange.

However, Taiwan Cement Corporation, the first company to be listed on the stock exchange in Taiwan with the stock code 1101, I am honored to represent it today, still standing here with everyone.

Cement has always been the most reliable building material for constructing the foundation of human living environments, and Taiwan Cement has always been at the forefront of safeguarding life. Taiwan Cement has always trodden the most challenging paths, braving through thorns and thistles, engaging in long-term exploration with the natural elements upon which humanity relies - sunlight, air, water, soil. We strive to understand the intricate relationship between human circumstances and the natural environment, thereby seeking and realizing the best ways for humans to live on Earth and the best solutions.

Lighting the Torch of Sustainability on Earth

To walk eternally, it is a long journey, and we choose only to walk eternally. The only time scale Taiwan Cement pursues is sustainability: sustainable operations and sustainable development. We must not only be observant and listen attentively to the changes in the world but also with introspection to ensure we stay true to our original intentions. Only then can we steady our steps, maintain the balance between internal operations and development, and achieve long-term success.

62 years ago, in 1962, Taiwan Cement became the first publicly listed company in Taiwan, with the stock code 1101.

7 years ago in 2017, Taiwan Cement had 16 subsidiaries, with over 80% of its revenue still coming from the cement markets on both sides of the Taiwan Strait. Today, in 2024, Taiwan Cement has 27 subsidiaries, spanning 11 industries and operating in 13 global markets.

62 years ago, Taiwan Cement was a simple cement supplier; Today, Taiwan Cement has advanced to become a developer of low-carbon building materials, resource recycling, and green energy. It is no longer just a supplier of raw materials but can compete and break new ground alongside high-tech and electronics industries, becoming a pioneer among its peers.

We cannot predict any earthquake or any extreme climate disaster. We must closely understand the constantly evolving carbon lexicon in this Carbon Era: carbon sinks, carbon fees, carbon taxes, carbon credits, carbon audits, carbon leakage, CBAM, ETS...

We hope to take the lead in pulling in the reins on global warming, to race against the increasing momentum of climate change, and to create and realize possible solutions on the path to net-zero emissions. Taiwan Cement has spent a long time at the forefront of protecting life, deeply understanding the laws of nature and how the world changes. We realize that there are no coincidences in this world, and no flukes, but rather one foot, one step at a time, through the accumulation of sweat and experience drop by drop.

Over the past seven years, the Taiwan Cement team has started from zero, from nothing, holding torches high in the long, dark tunnel, illuminating the exploration of this new journey towards human civilization.

Carrying the light source, we maintain a healthy and robust financial statement. Many people have asked, "Can environmental protection and economic development go hand in hand?" It used to be a question people were unsure about or hesitated to answer. Today we ask again: "Is economic development achievable without carbon reduction and concern for the environment?" Through our exploration these past few years, the answer is now a hundred percent affirmative. Environmental health and economic health can advance side by side and will become the direction every company seeks to turn towards because we have already led the way through this journey. This is the main topic we face 365 days a year, 24 hours a day, every minute, every second. Sustainability, for Taiwan Cement today, is a word but rather a continuous action. It strides powerfully, producing one healthy, robust, and future-oriented financial statement after another.

Before 2018, Taiwan Cement's business in Taiwan and mainland China, where it originated,
accounted for over seventy percent of its revenue, serving as the two pillars supporting the company.
At that time, Taiwan Cement had already foreseen that the Chinese market might plateau after reaching its peak. Therefore, starting from 2018, it began to explore markets beyond the strait. The first step was establishing a joint venture with Turkey's OYAK, followed by acquiring ultra-low carbon alternative fuels in Africa through Portugal's Cimpor. This move, utilizing calcined clay as a substitute for limestone clinker to produce ultra-low carbon cement, positioned Taiwan Cement as a global leader in the cement industry with the lowest carbon production.
To date, the low-carbon cement from Europe has already provided benefits to Taiwan Cement.
In 2023, approximately 45% of the profits came from the contribution of European low-carbon cement.
At the end of November last year, Taiwan Cement decided to expand its investment in the low-carbon cement market in Europe, Asia, and Africa. The stake in Turkey's OYAK was increased from 40% to 60%, and the stake in Portugal's Cimpor was raised from 40% to 100%. Although production might become a burden in an era where carbon has a price, we have decided to mitigate this burden with more low-carbon products. Low-carbon building materials are set to become our main competitive edge in the European market. The international layout in Turkey, Europe, and Africa undoubtedly creates a stable third pillar for Taiwan Cement's future operations.
Over the past six years, we have dedicated ourselves to a low-carbon transformation, investing in green energy that can be stored, managed, and aggregated for use and trade. We have established energy storage sites that regulate energy like reservoirs, provided stable power supply frequencies, enhanced energy efficiency through smart grids, and produced reliable, high-power lithium-ion batteries. We have fully realized a new, clean, friendly, renewable, and infinitely recyclable way of using energy.
These new energy ventures, supporting and extending the future of human civilization, extend our reach into the future. Not only have they brought stable profits, but they have also allowed Taiwan Cement to accumulate numerous cross-disciplinary patents and technologies. We firmly believe that we will stand strong in the competition of carbon reduction and energy in the future.

The new energy sector is the support that enables Taiwan Cement to transform, to completely shed its historical role, and to erect a brand new pillar for Taiwan Cement.

In the fiscal year 2023, we presented a financial statement that is balanced on four legs: diversified income, risk dispersion, innovative synergy, and ample cash flow, demonstrating a healthy and robust financial status.

We proactively take on and respond to societal needs and expectations, setting traceable, step-by-step, and verifiable short, medium, and long-term goals for 2025, 2030, and 2050. Taiwan Cement's healthy and robust financial statement is no accident; it is the result of experience and a step by step process with the concerted effort of all at Taiwan Cement. It is a solid proof of our never-retreating, publicly credible commitment, a health check won through self-challenge.

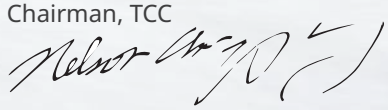
Aiming for the North Star,
we sail towards a new course for a new Taiwan Cement.

This low carbon era is a new epoch about sustainability and energy transformation actions and reflections. In human history, there are no precedents or markers left by predecessors; no one knows exactly how to navigate this new path.
It's like being in the vast ocean, without a clear direction, both open and boundless. What guides us is the human heart leading to a world of good intentions, just like the eternal North Star in the night sky, surpassing the compass needle and the sunset in the valleys.
What is certain is that Taiwan Cement is on the right path. At this moment, 200 years after the invention of Portland cement, there are only two types of cement industries left:
One is still stuck in yesterday's cement industry, still focusing on production volume;
The other looks towards tomorrow, firmly and confidently continuing on their path.

TCC is no longer just an abbreviation for Taiwan Cement Corporation;
TCC now stands for Total Climate Commitment and
Total Care Commitment to environmental and human concerns.

Today's TCC is rightfully TCC Group Holdings!
TCC is turning a new page, beginning
to write a new story for a new TCC.
We are on the right path,
and we are certainly not alone.

Chairman, TCC



Green Globalization

Diversity | Resilience | Innovation | Growth, Global Presence around the World

☐ Low-carbon Construction Materials
○ Resource Recycling
△ Green Energy

CIMPOR

☐ Volcanic ash of Cape Verde
☐ Calcined clay

OYAK

☐ OYAK Cement 4.0
☐ Reconstruction of cities in Turkey
☐ Million-ton construction waste treatment business

MAINLAND CHINA

☐ Low-carbon Products 2.0 Carbon Label Demonstration Enterprise
☐ AI-powered Purely Electric Mine

○ Domestic waste treatment
○ Single largest hazardous solid waste treatment center
○ Fly ash renewable resources center
○ Environmental services company

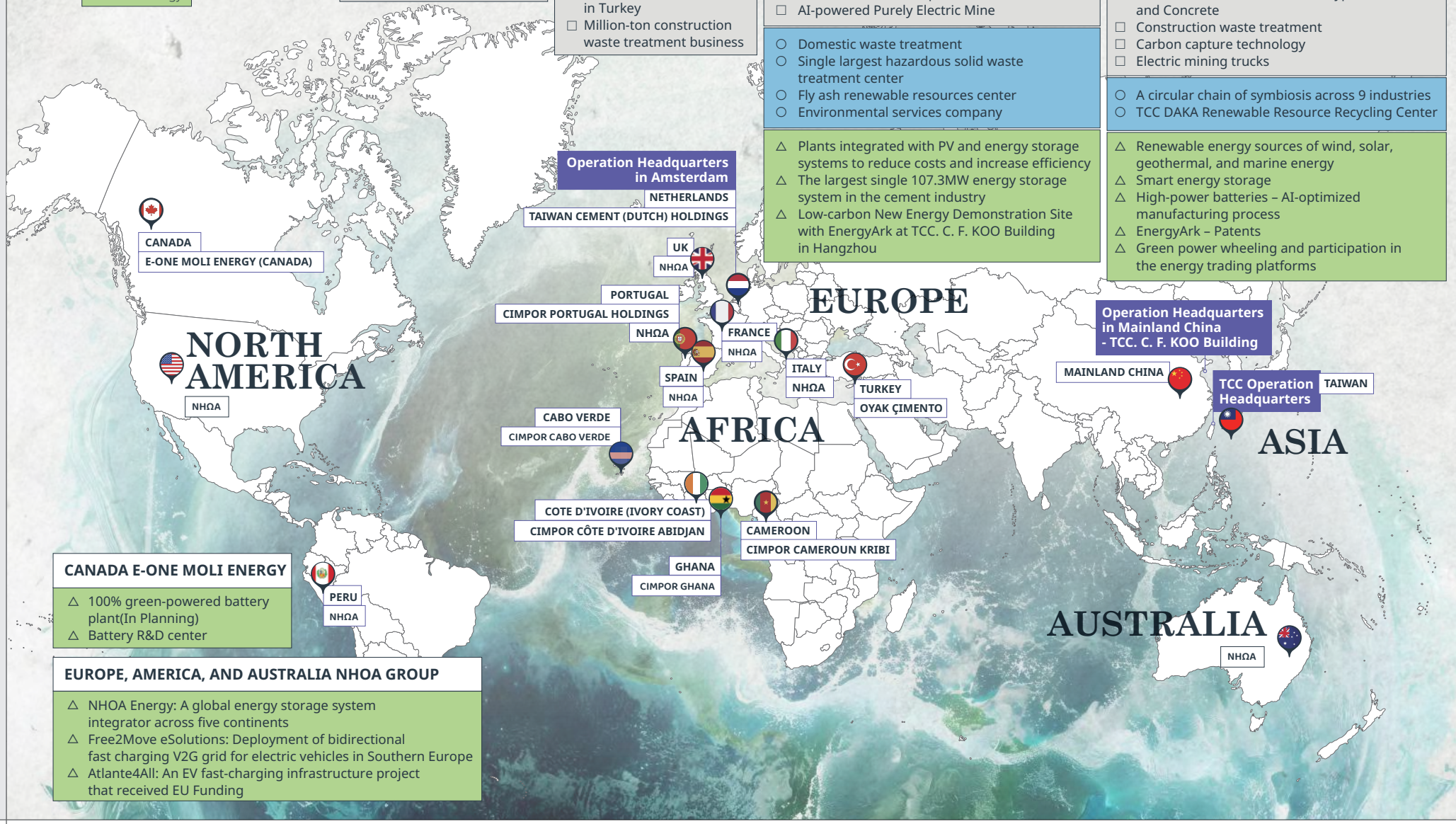
△ Plants integrated with PV and energy storage systems to reduce costs and increase efficiency
△ The largest single 107.3MW energy storage system in the cement industry
△ Low-carbon New Energy Demonstration Site with EnergyArk at TCC. C. F. KOO Building in Hangzhou

TAIWAN

☐ The lowest carbon footprint products in Taiwan – Portland Limestone Cement (Type IL) and Concrete
☐ Construction waste treatment
☐ Carbon capture technology
☐ Electric mining trucks

○ A circular chain of symbiosis across 9 industries
○ TCC DAKA Renewable Resource Recycling Center

△ Renewable energy sources of wind, solar, geothermal, and marine energy
△ Smart energy storage
△ High-power batteries – AI-optimized manufacturing process
△ EnergyArk – Patents
△ Green power wheeling and participation in the energy trading platforms



CANADA E-ONE MOLI ENERGY

△ 100% green-powered battery plant(In Planning)
△ Battery R&D center

EUROPE, AMERICA, AND AUSTRALIA NHOA GROUP

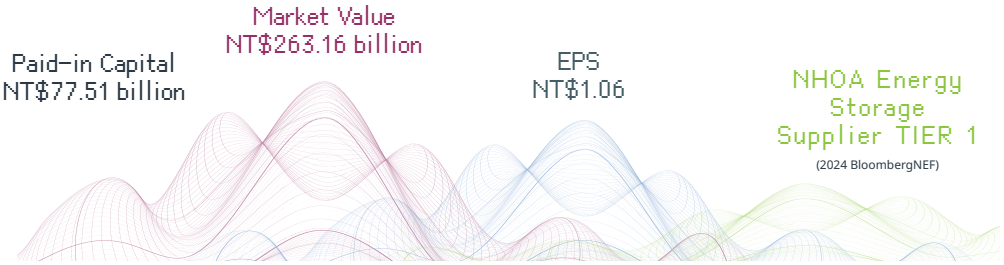
△ NHOA Energy: A global energy storage system integrator across five continents
△ Free2Move eSolutions: Deployment of bidirectional fast charging V2G grid for electric vehicles in Southern Europe
△ Atlante4All: An EV fast-charging infrastructure project that received EU Funding

In 2024 spring, TCC completed the key delivery procedures for its low-carbon cement business in Europe, becoming a low-carbon and renewable energy group spanning 13 markets across five continents. In May 2024, it officially changed its name into TCC Group Holdings (TCC).

Privatization in 1954, TCC upholds the honor of the first TWSE-listed company in Taiwan. TCC set in motion its green transformation and internationalization in 2018 to "Think Ahead Look Ahead" on its way onward.

TCC's foundational low-carbon construction materials business has expanded from Taiwan and Mainland China to Turkey and Portugal, establishing a solid four-pillar business structure. With a pioneering and innovative mindset, TCC has diversified into clean energy, energy storage, power grid, and energy trading services as well as created the interdisciplinary patented product, EnergyArk.

TCC has pioneered the world's lowest-carbon infrastructure material and the most comprehensive new energy industry chain, integrating green energy with charging and storage applications. With a diversified and resilient business model, TCC envisions a tangible future of growth. Committed to "In Service of Life", TCC aims to build the low-carbon, safe, and sustainable ark of the next generation.



Low-carbon Construction Materials (Cement & Concrete)	Resource Recycling & Green Logistics	Green Energy	Electricity
Revenue Share 61.5%	Revenue Share 4.1%	Revenue Share 9.7%	Revenue Share 24.4%

1946 — **TCC**
Cement | Cement Products Production and Sales

1955 — **Light and fire-resistant**
Refractories development and product innovation

1973 — **Taiwan Transport & Storage Corp.**
Warehousing | Transportation | Customs clearance
Comprehensive sea and air freight forwarding
Logistics services

1979 — **Ta-Ho Maritime Corporation**
Freight shipping
Ship sales and lease
Shipping agency services

1989 — **Hoping Port**
Operation, maintenance, and management of Hoping Industrial Port

1989 — **TCC Information Systems Corp.**
Professional system integration of corporate information technology/plant automation technology in Greater China

1996 — **Hoping Power Plant**
Coal-fired power generation service; production of raw materials/fuels for power generation and recycled materials of power plant

1997 — **E-One Moli Energy Corp.**
Energy batteries, power cell R&D, applied battery pack design, and overall energy solutions

1998 — **TCC Green Energy Corporation**
Investment and development of solar, wind, and geothermal energy; research, assessment, and cooperation on renewable energy

2017 — **New Branding System**

2018 — **Guigang TCC Dongyuan Environmental Protection Technology**

2019 — **CIMPOR**
Development and manufacturing of low-carbon construction materials in Southern Europe and North Africa
OYAK
The largest cement group in Turkey for low-carbon building material development and manufacturing

2020 — **NHΩA**
Energy storage and EV
EV-fast-charging devices and smart grid

2021 — **TCC Energy Storage Technology Corporation**
Integrated green energy charging and storage services
UHPC Energy Storage Cabinet

2022 — **Energy Helper TCC Corporation**
Green Energy Trading
Power Trading and Resource Integration

2022 — **Molie Quantum Energy**
R&D of Li-ion Battery

2024 — **Completion of the Expansion of Low-carbon Cement Investment in Europe**

2024 — **Taiwan Cement Corporation Officially Transformed into TCC GROUP HOLDINGS**

TCC Asset Management and Development

→ TCC Industry Category

- **Cement** — TCC Group Holdings, OYAK, CIMPOR
- **Transportation** — Taiwan Transport & Storage
- **Waste Management** — Guigang TCC Dongyuan Environmental Protection Technology, etc.
- **Green Energy** — TCC Green Energy
- **Information Technology** — TCC Information System
- **Battery** — E-One Moli Energy, Molie Quantum Energy
- **Shipping** — Ta-Ho Maritime, Hoping Industrial Port
- **Property Management** — TCC Asset Management and Development
- **Energy Storage Charging** — TCC Energy Storage, NHOA Group, Energy Helper TCC Corporation
- **Power Generation** — Ho-ping Power
- **Applied Building Materials** — Kuan-Ho Refractories Industry

The world has entered an era of large-scale green competition. Investors focus on carbon-reduction unicorns.

Green-conscious Operating Model at TCC

A McKinsey trend report underscores the crucial abilities companies need to develop carbon technologies and competitiveness. TCC's carbon reduction and greening strategies align with seven key competencies.

"In Service of Life" underpins TCC's sustainable development. The three strategies—Low-carbon Construction Materials, Resource Recycling, and Green Energy—aim to harmonize human civilization with nature, promoting societal inclusion and co-prosperity with Earth.

Hoping Cement Industrial Park, utilizing in-house R&D and multiple kilns, has become an eco-friendly low-carbon energy park. It features pure green EV charging stations, a large energy storage base, TCC Low-Carbon UHPC Center, and TCC DAKA Recycling Center for domestic waste, turning facilities into products and services.

TCC DAKA Renewable Resource Recycling Center (RRRC) employs co-processing to convert waste into alternative fuels, boosting project investments. TCC collaborates with firms like Green Image Environmental Technology Consulting Co., Ltd, to improve cost-efficiency. TCC also obtains funds via flexible financing, issuing ECBs/GDRs to attract long-term investors for its green shift.

In response to globalization and industrial transformation, the Sustainable Learning Passport and Carbon Academy enhance sustainability skills and cross-disciplinary knowledge for employees, suppliers, and clients, supporting a just transition. For details, see Section **5.1 Climate Action Talents – TCC Carbon Academy**. To foster global talent exchange, TCC participates in the MIT Industrial Liaison Program (MIT/ILP), providing diverse learning channels for employees

1. Outstanding Business Model and Positioning
2. Sustainable Growth Business Model
3. Production Facilities as Products
4. AI-powered R&D
5. Leading Costs and Operations
6. Supply and Raw Material Advantages
7. Talent Development, DEI and Just Transition

TCC's "carbon reduction and greening" strategy aims to cut emissions and develop five core energy capabilities: storage, creation, supply, solutions, and transmission, building a low-carbon, new energy conglomerate across all industry chains.

AI technology optimizes battery composition, logistics systems, and oxygen-enriched combustion, and aids in monitoring and managing NOx, SOx, and CO_2 emissions.

Advantages in supply prices are gained via the strategic product and raw material procurement models. The Procurement Portal developed offers real-time information and bilateral communication features regarding supplier selection, bidding, material quality management, and supplier sustainability performance.

TCC Sustainability Targets and Performance Tracking

ITEM				PROGRESS ACHIEVED 2023	PERFORMANCE 2023	TARGET 2025	TARGET 2030	TARGET 2050
GHG Management ◆ Base year 2016 | Unit metric tons of CO_2e/metric ton of cementitious materials		Taiwan		V	0.769	0.758 (SBT -11%)	0.585 (-31%)	Carbon Neutral Concrete
		Mainland China		V	0.671	0.651 (-11%)	0.585 (-20%)	
		Taiwan & Mainland China ■		V	0.686	0.675	0.585	
Water Management–WCI Reduction ◆ Base year 2023 | Unit megaliter/metric ton of cementitious materials		Taiwan & Mainland China ■		▲	0.000236	0.000233	0.000225	0.000220
Thermal Substitution Rate (TSR) of Alternative Fuels ◆	SEE CH2	Taiwan & Mainland China ■		▲	13%	25%	35%	50%
Ratio of Alternative Raw Materials ◆		Taiwan & Mainland China ■		▲	19%	21%	22%	25%
Clinker Ratio ▲		Taiwan & Mainland China ■		▲	0.799	0.796	0.780	0.570
Energy Efficiency ▲ Unit: GJ/t | Formula: Total petrochemical energy consumption / Cementitious materials output		Taiwan & Mainland China ■		▲	2.560	2.460	2.306	1.998
Air Pollution Management | Base year 2023		Taiwan & Mainland China	NOx	V	383	380	370	BACT[1]Minimum
		Unit: Grams emissions /metric ton	SOx	V	41	40	39	BACT[1]Minimum
		of cementitious materials	TSP	V	22	21	20	BACT[1]Minimum
		Taiwan & Mainland China	NOx		6.40	—	—	—
		Unit : metric tons of emissions	SOx		0.68	—	—	—
		/million USD	TSP		0.37	—	—	—
		Taiwan & Mainland China (co-pressing) | ton	Mercury ▲	▲	0.194	0.192	0.187	BACT[1]Minimum
On-site Waste Management-Proportion of Waste Convertedinto Renewable Resources and Energy ▲		Cement Plant in Taiwan & Mainland China		▲			100%	
Renewable Energy ▲ | Unit: MW		Taiwan & Mainland China		145MW (Accumulated until the end of 2024)		235MW	400MW	750MW
Carbon Capture R&D Budget Since 2011 | Unit: NT$				V	Total 1.89billion Invested	Total 13billion Invested	—	—
Carbon Capture | Unit: metric ton		Planning for the scale up verification of carbon capture technology				—	100,000 metric tons/year	1.6million metric tons/year
Conservation of Plant Species (Endangered Plants included) | Unit: taxa				V	34,646	≧35,000	≧40,000	≧45,000
Biodiversity Management Plan (BMP)[1] Proportion of Native Species Maintenance in Mining Areas		Taiwan		V	88.55%	—	90%	
TCC Community Engagement (CEM)[1] Since 2022 | Unit NT$ | Cumulative investment of				V	532million	800million	1.8billion	5.8billion
Education Investment Since 2022 | Unit NT$ | Cumulative investment of				V	20.1million	33.5million	73.5million	230million
Employee Education & Training Since 2020 | Unit NT$ | Cumulative investment of				V	86.62million	125million	250million	750million
The Ratio of Valid Data of Carbon Emissions Collected from Critical Tier-1 Suppliers ◆				V	95.7%	—	90%	—
		In 2024, a third-party carbon audit program for raw material suppliers in Taiwan and China will launch						

Note 1 (1) BACT: Best Available Control Technology (2) BMP: Biodiversity Management Plan (3) CEM: Community Engagement Management. Note 2 ◆ Climate-related management indicators and targets; ▲ New or adjusted indicators; ■ weighted average. Note 3 Taiwan follows CNS 61, while China adheres to GB 175 for chloride ion limits in fuel substitution rates. Note 4 Taiwan limits cementitious material additives to less than 10% per CNS 61. The American Concrete Institute's 2024 report notes CEM II, with 75% clinker, as Europe's predominant cement. The GCCA aims for a 52% clinker rate by 2050 for net-zero targets. Note 5 In Q1 2024, we completed transactions with Turkey and Portugal, expanding operations. We plan new sites at operational locations, with future announcements per case. Note 6 Critical Tier-1 suppliers significantly impact TCC products' quality and delivery or meet procurement thresholds.

Disclosure of Sustainability -related and Climate-related Financial Information

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IFRS S1 and S2

In response to the international trend of financializing sustainability information, TCC adopted the IFRS S1 "General Requirements for Disclosure of Sustainability-related Financial Information" and IFRS S2 "Climate-related Disclosures" issued by the International Sustainability Standards Board (ISSB) under the IFRS Foundation to serve as guidelines to optimize its ESG disclosures. According to the Financial Supervisory Commission's "Roadmap for Taiwan listed companies to align with IFRS Sustainability Disclosure Standards", TCC is one of the listed companies that will apply the standards for the first time in 2026. To effectively and smoothly transition to the standards, preparatory work for the standards will be conducted starting from the year 2024. Additionally, this year, TCC will refer to the IFRS S1 and S2 published by the ISSB for relevant disclosure, with the aim of gradually reviewing and adjusting the disclosure content to make it more complete.

Starting from the perspective of the primary users of general-purpose financial reports (including existing and potential investors, lending banks, and other creditors), and based on the results of the double materiality analysis and strategic development focus in 2023, TCC has selected "Climate Actions and Net Zero Emissions," "Green Energy and Energy Storage," and "Sustainable Products and Services" as the three material sustainability topics. Then in accordance with the IFRS S1 and S2, TCC identifies sustainability-related and climate-related risks and opportunities that could reasonably be expected to affect TCC's prospects.

→ Summary of TCC's Sustainable Financial Performance in 2023

Diversity

Carbon reduction and green investment capital expenditure accounts for 68% of the total capital expenditure: The TCC Group, spanning across Europe, Asia, and Africa, has invested in low-carbon construction materials, fully laying out the new energy industry chain, thereby diversifying its revenue streams. In the fiscal year 2023, the capital expenditure allocated to carbon reduction and green initiatives amounted to NT$16.875 billion, accounting for 68% of the total capital expenditure of NT$24,726 billion.

Resilience

100% funded with operations generated cashflows: In 2023, TCC's total capital expenditure accounted for less than 80% of the net cash inflow from operating activities. In the fiscal year 2023, the net cash inflow from operating activities amounted to NT$33.75 billion, which is sufficient to fully cover the investment for low-carbon and new energy transition in the same year, while maintaining a robust balance sheet and cash flow statement.

Growth

Profit attributable to the parent company grew by 48%: Continuing to invest and maintain positive profitability, the net profit for the year 2023 reached NT$10,005 billion,, of which the net profit attributable to the parent company reached NT$7.998 billion, representing a net profit growth of over 140% compared to the year 2022, and net profit attributable to the parent company increased by approximately 48%.

Note 7 Source:https://www.ifrs.org/

IFRS Sustainability

Disclosure of Sustainability -related and Climate-related Financial Information

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IFRS S1 and S2

→ 「The financial impacts of "Climate Action and Net-Zero Emissions", "Green Energy and Energy Storage" and "Sustainable Products and Services" for the fiscal year 2023 mainly include:

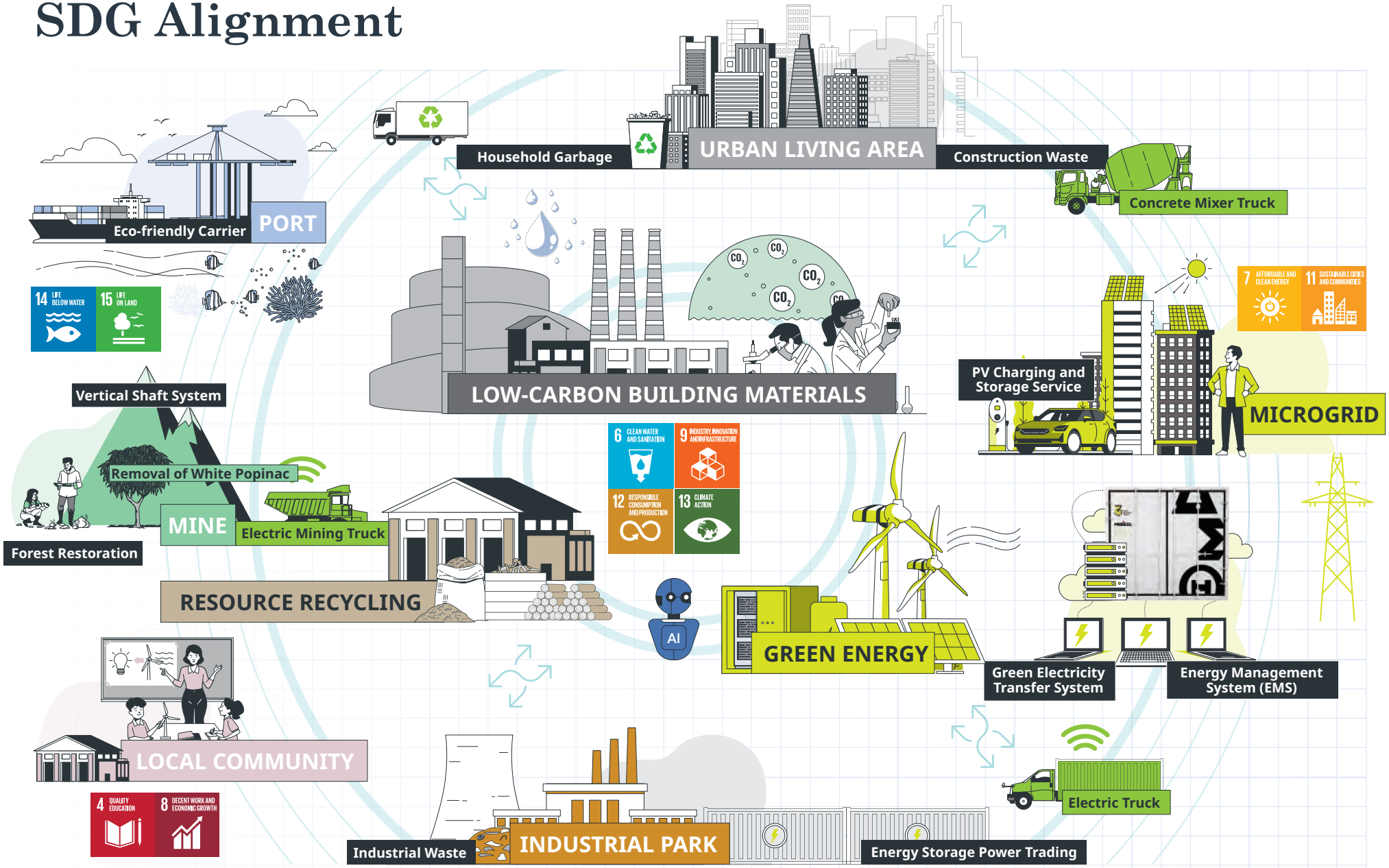
Unit: in Thousands New Taiwan Dollar	Climate Action and Net-Zero Emissions	Green Energy and Energy Storage	Sustainable Products and Services	Total	Note
Revenues	748,807	5,817,397	39,279,069	45,845,273	1
Revenues (Onyx Ta-Ho Environmental Services Co., Ltd. Included)	3,788,519	5,817,397	39,279,069	48,884,985	1
Cash Inflow from EU Subsidy	-	371,713	-	371,713	2
Capital Expenditures	5,218,254	11,539,175	117,523	16,874,952	3
Net Cash Inflow from Operating Activities			33,751,150	33,751,150	4
Sustainable and Green Financing Cash Inflow			30,829,871	30,829,871	5

Notes:

1	Revenues from low-carbon cement and concrete products, waste management services, storage and charging services, and renewable energy trading amounts to $ 45,845,273 thousands , accounting for 41.94% of total revenues. Onyx Ta-Ho Environmental Services Co., Ltd., an associate company in which TCC holds a 50% stake and accounted for using the equity method, is also engaged in the provision of industrial waste and domestic waste management services. If the financials from Onyx Ta-Ho Environmental Services Co., Ltd. is included in pro forma financial statement, the total revenues will reach $ 48,884,985 thousands , accounting for the total revenues after including Onyx Ta-Ho Environmental Services Co., Ltd is NT$43.51%.
2	In September 2022, NHOA secured a grant of €22,700 thousands from the "Connecting Europe Facility" (CEF Fund), which is allocated for the construction of 215 pure green electricity charging points across four European countries. In year 2023, a total of $ 371,713 thousands (€11,350 thousands Euros) in grants was received, resulting in an increase in cash inflow. NHOA's subsidiary, ATLANTE S.R.L (ATLANTE), is dedicated to the development of fast and ultra-fast charging networks for electric vehicles, aligning with the European Union's transport infrastructure funding programs. In September 2023, ATLANTE was granted sponsorship by the EU CEF Fund, expecting to receive a subsidy of $1,695,602 thousands (€49,900 thousands euros)
3	TCC continuously upgrades equipment and optimize technology efficiency. Additionally, TCC invests in the energy sector and installs renewable energy equipment. The total capital expenditure for these initiatives amounts to $16,874,952 thousands, accounting for 68.25% of the total capital expenditure. The total amount of these capital expenditures is fully covered by cash generated from operating activities.
4	The company's net cash inflow from operating activities is $33,751,150 thousands, which is sufficient to fully cover capital expenditures. The remaining free cash flow also has sufficient surplus to cover dividends and interest expenses. In addition to supporting sustainability, TCC also robustly addresses sustainable business operations.
5	Actively participate in green and sustainable finance, obtaining sustainable and green financing lines of $95,734,509 thousand and overseas green convertible bonds (ECB) of $13,473,544 thousand, which actually caused the cash inflow of financing activities to increase by $30,829,871 thousands.
6	Please refer to the 2023 annual report for material information about sustainability-related and climate-related risks and opportunities .

Sustainable Value Chain: SDG Alignment

SDG Alignment



→ Corresponding to sustainable and climate-related financial information - IFRS S1 and S2 (hereinafter referred to as Sustainability Financial Information) **[Major topics 1]**

SDG 9 Industry, Innovation, and Infrastructure 9.4

Eco-friendly Transportation

- Phased-excavation at Hilltop Platform for limestone mining: **-23 million mt CO_2e**
- Introduced electric mining trucks, : -4,712 mt CO_2e
- New eco-friendly cement carriers, : -2,800 mt CO_2e
- AMP systems for TCC vessels and ports, : -710.3 mt CO_2e
- Collected valid carbon emissions data from suppliers: 95.7%

Low Carbon Production & Alternative Raw Materials/Fuels

- AI Carbon Reduction Management System: **Ratio of alternative raw materials 19%; TSR of alternative fuels 13%**
- Equipment and process enhancements: Save energy 17,837 GJ; **-9,121.58 mt CO_2e**
- Waste heat recovery generates 35% of manufacturing electricity: -452,064 mt CO_2e
- Self-use renewable energy generation16,833,350 kWh

Responsible Consumption and Production 12.2 / 12.5

Renewable Resource Co-processing

- DAKA Resource Recycling Center **treated 13,762 mt Hualien domestic waste**
- **Assisted industries in processing 6,832,393 mt waste**

Pollution Prevention and Control Management

- Air emissions of cement plants way below regulation standards
- No air pollution from RMC plants

Clean Water and Sanitation 6.3 / 6.4

Water Resources Management

- 100% of wastewater of RMC plants not discharged
- Suao Plant zero process wastewater discharge
- Hoping Plant domestic wastewater recycled via MBR
  - 7.34% water withdrawal | compared to 2022

Climate Action 13.3

Innovative Carbon Negative Technologies

- Cumulative investment of NT$189 million of carbon capture R&D budget | Since 2011
- Surveys into carbon sinks and soil carbon sinks in mines launched

→ Mutual care with communities fosters co-prosperity

Since 2020, TCC DAKA Open Eco-Factory has promoted sustainable development for industry and cities. The EARTH HELPER Carbon Reduction Action and Hoping Carbon Reduction Parent-Child Bankbook Program guide EV owners and nearby communities in lifestyle transformation. These efforts are featured as an iconic corporate case for SDG 13 in the Ministry of Education's SDG book.

TCC's Net-Zero Transition Recognized as Teaching Material for Elementary and Junior High Schools by the Ministry of Education

→ Corr. to Sustainability Financial Information
[Major topics 2]

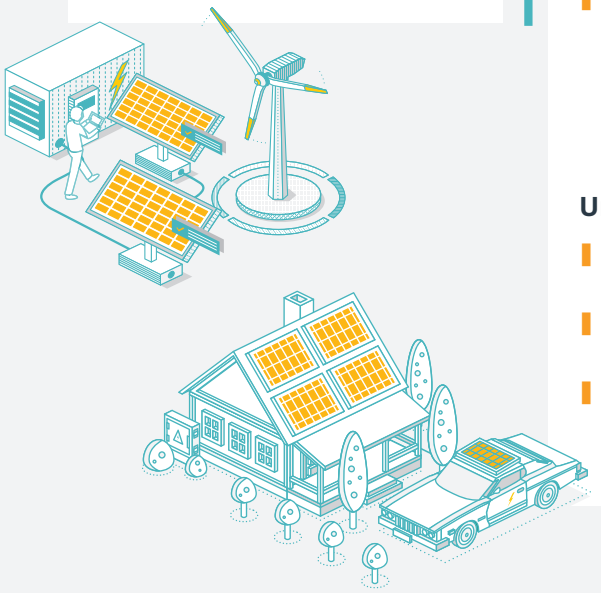
7 Affordable and Clean Energy 7.1 / 7.2 / 7.3

Renewable Energy Installation

- Renewable energy generated: over 315 million kWh | Cumulative from 2021 to 2023

Safe Energy Storage Solutions

- First patented EnergyArk fireproof & extinguishing guarantee Energy Storage Cabinet



→ Corr. to Sustainability Financial Information
[Major topics 3]

11 Sustainable Cities and Communities 11.6

Low-carbon Building Solutions

- Total Climate & UHPC Series
  Low-carbon products: reducing carbon without reducing strength
  Adopted by leading builders and construction companies

Total Solution Low-carbon New Energy Solutions

- Offering construction planning and services of green energy, energy storage, and charging station integrated with solar, charging and storage applications

Urban Microgrids Installation

- NHOA.TCC has accumulated 226 charging points
- NHOA's Atlante has a total of 4,111 charging points
- Energy Element Convenience Stores have sold over 40 million kWh of green electricity

14 Life Below Water 14.2

Marine Ecosystem Conservation

- Coral Rehabilitation Project at Hoping EcoPort: 1,001 corals have been rehabilitated | As of 2024/02/29

15 Life on Land 15.1 / 15.4 / 15.a

Mine Restoration

- Coverage rate of the Biodiversity Management Plan (BMP) for High-Risk Mining Areas: 100%
- Quarry Rehabilitation Plan (QRP) Coverage: 100%

4 Quality Education 4.1 4.7

5 Gender Equality 5.5

8 Decent Work and Economic Growth 8.9

10 Reduced Inequalities 10.2

Cross-domain Empowerment

- TCC Carbon Academy

Internal certification pass rate: 100%

- Sustainable Learning Action Program

48,496 participants with 100% coverage

2025 female employees target: 22%

- Share of women in total workforce: 23.7%

Cement and Battery Business (Southern Taiwan Science Park & Siaogang Plant) and NHOA

Cement Academy

- Collaboration with 21 elementary schools

Assist 1,293 students in securing proper educational resources

TCC DAKA

- 8.44 million visits | As of 2024/04

Note 8 Assessed according to the international IUCN, WPDA, and various regional databases.

Honors and Recognitions

2023

→ Sustainability Ratings

2023 MSCI ESG Ratings "A"

2023 CDP Climate Change B
Supplier Engagement Rating (SER) "B"

2023 CDP Water B

2023 S&P Global CSA
Top 7 in "Construction Materials"

Fitch Ratings "BBB-"

Taiwan Ratings "twA+"
Rating Outlook "Stable" Liquidity Assessment "Extremely Robust"

Greater China Business Sustainability Index "Pace-setter"

2023 Taiwan Sustainability Ratings of the NTPU on SEED "AAA"

The 10th Corporate Governance Evaluation of TWSE Top 5% in the TWSE-listed Companies

Included as Constituent
FTSE4Good TIP Taiwan ESG Index
Taiwan Corporate Governance 100 Index
MSCI Taiwan Select ESG Sustainability High Yield Top 30 Index
TIP Customized Taiwan Green Energy and Electric Vehicles Index
TIP Customized Taiwan Smart Vehicles and Supplier Alliances Index

Business Weekly's "Carbon Competitiveness 100"

→ Sustainability Initiatives

Member of Science-Based Targets initiative (SBTi)

TCFD Supporter

TNFD Early Adopters

ISSB's "Partnership for Early Awareness of Sustainability-Disclosure Today"

EP100 Member
The 1st large manufacturer in Taiwan

Signed Business for Nature
Make it Mandatory
Call to Action

Founding partner of BCSD Nature Positive Initiative

Taiwan Alliance for Net Zero Emission
"Silver" Net-Zero Label

It's Now for Nature

→ Sustainability Recognitions

The 19th CSR and ESG Awards of Global View Monthly in 2023 Honor of the Year
Model Award of Low-carbon Operations

No. 2, 2023 CommonWealth Excellence in Corporate Social Responsibility
Top 5, 2023 CommonWealth Talent Sustainability Award

→ Sustainability Recognitions

Top 10 Taiwanese Sustainable, Manufacturing Companies Award, 2023 TCSA, for 3 years in a row
Sustainability Report Platinum Award
Climate Leadership Award & Circular Economy Leadership Award

Golden Award, Profit-seeking Enterprise Category, 2023 Taiwan Biodiversity Awards

2023 BSI Sustainability Resilience Award - Pioneer

2023 "Energy Taiwan" and "Net-Zero Taiwan" Sustainability Award Platinum Award
Popularity Award

Gold Award, Green Design Award, 2023 SDGs Asia
Film: "Build home for coral reefs"

Silver Award, Sustainable Micro Movie, 2023 Taipei Golden Eagle Micro Movie Festival
Hoping EcoPort
Excellence Award, the 9th National Environmental Education Awards
High Distinction Award, Environmental Education Award, Hualien County
No. 1, Citizen Carbon Reduction Competition, Hualien County

→ Green Certifications

Hoping Plant, Hualien
Distinction Award, ESG Contribution Award, 2023 Taiwan Circular Economy Awards
Clean Production System of Green Factory Certification

Suao Plant, Yilan
Outstanding Enterprises in Industrial GHG Emissions Reduction from Industrial Development Administration (IDA), MOEA
Clean Production System of Green Factory Certification
Excellence in Green Procurement, Yilan County

Taichung and Kaohsiung RMC Plants
Clean Production System of Green Factory Certification, MOEA

Taipei, Taichung, Dadu, Kaohsiung, and Tainan RMC Plants
Excellence in Green Procurement, Ministry of Environment

Taipei RMC Plant
Outstanding Enterprises in Green Procurement Performance, Environmental Protection Department, New Taipei City

Kaohsiung RMC Plant
Entities with Distinguished Contribution in Green Procurement Amount, Environmental Protection Bureau, Kaohsiung City

Tainan RMC Plant
Excellence in Green Procurement and Resource Recycling Reporting Award, Environmental Protection Bureau, Tainan City

TCC DAKA Open Eco-Factory
Passed in the Renewal Evaluation, Tourism Factory, IDA, MOEA
High Distinction Award of the Best Public Toilet Award, Ministry of Environment

Hanben Ocean Station
Silver Award, Outstanding Public Toilet Ratings of Yilan County

Award situation of plants in Mainland China | Please refer to 2023 Sustainability Report (Simplified Chinese Version) →

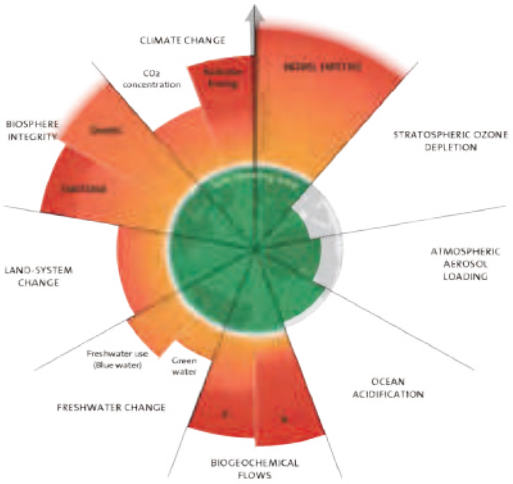
Total Climate Commitment

"Despite the daunting challenges ahead, we have the power to choose a path to a brighter future. That is the path we must succeed for the 30 years to come, the path of the carbon revolution!"

Nelson An-ping Chang,
Chairman

February 2024 was the hottest spring on record, 1.77°C above pre-industrial levels. Ocean surface reached 21.06°C, breaking the ninth consecutive yearly record and setting an all-time high.

Human activities have disrupted Earth's stability. The 2023 Planetary Boundaries report reveals breaches in six of nine critical thresholds, including climate, biosphere, land, freshwater, ocean, and biogeochemical flows. Climate change and biosphere integrity are the most crucial. With either one crossed, it can trigger significant systemic shifts .



↑
Planetary boundaries 2023,
3rd update-selected

TCC Decarbonizaiton and Green Transition Strategy | From Business Carbon Reduction to Aiding Others in Cutting Carbon.

TCC began its carbon revolution and global expansion in 2018, aiming for net-zero emissions by 2050. Aligning with its decarbonization and green transition strategy, TCC unveiled a new Net Zero roadmap in 2024, featuring " Net Zero Pathways for Cement and Concrete Business Units Worldwide" and "Avoided Emissions" to measure its green transformation progress and future goals.

Note9 Please refer to Chapter 2 and Chapter 3
* NEW MATERIALS

Innovative Carbon Capture Technology with Separate Oxyfuel

In 2024, TCC collaborated with thyssenkrupp Polysius (tkPOL), a company aiding European cement firms in the Catch4Climate project, a significant carbon capture initiative. Utilizing its Hoping Plant, TCC aims to co-develop the third-generation pure oxygen combustion technology to significantly increase CO_2 capture efficiency and reduce energy use. By 2030, TCC targets mastering this technology for commercial use and capturing 100,000 tons of CO_2 annually.

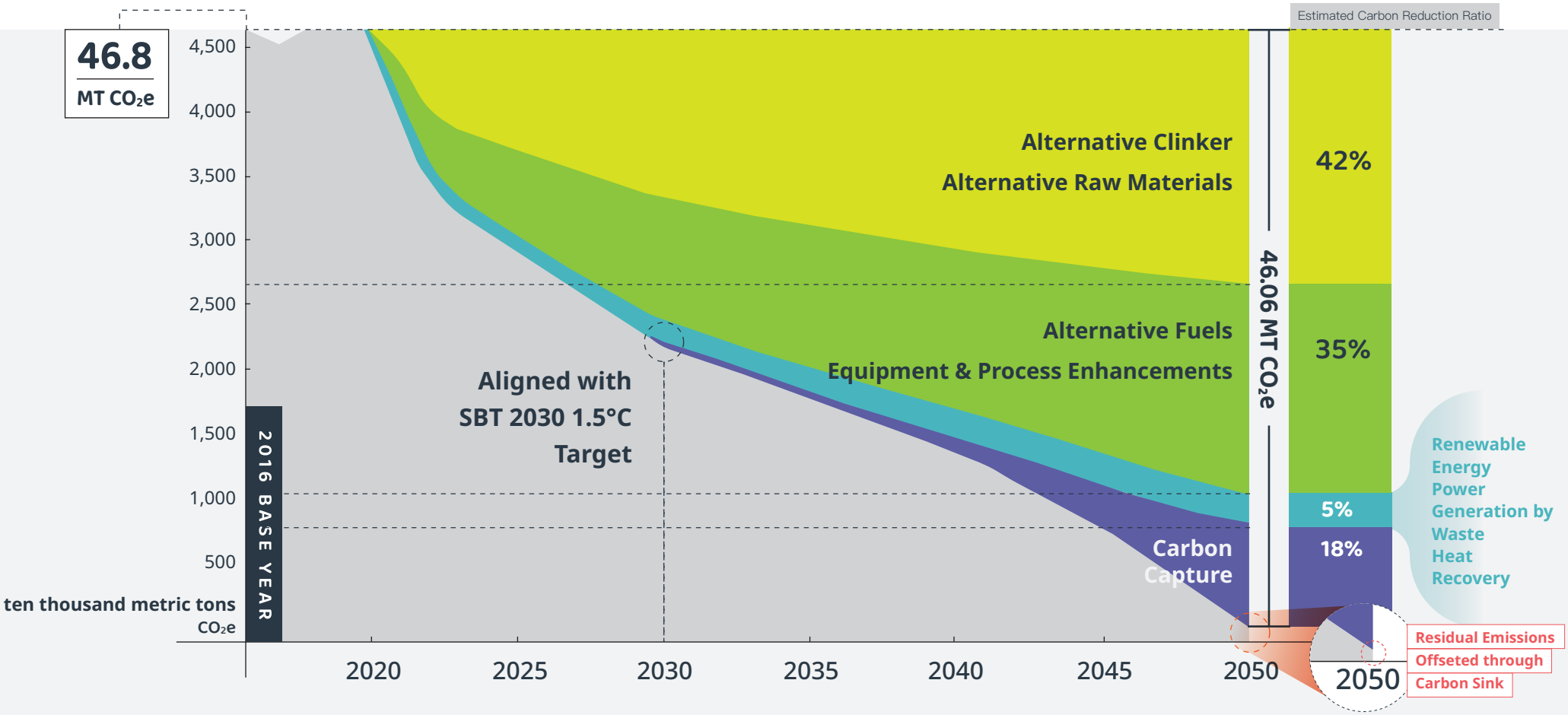
GRI 2-23

→ Net-zero Pathways for the Cement and Concrete Business Units Worldwide

TCC's 2050 net-zero roadmap for its cement and concrete businesses follows the SBT 1.5°C methodology and ISO's Net Zero Guidelines (IWA 42), with targets for 2030, 2050, and net-zero goals. It covers cement and RMC plants across Taiwan, Mainland China, Turkey, and Portugal, Low-carbon R&D Centers, and TCC Headquarters. Strategies invlove alternative clinkers, raw materials, fuels, waste heat recovery, process enhancement, renewable energy, and carbon capture. Forest and soil surveys from 2023 offer carbon removal options. Aligning with UN recommendations, corporate net-zero should follow IPCC and IEA models. The 2050 net-zero pathway is informed by the 2023 Net Zero Roadmap report and IEA's World Energy Outlook 2023. Please refer to the **ESG section on the TCC website.**

Methodologies for Net-zero Pathway

SBTi's Sectoral Decarbonisation Approach (SDA) for the cement sector's 1.5°C-aligned and net-zero SBTs	ISO Net Zero Guidelines (IWA 42); ISO 14064-1	MIT En-ROADS net-zero simulator's open-source formulas	International Energy Agency (IEA) Global Energy and Climate Model (GEC Model) logic and NZE Scenario parameters



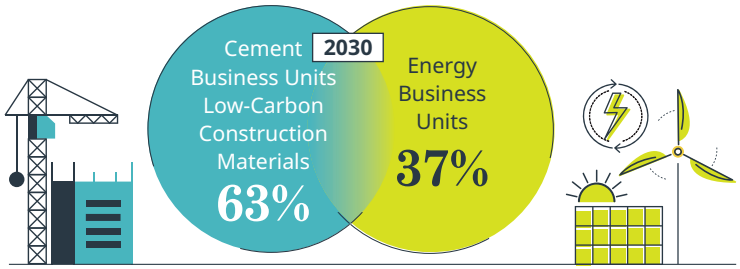
→ Avoided Emissions of TCC Business Units Worldwide

Avoided emissions measure the global impact of corporate transformation, quantified by low-carbon construction materials, renewable energy sources, and energy storage solutions. **By innovating products and services to address social challenges, TCC increases its value through impact transformation**.

Cement Business Units | Low-carbon Construction Materials

The UN's net-zero building pathway aims for a 40% reduction in embodied carbon from new projects by 2030. Low-carbon building materials are in demand due to green public procurement in the UK, US, Germany, and Canada. Taiwan's Public Construction Commission and Water Resources Agency have introduced carbon disclosure regulations. TCC has achieved 70% low-carbon products in Mainland China and launched the lowest-carbon limestone cement (Type IL) and limestone cement concrete (Type IL) in Taiwan in October 2023. TCC promotes low-carbon buildings and projects to listed companies, builders, and construction firms, quantifying sustainability impact alongside product sales.

Cement Business Units : Energy Business Units Constitutes Overall Impact



Energy Business Units

COP28 consensus and IEA net zero pathway: global renewable energy installed capacity should increase from 3,630 GW in 2022 to 11,000 GW by 2030; BloombergNEF estimates energy storage needs to increase 16.1 times. The IEA's 2023 Net Zero Roadmap update projects aviation activity will grow from 6 trillion to 16.5 trillion revenue passenger-kilometers from 2022 to 2050. Electric flying vehicles, including eVTOLs, must achieve proof of concept, small and large prototyping by 2030, and market entry by 2040, with ultra-high-power batteries playing a key role. TCC's renewable energy, energy storage, and battery developments align with international trends, enabling quantification of avoided emissions from global energy transformation.

Methodologies for Avoided Emissions

WBCSD's Guidance on Avoided Emissions	WRI's methodology for product carbon reduction impact quantification	European Union Innovation Fund's Methodology for GHG Emission Avoidance Calculation

Low-carbon Construction Materials

Assist Construction Industry

2023

-1.09 Million Tons CO_2e

2030 Target

-1.69 Million Tons CO_2e

2023

-7,5000 Tons CO_2e

2030 Target

-160,000 Tons CO_2e

Energy Storage

Stabilizes The Grid, Reducing Carbon Emissions from Traditional Thermal Power Auxiliary Services

Assist Energy Sector

2023

-60,000Tons CO_2e

2024-2030

Continue Developing Solar | Wind Geothermal | OTEC

2030 Target

-530,000 Tons CO_2e

Solar and Onshore Wind Power

Renewable Energy

Battery

Molicel Batteries

2023

Helped Power Tool Clients -2,300 Tons CO_2e

2030 Target

Being Used in 12,130 eVTOLs, Replacing an Estimated 620,000 Tons of Aviation Fuel Assisting Aviation Industry -320,000 Tons CO_2e

Low-carbon Construction Materials

Low-carbon cement and concrete are crucial for urban infrastructure. TCC assess its low-carbon products by comparing emissions to similar products using Taiwan's ARBI database. Future carbon reductions are projected using the Ministry of Environment (MOE) LEAP model. In mainland China, products are benchmarked against clinker emission intensity from "Technical Requirement for Environmental Labeling Products: Low-carbon Cement" and "A Study on the Carbon Neutrality Pathways of China's Cement Industry". Internationally, TCC applies the IEA's ASP scenario as a benchmark.

Renewable Energy

Assessing the carbon reduction benefits of TCC's solar, wind, geothermal, ocean energy projects, and signing CPPAs with major green energy developers.

The WBCSD methodology ensures no double counting of carbon reduction. For instance, TCC can claim avoided emissions if it signs a CPPA with a green energy developer and resells the energy to SMEs.. Renewable energy quantification involves multiplying annual renewable energy generated by that year's grid emission factor. Future emission factors up to 2030 are estimated by the MOE LEAP power model.

Energy Storage Business

Avoided emissions come from ancillary services reducing carbon emissions by assisting conventional fossil fuel-based power grids through frequency regulation, rapid response, and load balancing. When paired with renewable energy, energy storage systems also helps replace fossil fuel power with green electricity.

The Methodology for Calculation of GHG Emission Avoidance is used. First, energy storage systems on the generation and grid sides are distinguished, then the energy efficiency and power consumption are considered along with the emission factors of gas-fired power units and local power grids to calculate avoided emissions at project sites.

Battery Business

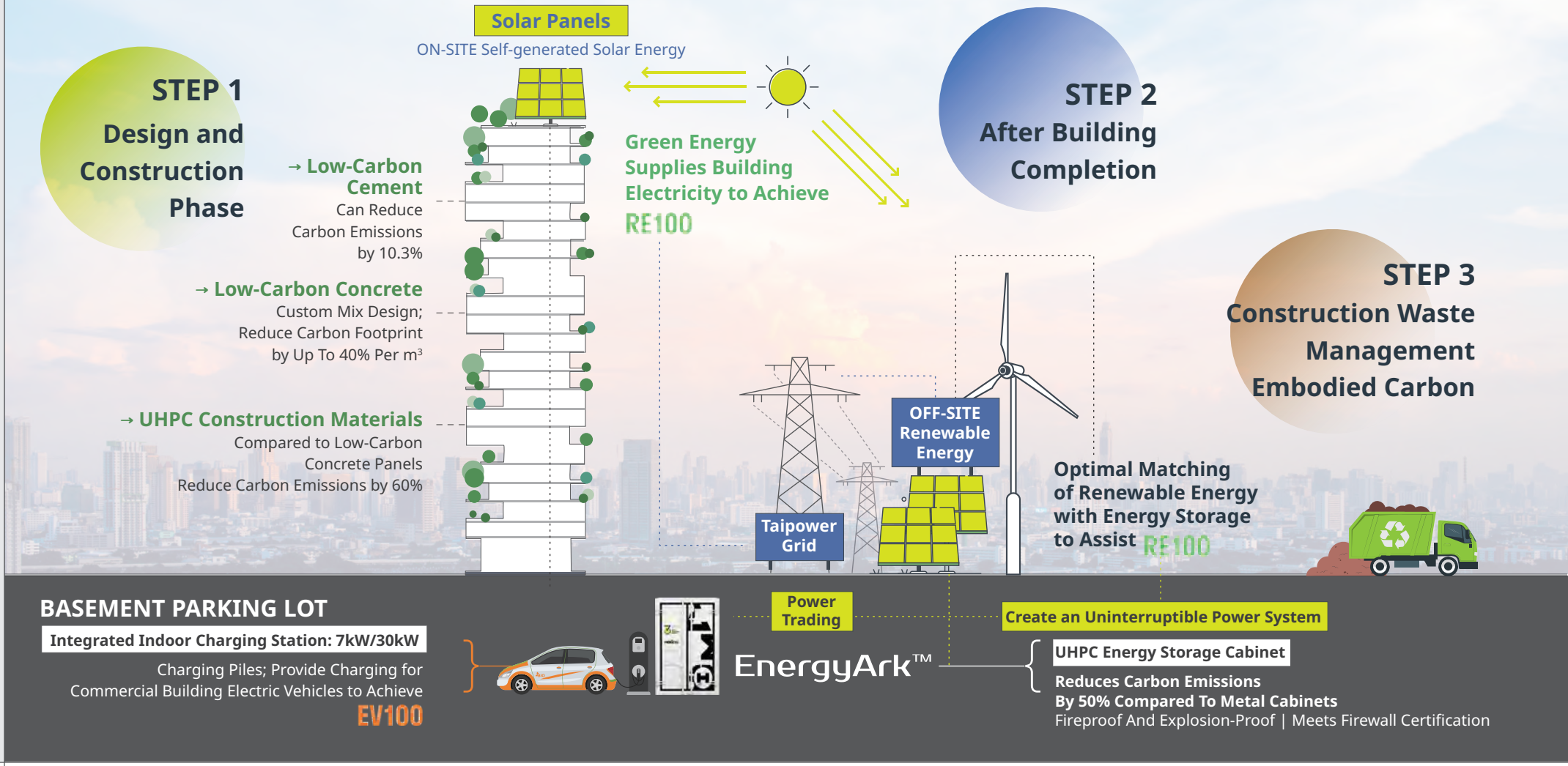
Avoided emissions come from using low-carbon batteries and replacing fuel vehicles with MOLICEL batteries in electric vehicles.

TCC's carbon reduction from P42A battery sales until 2030 is gauged by comparing 2022 MOLICEL battery carbon footprints with 2018 global averages from WEF. For eVTOLs using MOLICEL batteries, carbon reduction is calculated based on the European Environment Agency data on fuel-powered aircraft consumption per hundred passenger kilometers and local power grid emission factors.

Utilizing scientific frameworks and methodologies, TCC's gradual green transformation results are showcased as "TCC Net-zero Pathway for the Cement and Concrete Business Units Worldwide" and "Avoided Emissions of TCC," turning challenges into opportunities. While reducing emissions in its cement business, TCC launched new products and services for avoided emissions. TCC aims to offer climate solutions with high avoided emissions, leading value chain to jointly achieve net-zero targets.

→ Total Solution: Comprehensive Low-carbon Circular and New Energy Building Solutions

The UN estimates 68% of the global population will live in urban areas by 2050, with urban construction and infrastructure contributing 43% to global emissions. Embodied carbon from materials, transport, construction, renovation, and waste, accounts for about 35% of these emissions, while operational carbon from energy use makes up 65%. TCC is transitioning to low-carbon materials, resource recycling, and new energy, developing low-carbon products and services to meet demands for low-carbon materials, waste management, and green energy. The "Total Solution: Low-Carbon New Energy Building Solution" addresses climate mitigation and urban resilience by assessing optimal low-carbon construction materials and energy use. It covers design, construction, operation, and urban renewal, offering a complete life cycle assessment and services for buildings.



→ Design and Construction Stage — Embodied Carbon

Estimated 30% average carbon reduction in building design (Based on Ministry of the Interior data)

- TCC's "Low-Carbon Building and Engineering Carbon Emission Estimation System" enables clients to assess carbon savings by using TCC's low-carbon materials.
- TCC offers low-carbon products with carbon footprint reports, aiding in low-carbon building certification.
- TCC assists clients in planning and installing renewable energy and storage to increase green electricity use.
- TCC helps install charging piles integrated with solar, charging, and storage.

→ Building Use Stage — Operational Carbon

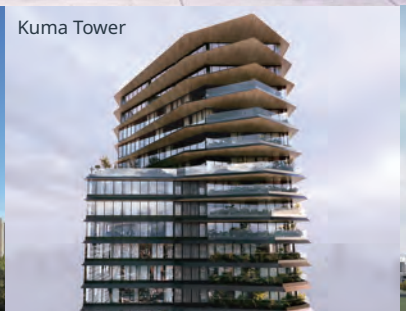
- Smart energy-saving services with renewable energy, storage, and charging equipment, integrated with EMS.
- Green power wheeling services.
- Aggregated energy trading platform management, including frequency regulation, spinning reserve, supplemental reserve, and backfeeding service planning.
- Uninterruptible power supply system planning to reduce costs and stabilize power grids.

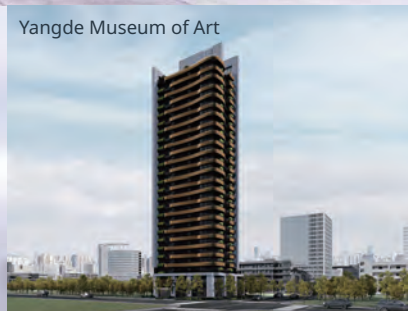
→ Construction Waste Stage — Embodied Carbon

- Treatment of construction waste from urban renewal or demolition.
- Use construction waste as resources, replacing raw materials in cement or as concrete aggregates.

→ Key Projects


Fubon Construction Property Insurance Headquarters Building


Kuma Tower


Yangde Museum of Art

Projects	Project Name	Usage of Low-Carbon Concrete Volume	Amount of Carbon Reduction	
North District Fubon Construction Property Insurance Headquarters Building	Fubon Construction Property Insurance Headquarters Building	16,407m³ New project	2,394 Ton-CO_2e	37%
Taoyuan District Dayi Technology Luchu District Shanbi Factory New Construction Project	Dayi Technology Shanbi Factory	13,000m³ New project	2,001 Ton-CO_2e	42%
Central District Lufu Construction Fengda Section	Lufu Construction	61,423m³ New project	11,364 Ton-CO_2e	43%
Central District Changan Daxu New Construction Project	T6 Project Changan Daxu	25,568m³ New project	4,424 Ton-CO_2e	42%
South District Meishu Nanshan Rd, South Second Rd, Gushan District	Yangde Museum of Art	11,891m³ Conversion from existing project	1,188 Ton-CO_2e	29%

Total Care Commitment

Employees are the cornerstone to the sustainable development at TCC.

Chairman Nelson An-ping Chang emphasizes that a company's survival hinges on three pillars: societal contribution (air), profitability (food), and employee welfare (water). Neglecting employee care can lead to a company's downfall.
At "human-centered" TCC, all employees form a "family" that cares for each other for the common good.

→ Across 11 sectors, 47 nationalities, and 6 generations | Employee Diversity, Equity, and Inclusion (DEI) Programs

Reflecting industry shifts over 78 years, TCC's workforce now includes six age generations. The past decade saw female staff grow from 7% to 20%, the 20-29 age group from 7% to 10%, and those 60+ from 1% to 7%. The 40-60 age bracket remains a stable quarter of the team. TCC records consistent turnover rates.

Bridging the Age Gap with Inclusive Empathy & Establishing a Tech Support Team

TCC's workforce, spanning six generations, values the exchange of knowledge across age groups. TCC's apprenticeship system and resource models encourage collaboration, while Town Hall Meetings, employee camps, Family Day, road races, and tours enhance intergenerational communication. TCC's upcoming tech support team will provide opportunities for seasoned and retired employees to explore new career paths and realize their potential.

Stellar Performance in the 1st CommonWealth Talent Sustainability Award

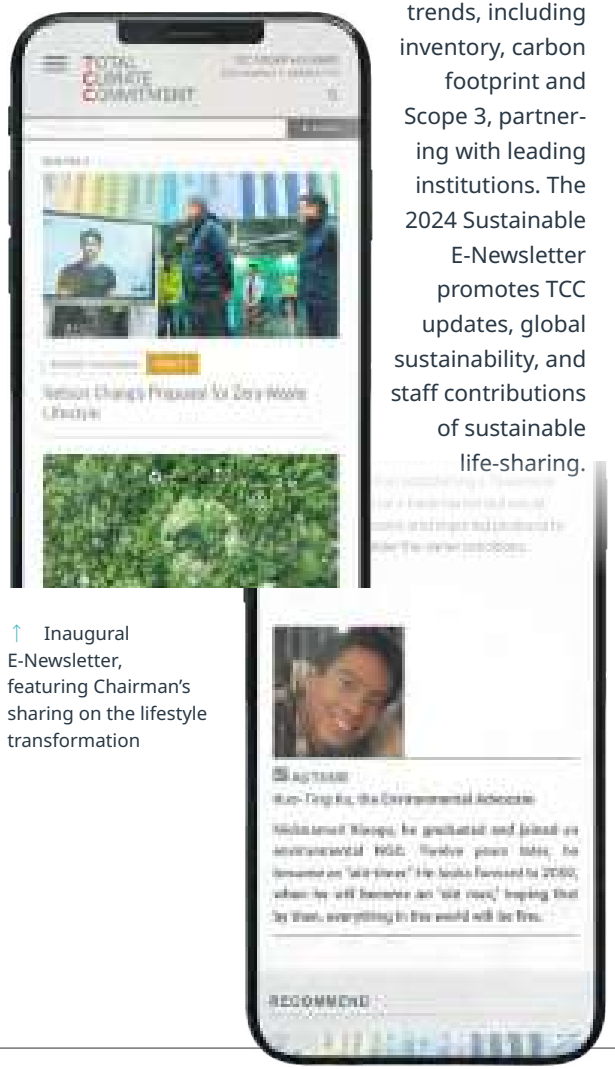
TCC emphasizes DEI at its core, earning recognition for its "human-centered" approach with a top-five finish in the CommonWealth Talent Sustainability Award. TCC actively fosters diversity and inclusion, with targeted initiatives for women, seniors, and international staff, resulting in a 100% increase in female representation.

Interdisciplinary Transfer for Talent Empowerment & International Teams for Professional Exchange

TCC, aligning with global trends, advances into diverse sectors including cement, environment, energy, and IT. Subsidiaries NHOA and NHOA.TCC completed Taiwan's largest energy storage projects at Hoping and Suao Plants. Focused on cross-disciplinary, multinational teamwork, TCC promotes skill development via biweekly English meetings, creative thinking, language courses, and internal transfers. TCC also launched the Key Talent Development Program, including professional and management training, enable overseas rotations and build a talent succession pool.

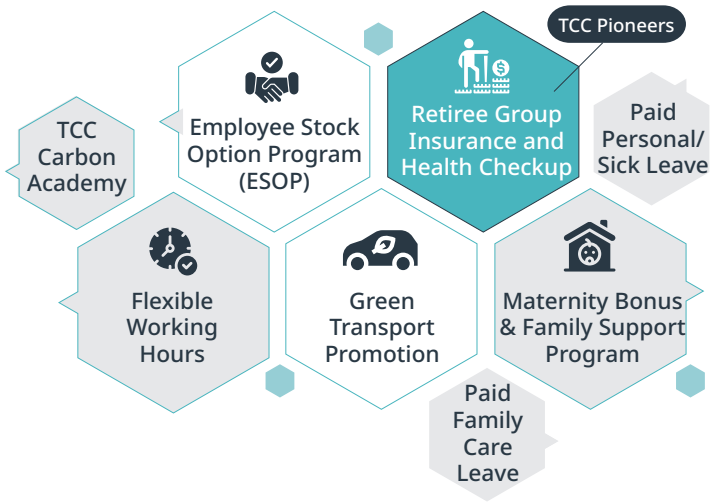
From Knowledge to Skills to Fully Build the Sustainable DNA

TCC's mandate is "in service of society, earth, and life," weaving carbon reduction and ESG into its operations. Focusing on enhancing employee sustainability awareness, TCC rolled out the Sustainable Learning Action Program in 2023, featuring online and offline courses linked to performance evaluations. TCC's Carbon Academy delivers expert training on global carbon trends, including inventory, carbon footprint and Scope 3, partnering with leading institutions. The 2024 Sustainable E-Newsletter promotes TCC updates, global sustainability, and staff contributions of sustainable life-sharing.



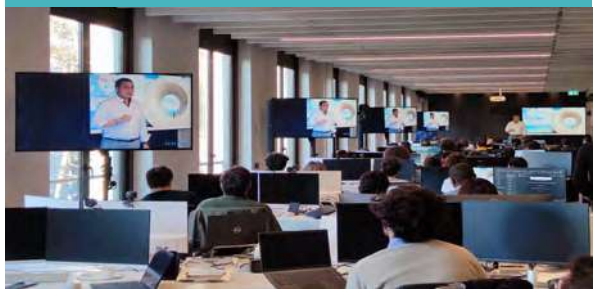
↑ Inaugural E-Newsletter, featuring Chairman's sharing on the lifestyle transformation

→ Big Family of TCC for All-round Career Care Scheme



NHOA Group Annual Meeting

At the Meeting, a diverse group of employees convened in Italy, led by Chairman Chang, for knowledge sharing and team bonding. The highlight was the launch of the "NHOA Ski Team" by CEO and Paralympic Medalist Daniele Cassioli, aimed at promoting skiing among students, staff, and the differently-abled, enhancing unity and inclusivity. The event featured a ski contest to uplift spirits and strengthen team cohesion.



A Pioneer in Cross-border Exchange—Dante

Dante, a Renaissance pioneer, promoted cross-border exchange, mirroring the inclusive diversity at TCC. Many Italian employees from TCC's energy storage company have come to work in Taiwan. A special "Dante Movie Night" at Operation Headquarters in partnership with the Italian Economic, Trade and Cultural Promotion Office, offered cocktails and Italian dishes, fostering cultural appreciation and lifestyle insights among attendees.

The Earth-shattering Minute: A Chronicle of the Hualien Earthquake on April 3

On April 3, 2024, a 7.3 magnitude earthquake hit near Hualien, Taiwan, causing intense tremors nearly a minute. It was the strongest since the Jiji Earthquake 25 years ago. TCC's 3-in-1 Park of EcoPort, Power Plant, and Cement Plant in Heping, Hualien, recorded a maximum seismic intensity of 6. Chairman Nelson Chang led TCC's emergency team, activating the Business Continuity Plan (BCP), **prioritizing staff safety**, and evaluating facilities and operations. The quake's significant ground shift led to revised response plans and BCP enhancements for improved resilience. For more details on TCC's risk management and BCP, please refer to Section **1.3 Risk Management Implementation Framework.**

DAY 0 — 4/3

Operation Headquarters

- TCC's Emergency Response Team: led by the Chairman with President and VPs as Members, manages safety, equipment, and production, formulating response strategies
- HQ Logistics Group: Led by the President, with General Affairs and department heads, oversees office sites and assesses supply needs.
- Chief Sustainability Officer (Spokesperson): Manages public opinion and reporting
- Chief Human Resources Officer: Confirms school and work closures in impacted areas and adjusts employee attendance
- All business units: Propose alternative business continuity plans

Cement Plants

Managers' line groups of plants

STEP 1

Confirmed personnel safety

STEP 2

Enforced emergency measures for power outage on the plant

- Plant-wide powercut
- Cement kiln slow rotation device engaged

Mine

Mine team radio communication network

STEP 1

Confirmed personnel safety

- On-duty personnel called; no response from outsourced personnel Contacted on-duty staff; no reply from outsourced team members
- 59 employees and 10 contractors evacuated to open space outside mine office

STEP 2

Proceeded to the scene

- 2 trapped contractors confirmed safe
- Helicopter rescue arranged; personnel rescued at noon

STEP 3

Checked external communication

- Mine roads blocked by rockfalls; drones deployed for inspection
- **Excavators mobilized for initial clearance**

STEP 4

Ensured trapped personnel were well supplied

- Inventoried existing mine supplies
- Foraged local wild vegetables
- Helicopter delivery of relief supplies arranged

Informed families of trapped personnel

Hoping EcoPort

The loading/ unloading machin ery severe damaged, but no personnel injured

Hoping Power Plant

Auxiliary generators engaged to restore power in the event of turbine trip, along with a full overhaul

The Earth-shattering Minute: A Chronicle of the Hualien Earthquake on April 3

DAY 1 — 4/4

Cement Plants

STEP 1
Initiated plant-wide overhaul after gradual reduction of cement kiln temperature

STEP 2
Conducted damage assessment and reporting

STEP 3
Proposed alternative BCP

Mine

President went to Heping to organize all rescue matters on the behalf of Chairman

STEP 1
Helicopter delivered relief supplies early morning. Mine employees voluntarily return from leave to assist

STEP 2
10 personnel descended safely; others used an alternative forest trail due to stable weather and terrain familiarity

STEP 3
Advance employee cafeteria food preparation and notify families for personal medication provision

STEP 4
Checked personnel's physical condition and provided basic medication and dressing

STEP 5
President expressed care for the mine team after all personnel were evacuated

Hoping EcoPort

STEP 1
Conducted damage assessment and reporting

STEP 2
Proposed alternative BCP

Hoping Power Plant

STEP 1
Conducted damage assessment and reporting

STEP 2
Proposed alternative BCP

STEP 3
Minister of MOEA check repair progress Emergency repairs continued

DAY 2 — 4/5~ **Alternative BCP confirmed**

Operations of certain units continued Uninterrupted supplies ensured

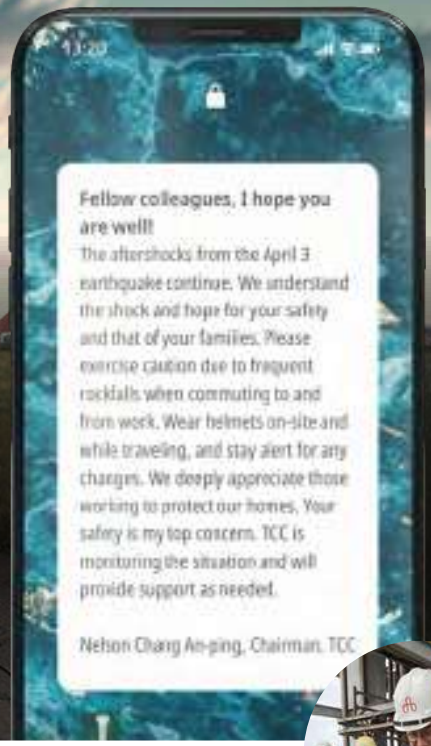
Employing hilltop platform phased-excavation and a vertical shaft transport system, the transportation of mined stones continues, utilizing the latter's enhanced seismic resistance over traditional methods.

Vehicle transport in place of enclosed corridors for fuel transportation

Emergency repair continued

Assistance to household repairs; support to local businesses in Hualien

Note 10 Continuous aftershocks after the April 3 earthquake delayed confined space repairs and high-altitude operations in the Hoping Power Plant furnace. Repairs are postponed to April 15, grid-connection on April 16, and full-load operation resumption on April 17.



TCC damage report and material information of operations

Following the earthquake in eastern Taiwan on April 3, TCC's facilities, including the Hoping Plant, Ho-Ping Power Company, and Ho-Ping Industrial EcoPort Corporation, have incurred damage. Hoping Plant and Ho-Ping Power will proceed with maintenance for Kiln No. 2 and Unit 2 as planned, respectively. Kiln No. 1 will start on April 26, and Unit 1 will power up on April 14. Ho-Ping EcoPort has activated backup systems to ensure cement and coal transport. Full operations are expected by early May. TCC reports a consolidated revenue loss of NT$750 million and a gross profit decrease of NT$250 million due to operational impacts. Repair costs for damaged equipment are estimated at NT$800 million, with capital expenditures at NT$500 million, current expenses at NT$300 million, and an expected insurance payout of NT$220 million.

DAY 6 — 4/9

As dawn broke on April 3rd, TCC Mine employees set out along the mountain path, only to be met with a sudden quake. Rocks cascaded down, blocking their way. The manager's urgent call to gather in the open office area was a race against time, as aftershocks continued to echo through the mountains.

Home Safe for Hoping Mine Employees 32 Hours after Shock

Warmest Hug

At 1,010 meters, the Hoping mine's descent required vertical climbing. Most TCC Mine Team members, from local Hoping and Aohua tribes, knew the terrain well. Several were volunteer firefighters, facilitating the descent. Employees on leave joined tribal youth to help via an old forest trail. Despite challenges, 59 workers were evacuated. Their families greeted them warmly at the trail's end, with children ran to hug their returning fathers.

Upon reaching safety, TCC provided hot meals for the employees and their families at the cafeteria. President Roman Cheng visited, conveying the Chairman's regards and presenting red envelopes to each worker. After overcoming the earthquake disaster, a simple meal became even more precious!

Assistance to Damaged Households in the Tribe for Post-earthquake Repairs

Heping Village, close to the earthquake's epicenter, suffered extensive damage, isolating it from external transport. Villagers endured days of cleanup and nights outdoors, wary of aftershocks. Hoping Plant aided reconstruction, repairing homes and public facilities. They restored a 93-year-old villager's water tower and pipes, and fixed water pipes at Cifu Temple, alleviating villagers' concerns.

TCC in Action to Support Local Brands During the Post-earthquake Tourism Winter in Hualien

TCC, with a 20-year presence in Hualien, initiated a campaign to bolster local green brands post-earthquake. Despite damages to Hoping EcoPort, Power Plant, and Cement Plant, TCC promoted local products and eco-friendly brands on social media, urging support for the community's recovery.

TCC Material Topics & Stakeholder Engagement

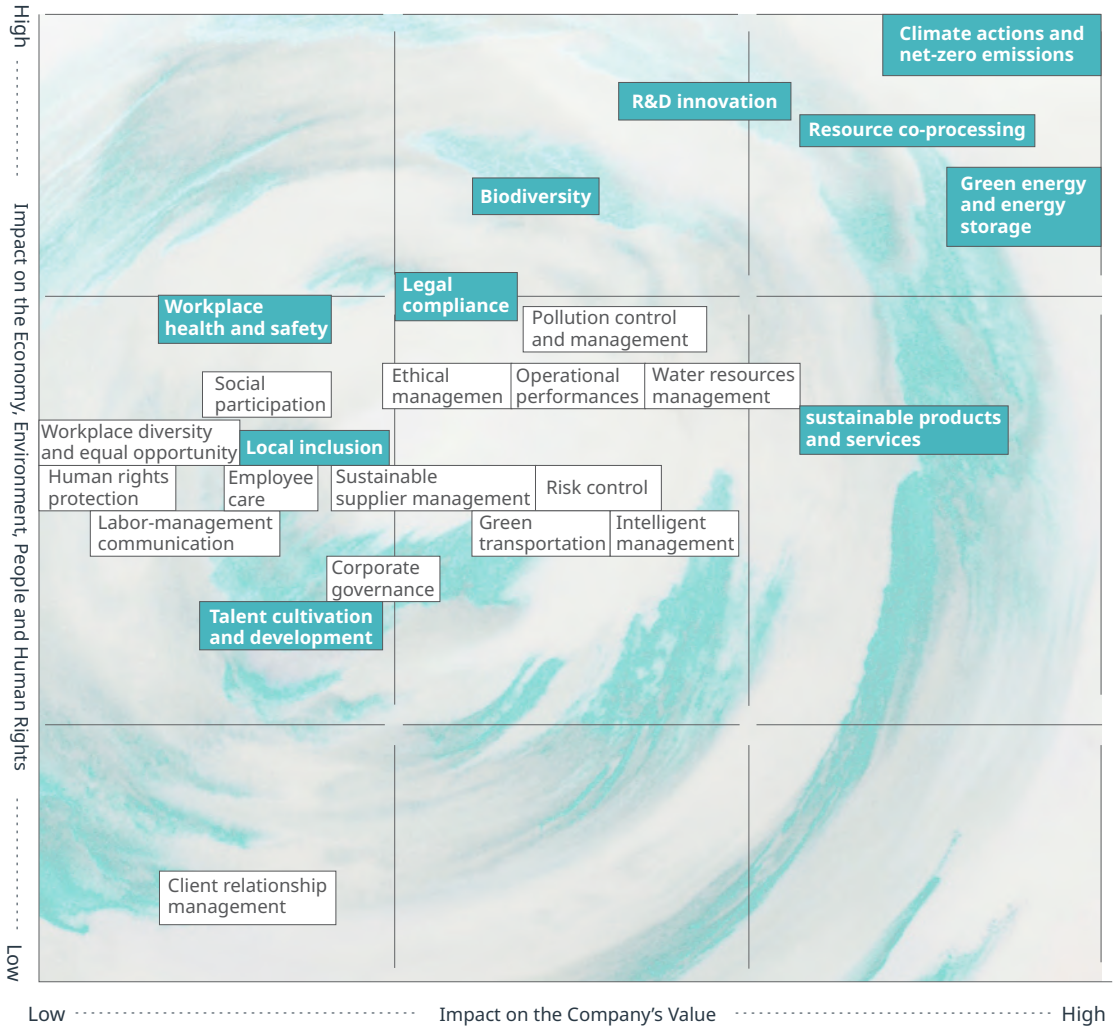
→ Double Materiality Analysis of Sustainability Issues

TCC conducts sustainability issue identification every other year. The "Double Materiality" analysis principle is adopted this year. In accordance with the GRI Universal Standards 2021, with reference to the international trends of sustainable development, international sustainability ratings(eg. MSCI,S&P CSA and CDP), sustainability disclosure standards, industry characteristics, and benchmark corporate practices, TCC compiled a list of sustainability issues to survey the opinions of stakeholders on each sustainability issue and consider the "impact on the company's value" and "impact on the economy, environment, people and human rights" of each sustainability issue. It comprehensively evaluated the positive and negative impacts of sustainability issues from both internal and external perspectives of the organization and identifies the material sustainability topics of the year in terms of the level of impact and likelihood.

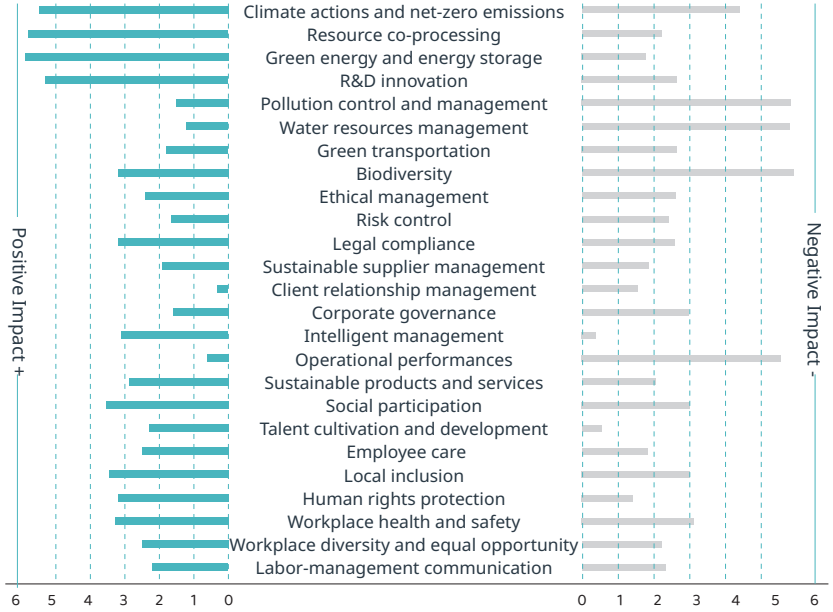
Through the double materiality analysis, a total of 8 material sustainability topics were identified, including "climate actions and net-zero emissions," "resource co-processing," "green energy and energy storage," "R&D innovation," "sustainable products and services," "biodiversity," "legal compliance," and "workplace health and safety." Meanwhile, considering that "pollution control and management" and "water resources management" have a higher negative impact on the economy, environment, people and human rights, and are the focuses in the industry disclosure of various sustainability disclosure standards, both are also included in the material sustainability topics this year. In addition, in the human-centered, TCC puts employee inclusion and common good into practice. After discussion at the management meeting, "talent cultivation and development" and "local inclusion" are included in the material topics this year as well.

A total of 12 material sustainability topics were identified for TCC in 2023. The identification result was adopted by the Board of Directors. Also, the development and achievement on these material sustainability topics are linked to the executive remuneration.

→ 2023 TCC Double Materiality Matrix



→ 2023 Positive/Negative Impacts on the Economy, Environment, and People and Human Rights



Stakeholder Identification Result

Referring to the AA1000 Stakeholder Engagement Standard (SES), TCC identifies and prioritizes the key stakeholders based on the five principles, i.e., Responsibility, Influence, Tension, Diverse Perspectives, and Dependency.

→ Assessment Process for Stakeholders and Material Topics

	Step and Action	Key Performance
STEP - 1	**Identify stakeholders** Department heads complete a survey to rank and identify key stakeholders.	**categories of stakeholders identified**
STEP - 2	**Zoom in on the sustainability issues of TCC** List sustainability issues based on global trends, ratings.	**25 sustainability issues cover corporate governance, economy, environment, and people and human rights**
STEP - 3	**Assess impacts of sustainability issues on the economy, environment, people and human rights** Hold a workshop on material topics, invite VP-level supervisors to identify impacts, and ask each unit to send survey in Chinese and English to 10 internal/external stakeholders to capture the levels of impact.	**337 questionnaires collected**
STEP - 4	**Assess impacts of sustainability issues on operation** The Corporate Sustainable Development Committee and VP-level supervisors assess sustainability impacts on operation and rate the significance based on the "level of impact" and"likelihood" of respective impacts.	**8 VP-level and above supervisors discussed at management meeting**
STEP - 5	**Double materiality assessment & analysis** Summarize internal/external survey results, map double materiality matrix, link issues and TCC sustainability strategies, and decide material topics for 2023.	**12 material topics identified by the Corporate Sustainable Development Committee**
STEP - 6	**Determine material topics** Submit the 12 material topics identified to the Board of Directors to ensure these material topics are aligned with the business risks and strategies of TCC.	**Submitted to the Board of Directors compliance of in sustainability and integrity**

Government & Competent Authorities
They affect policy and industry development and care TCC's legal compliance

Shareholders & Investors
They fund TCC and care for operational performance and sustainability

Clients
They value TCC's quality, services, operations, compliance, and environmental protection efforts

Employees
The key for ongoing breakthroughs and innovations as a crucial human capital at TCC

Suppliers/ Contractors
Partner in quality improvement and jointly address environmental and social issues

Media
They help TCC in disclosing and communicating sustainability-related actions

Local Communities
Residents near TCC sites concern about its local operations

Industry Associations/ Industrial & Academic Organizations
They partner to advance the industry and share business insights

Sustainability Associations
They are concerned about TCC's sustainable actions, and share the latest trends with TCC

Environmental Groups/NGOs
They value TCC's environmental, employee, and community efforts and urge more progress

→ Impact Management of Material Topics

Note11 +indicates a positive impact; −indicates a negative impact

Supply Chain | TCC Operations | Products/Services | Local Communities

Material Topic	GRI Topics/ SASB Indicators	Significance to TCC (Operational Materiality)	Significant Impacts	Impacts to Value Chain	Policy Commitment	Management Actions	Chapters of Disclosures
Climate Actions and Net-Zero Emissions	GRI 201: Economic Performance 2016 GRI 302: Energy 2016 GRI 305: Emissions 2016 SASB Topic: Greenhouse Gas Emissions	The cement industry is a high-carbon industry that has a negative impact on the climate. TCC proactively adopts emission reduction measures to bring positive impacts to climate change via innovative technologies.	+Climate-related opportunities −Climate-related risks		TCC participates in the global low-carbon transition and stays aligned with the "Paris Agreement" to limit global warming to 1.5°C or lower.	Seven Carbon Reduction strategies have been formulated, aiming to march towards the goal of 'Net Zero by 2050'.	Total Climate Commitment 02 Carbon Reduction
Resource Co-processing	GRI 306: Waste 2020 SASB Topic: Waste Management	TCC extends its core power as services through the co-processing technology of cement kilns to help the society and industries resolve waste issues while creating positive impacts like circular use of resources.	+Circular economy of resources +Good interaction with society		TCC is committed to resource recycling and using recycled materials with low environmental impact for the sustainable use of resources of Earth.	Industrial wastes of various industries are co-processed leveraging the high temperature property of cement kiln. In addition, TCC DAKA Renewable Resource Recycling Center was established to facilitate the treatment of domestic wastes for the local residents in Hualien.	Total Climate Commitment 02 Carbon Reduction
Green Energy and Energy Storage	GRI 302: Energy 2016 SASB Topic: Energy Management	TCC develops green energy in response to the government's energy transition policy, which helps reduce the industry's dependence on fossil fuels, mitigating climate change. This also yields positive impacts on the overall economy and society.	+Technological and product innovation +Climate-related opportunities		Setting out from its 3 core businesses, TCC created new living models of low-carbon new energy, so as to build all-round EV low-carbon cities for the future.	Actively invest in the development of renewable energies, smart energy storage, and integrated services with solar, charging and storage applications; launch EnergyArk Energy Storage Cabinet that is fireproof and fire-extinguishing.	Total Climate Commitment 03 Greening
Sustainable Products and Services	GRI 301: Materials 2016 SASB Topic: Product Innovation	Committed to product lifecycle management, TCC continuously researches and controls its processes to reduce the carbon content of products and the water resources used in manufacturing. This ensures that its products meet client needs and comply with environmental standards	+Technological and product innovation +Climate-related opportunities		Aiming for low carbon, energy saving, and zero waste in TCC products, TCC demands the partners in the value chain to implement sustainability management in facets of production, manufacturing, transportation, and services.	Introduce various ISO management systems to systematically manage the production process and improve the green content in products by setting production targets such as product's carbon emission intensity.	02 Carbon Reduction 03 Greening

Note11 +indicates a positive impact; −indicates a negative impact Supply Chain TCC Operations Products/Services Local Communities

Material Topic	GRI Topics/ SASB Indicators	Significance to TCC (Operational Materiality)	Significant Impacts	Impacts to Value Chain	Policy Commitment	Management Actions	Chapters of Disclosures
Legal Compliance	GRI 205: Anti-corruption 2016 GRI 206: Anti-Competitive Behavior 2016 SASB Topic: Pricing Integrity & Transparency	Legal compliance not just reduces operational risks and penalties but also improves overall operational performance. TCC has established a corporate culture on the basis of integrity to ensure that all operational procedures comply with relevant legal and regulatory requirements.	−Operational risks such as penalties or losses arising from regulation violation		TCC has established rigorous internal control and legal compliance systems, prevent compliance risks, and protect the Company's reputation. TCC also prohibits any conduct of unfair competition and upholds a free-market competition mechanism.	Identify and track matters such as law amendments and competent authority requirements through the "Internal/External Issues Registry" on a regular basis. Meanwhile, establish the reporting system and whistleblower protection mechanism to establish compliance awareness among employees.	01 Governance
Workplace Health and Safety	GRI 403: Occupational Health and Safety 2018 SASB Topic: Workforce Health & Safety	Failure to properly implement workplace safety measures will expose employees to potential occupational safety risks, possibly lead to safety incidents, increasing losses and legal liabilities. TCC attaches great importance on workplace environment, establishing a safe workplace without concerns for employees.	+Healthy and safe workplace −Occupational hazards		"OHS Policy" has been stipulated at TCC, 100% applied to all employees and contractors. Also, TCC has been aiming for "zero work-related injuries" among employees and contractors.	The ISO 45001 OHS management system has been introduced and 100% applied to the cement plants, RMC plants, and Operation Headquarters of TCC. Additionally, the workplace safety awareness of personnel is strengthened via safety management and promotion for contractors, occupational health and safety education and training, etc.	05 Inclusion
R&D Innovation	Self-defined material topic SASB Topic: Product Innovation	TCC continues to invest in the research and development in basic construction materials, energy storage equipment, and carbon capture technology, actively improves product and business values, introduces energy for innovation to the industry.	+Technological and product innovation +Climate-related opportunities		Continuously invest in the research of low-carbon products and technologies, develop innovative and eco-friendly products and services, and boost added value.	Establish R&D centers and new units dedicated to business promotion, actively seek opportunities to collaborate with international entities, and harness energy for innovation.	Total Climate Commitment 02 Carbon Reduction 03 Greening

Note11 +indicates a positive impact; −indicates a negative impact

Supply Chain TCC Operations Products/Services Local Communities

Material Topic	GRI Topics/ SASB Indicators	Significance to TCC (Operational Materiality)	Significant Impacts	Impacts to Value Chain	Policy Commitment	Management Actions	Chapters of Disclosures
Biodiversity	GRI 101: Biodiversity 2024 SASB Topic: Biodiversity Impacts	The quarrying of limestone, the primary raw material for cement, may lead to destruction of the ecosystem on land. Committed to restoring the original ecosystem services and maintaining biodiversity, TCC actively reduces the negative impacts potentially arising from operations.	+ Maintaining biodiversity systems − Loss of biodiversity		With the "Biodiversity Policy" and "No Deforestation Commitment" formulated Committed to prevents and reduces impacts of development to nature, and engages in restoration projects.	TCC has implemented biodiversity protection measures on land and at sea. Also, it has become one of the TNFD Early Adopters. TCC is engaged in indigenous species ecosystem restoration projects and soil research programs in its mines.	04 Nature
Local Inclusion	GRI 413: Local Communities 2016	TCC actively participates in community development and charitable activities, establishes various channels to connect with local communities, as well as promotes inclusion of enterprises and local residents.	+ Social impact increase − Reputation damage		The EARTH HELPER initiative communicate sustainability value in collaboration with sustainability partners.	Organize EARTH HELPER carbon reduction sustainability actions, Carbon Reduction Parent-Child Bankbook, etc., and establish Hoping Sustainability Charity Foundation.	05 Inclusion
Talent Cultivation and Development	GRI 404: Training and Education 2016	Improving the professional level of personnel and meet the development needs of the Company, drive innovation and enhance competitiveness, help mitigate the talent gap, and construct a vibrant talent system.	+ Increase in the corporate talent asset competitiveness − Talent loss		Talents constitute the crucial cornerstone of sustainable business operations. Committed to cultivating diversified developments of its employees, TCC endeavors to maximize their potential.	Offering interdisciplinary and diversified opportunities, TCC launched the "TCC Climate Action Talent Recruitment Program," and provides support through employee development blueprint and training resources.	Total Climate Commitment 05 Inclusion

Note11 +indicates a positive impact; −indicates a negative impact

Material Topic	GRI Topics/ SASB Indicators	Significance to TCC (Operational Materiality)	Significant Impacts	Impacts to Value Chain (Supply Chain / TCC Operations / Products/Services / Local Communities)	Policy Commitment	Management Actions	Chapters of Disclosures
Pollution Control and Management	GRI 305: Emissions 2016 SASB Topic: Air Quality	TCC rigorously manages the pollution of noise, wastewater, and exhaust gas through reduction, collection, and control technologies, thereby reducing the negative impacts of the company's operations on the environment.	− Pollutions and impacts on the surrounding environment	TCC Operations	Aiming for "zero pollution and zero emission/discharge," TCC adopts the best available pollution preventive and control technologies and measures.	TCC has strengthened its environmental protection and treatment facilities to prevent water, air, and soil pollution, including the internal monitoring of wastewater and high standards for managing air emissions.	02 Carbon Reduction
Water Resources Management	GRI 303: Water and Effluents 2018 SASB Topic: Water Management	TCC actively enforces various water consumption and conservation plans in order to address the potential negative impacts arising from water shortage and the impacts from water withdrawal on communities where it operates.	+ Water resources management and reuse − Water resources consumption and pollutions	TCC Operations / Products/Services / Local Communities	Aiming for "not a drop of water wasted," TCC seeks a sustainable use of water resources, improves water resources management to increase water use efficiency.	Effectively managing the use of water resources through the implementation of water conservation programs, certification to the ISO Management System, and establishment of a systematic water footprint management platform, among other initiatives.	02 Carbon Reduction

→ Description for the Change to the Material Topics in 2023

Reason for Change	Description of Change
Adjustment to the Title of Sustainability Issue	For organizational operations and management practices, "Innovation & Intelligent Optimization" is adjusted into "R&D Innovation" and "Intelligent Management" for assessment respectively.
Deletion of Sustainability Issue	Since the assessment content of "Sustainable Supplier Management" encompasses "Raw Material Use and Management," "Raw Material Use and Management" is deleted.
Adjustment to Material Topic	Based on the double materiality analysis of each sustainability issue's impact, two new material topics, "R&D Innovation" and "Water Resources Management," are added for 2023, whereas "Risk Control," "Operational Performance," and "Ethical Management" are deleted.

→ Stakeholder Communication and Just Transition

"We want "justice" transition, not "just" a transition,"

—remarked by an environmental non-governmental organization (ENGO) at People's Plenary of COP28.

In pursuing corporate net-zero goals, economic and workforce structures may be affected. TCC's just transition aligns with the "Summary of Taiwan's Pathway to Net-Zero Emissions in 2050 and Strategies" by NDC, addressing the impacts on employees and stakeholders. It ensures an inclusive shift towards a sustainable economy. TCC's just transition strategy ensures inclusivity, justice, and community rights, with regular stakeholder impact disclosures. TCC supports SDG 8 by creating jobs in climate mitigation, adaptation, and social transition, and empowering employees for transition. TCC aligns industry and sustainability associations with its just transition policy. Discrepancies prompt TCC to clarify its stance and discuss for responses at the vice president's meeting, with unresolved issues risking association withdrawal.

Stakeholder Policy

→Just Transition

Potentially Impacted Facet	Hard-to-abate industry's transition	Changes in the labor employment structure	Installation of new energy project sites or biodiversity areas nearby TCC plants	Information opacity and asymmetry	Green inflation born from net-zero transition
COPING STRATEGY	Support the industrial transition of cement industry	Participate in industrial/-sustainability associations for more communication	Avoid impact on employees' rights and interests	Ensure the rights and interests of communities near TCC plants	Expand communication to reduce transition risks	Assist in reducing costs in switching to green lifestyle
	▌Actively engage with agencies like MOEA, MOI, Public Construction Commission, and MOE, participating in amending construction regulations for low-carbon products, including the roles of public construction, chloride ion, and commodity tax. ▌Launch the Total Solutions for low-carbon and new energy buildings, strengthen the application and promotion of low-carbon construction material products. ▌Provide GHG inventory courses to suppliers and set up "the supplier and client program" TCC Carbon Academy in 2024.	▌Partake in the GCCA meeting to formulate net-zero pathway solutions with peers. ▌Participate in associations like Taiwan BIM Alliance of NTU and the Low Carbon Building Alliance, capturing processes and perspectives of civil engineering talent development and enhance product applications. ▌Advocate and discuss Taiwan's construction industry's carbon competitiveness and trends at major sustainability events and at Operation Headquarters.	▌TCC provides the "Sustainable Learning Passport" and "Carbon Academy" to enhance employee sustainability awareness and foster carbon management expertise. ▌Provide professional skills training and helps in acquiring licenses/certificates for new roles emerging from the transition. ▌Organize "Hoping Plant Cement Workshop" to develop new potential from employees.	▌Applied for tribal consultations and consent to protect local residents' rights and interests. ▌Open the Electrical Engineering Talents Program at Szu-Wei Senior High School, Hualien. Offer local students exam-free entry and aid in certification attainment. ▌Establish DAKA Market as the local startup incubator.	▌Publish Stakeholder Engagement Policy. ▌Periodically update stakeholders through the corporate website, Sustainability Reports, and social media to improve engagement and communication. ▌Promote the "Carbon Reduction Parent-Child Bankbook" to simulate carbon currency transactions. ▌Establish communication venues such as TCC DAKA Open Eco-Factory and Hanben Ocean Station.	▌Provide employees with subsidies for green transport, negotiate discounts with electric motorcycle brands, and offer on-site promotions and sales. ▌Promote "EARTH HELPER, the Carbon Reduction Sustainability Action" campaign for a lifestyle transformation. ▌Install smart recycling machines and eco-friendly laundry/dishwashing refill stations at TCC DAKA, offering discounts to travelers using eco-friendly utensils.

Stakeholder Engagement Performances

TCC incorporates stakeholder feedback into the Company's sustainable development strategy guidelines. With a plan for ongoing dialogues with stakeholders, and through stakeholder engagement and collection of ESG-related issues of their concerns, TCC probes into the topics and dimensions of ESG information they care about.

Stakeholder	Means of Engagement	Frequency of Engagement	Engagement Performances	Engagement Experiences and Feedback
Government & Competent Authorities	Participation in training courses and promotional seminars	Multiple times a year	▌Participation in the 2023 Seminar on Promoting IFRS S1 and S2 organized by Taiwan Stock Exchange ▌2023 TWSE-listed company business briefing, amendments to the corporate governance regulations, and proper disclosure and information reporting in the 2023 Annual Report	▌Understanding the implementation of new policies, to ensure the compliance of the Company with legal and regulatory requirements, and to timely update regulations and amend or add new business operations, in order to enable the Company to formulate strategies and reduce risks
	Conference exchanges and interviews	Semiannually	▌Visits by the Investment Commission, MOEA and the Chung-Hua Institution for Economic Research for survey and research	▌Support to the Investment Commission's understanding of the business direction of TCC.
			▌2 meetings organized regularly per year by the researchers and specialists of the Central Bank of the Republic of China (Taiwan) to communicate with the business managers of TCC to capture the current landscape of the cement industry	▌Assistance to the government or competent authorities in capturing the latest update of the Company and the industry through relevant meetings
	Proactive external communication of TCC actions via disclosures on corporate website and the Market Observation Post System	Biweekly	▌Top 5% in the 9th and 10th Corporate Governance Evaluation of TWSE ▌Ongoing communication with the government and competent authorities	▌Friendly relationships and bidirectional communication with the government and competent authorities maintained
	Bilateral communication with stakeholders via official document and correspondence	Biweekly		
	Communication and discussion with the government and competent authorities	Irregularly		
Shareholders & Investors	Hosting or attending investor conferences	Semiannually	▌1 investor conference organized by TCC ▌1 investor conference attended at invitation ▌1 Non-Deal Roadshow (NDR) organized	▌IR contacts designated by important subsidiaries or key departments to establish a sound investor communication process
	Communication with institutional investors via email, phone call, or meeting.	Irregularly	▌Engaging with financial/investment institutions in ESG questionnaires response and engagement meetings, including major sovereign wealth funds from Nordic and Southeast Asian countries, as well as Article 8 funds from the largest asset management company in Europe ▌Inquiries from investors and analysts regarding financial, business, and operational matters responded irregularly via correspondence or phone call	▌IR contacts designated by important subsidiaries or key departments for a timely response to external inquiries ▌Pre-meetings before ESG engagement meetings held to discuss relevant responses

Stakeholder	Means of Engagement	Frequency of Engagement	Engagement Performances	Engagement Experiences and Feedback
Clients	Client Satisfaction Survey	Annually	▌Weighted average client satisfaction: 95.4%	▌Producing the "Survey Results Analysis Report" based on the annual client satisfaction survey, which is presented and analyzed with the heads of plants and stations during the monthly logistics meeting of the Sales Department meeting to demand correction, followed by feedback of results to clients
	Low-carbon cement business promotion	Monthly	▌A total of 447 promotional activities organized by RMC plants	▌Review of client feedback on the monthly promotional activities during the monthly operations meeting of the Sales Department, along with study and consultation with the R&D units, for an unceasing improvement of product quality
Employees	Performance appraisal and interviews	Annually/Quarterly	▌Timely communication between employees and supervisors on performance targets via the performance appraisal mechanisms of the annual Management by Objectives and quarterly agile conversations	▌Consensus on employee's work goals, personal career development, and performance evaluations reached
	Employee engagement survey & human rights due diligence	Annually	▌Employee engagement survey & human rights due diligence completed	▌Employee feedback captured via diverse surveys and communication channels to empower the ongoing improvement of the Company
	Labor-management meeting/union meeting/employee welfare meeting	Quarterly	▌Multiple labor-management meetings/union meetings/employee welfare meetings called	
	Town Hall Meeting	Twice a year	▌2 Town Hall Meetings convened	
	TCC Monthly Meeting	Monthly	▌12 monthly meetings held	
	Employee suggestion mailbox , Care Platform, and grievance channel for cases involving sexual harassment and gender equality violations	Irregularly	▌Unhindered communication channels maintained and bidirectional communication with employees established	
Suppliers/Contractors	Organizing education, trainings, or workshops	Irregularly	▌Supplier GHG Inventory Assistance, GHG Workshop, and Supplier Sustainability Governance Workshop organized	▌Suppliers assisted on carbon emissions calculations as well as in improving the data quality in carbon data collection and carbon reduction plan formulation to jointly mitigate climate change

- Employee suggestion mailbox
- Grievance channel for cases involving sexual harassment and gender equality violations

Stakeholder	Means of Engagement	Frequency of Engagement	Engagement Performances	Engagement Experiences and Feedback
Suppliers/Contractors	Supplier suggestion mailbox available on the TCC corporate website	Irregularly	▌Timely bidirectional communication engaged	▌Supplier suggestions acquired via diverse channels to continuously strengthen the partnership
	Communication with suppliers/ contractors via email and phone call	Irregularly		
Media	Media delegation tour and press release	Irregularly	▌Several tours organized; 36 press releases published	▌Showcase of various sustainable actions of TCC to the broader society via media and social media platforms to receive feedback from various stakeholders
	Phone call & email	Irregularly	▌Timely bidirectional communication engaged	
	Corporate website, Facebook Page/WeChat official account/Instagram	Irregularly	▌The sustainable actions of TCC communicated externally	
Local Communities	Social Return on Investment (SROI) in force	Irregularly	▌The Social Return on Investment (SROI) introduced and accredited by Social Value International in the U.K. in December 2021, verifying that for every NT$1 invested in the projects of TCC DAKA, social value worth of NT$3.54 was generated	▌Direct interaction with local communities, allowing community residents to better understand TCC, gaining insights into local needs for TCC to provide relevant resources, and establishing quality interactions between TCC and communities
	Visits to local communities and schools	Irregularly	▌Result Presentation of 4 Cement Academies organized	
	Promotion of sustainable ideas via featured program	Irregularly	▌"Hoping Carbon Reduction Parent-Child Bankbook" implemented in partnership with Heping Elementary School	
Industry Associations/Industrial & Academic Organizations	Participation in the Annual Meeting of the Asian Cement Producers Amity Club (ACPAC)	Annually	▌The meeting attended by the Sales Department for information exchange with cement manufacturers across countries	▌The cement data across Asian countries captured; the interaction and understanding between TCC and the peers in the neighboring countries strengthened
	Participation in GCCA's seminars and various sustainability meetings	Biweekly	▌Over 50 meetings attended	▌Information retrieved via exchanges with international cement companies and expert experiences sharing for the reference and use by various departments

Stakeholder	Means of Engagement	Frequency of Engagement	Engagement Performances	Engagement Experiences and Feedback
Industry Associations/Industrial & Academic Organizations	Attendance in the association board of directors' engagement/-sales/technical committee to share the industrial practices of TCC	Monthly	▌Concrete Durability Design and Repair Technology Seminar, Printed Concrete Innovative Research Technology Seminar, and Taiwan Concrete Application and Technology Seminar participated ▌The 2023 Taipei Building Show participated ▌The 2023 Annual Meeting of TCI participated with 7 theses presented ▌Taiwan Concrete Institute (TCI) and Taiwan Construction Research Institute assisted in the compilation of limestone cement concrete manual; testing of limestone cement concrete assisted	▌Meetings participated together the Works Department and the Low-carbon R&D Center for discussion on the framework and progress of low-carbon cement procurement promotion Participation in meetings to share corporate policies and practices of TCC and further engage in technical exchanges with peers for promotion  ↑ In May 2024, Ms. Judy Sgro, Chair of the Canadian House of Commons Standing Committee on International Trade, led a delegation to visit TCC, focusing on low-carbon cement and green energy, and highlighting the increasing importance of human rights.
	Participation in the Business Committee of Taiwan Electrical and Electronic Manufacturers' Association to promote low-carbon products	Monthly	▌15 or more relevant meetings attended	
Sustainability Associations		Irregularly	▌Timely bidirectional communication engaged	▌The latest sustainability trends and the industry practices gained, facilitating the review of the directions of sustainability strategies at TCC
	Phone call & email Sustainability exchange activities	Irregularly	▌Several sustainability-related activities and seminars attended	
Environmental Groups/ NGOs		Irregularly	▌Timely bidirectional communication engaged	▌Showcase of corporate policies and practices for further exchange with environmental groups/NGOs to identify opportunities for improvement of TCC
	Phone call & email TCC Corporate website, Facebook Page/WeChat official account/Instagram	Irregularly	▌Sustainable actions communicated externally	

CHAPTER 1

GOVERNANCE

Joint Effort to Build a Green Future

Targets__

Sustainable Supply Chain

Valid Data of Carbon Emissions from Significant Tier-1 Suppliers

by 2023 **78%**

Initiate Third-party Carbon Audit Program for Raw material Suppliers in Taiwan and Mainland China

2024

Client Satisfaction Survey

Over 95% of Satisfied

Ethical Management

0 Violation in 2023
100% of Employees Signing the Statement of Integrity and Ethical Conduct

Information Security

0 Critical Information Security Incident

2023/ Performance Highlights__

Board of Directors

Board Directors
ESG-related Courses: 48 hrs.
Corporate Sustainable Development Committee:
6 Members with
3 Independent Directors

Corporate Governance Evaluation

TOP 5%

Invention Patents

Granted 82
Applying 61

Integrity & Ethics Trainings

3,904.2 hrs.

Client Satisfaction

95.40%

Information Security Trainings

1,600 Participants Trained

1,800 hrs.

Sustainable Supply Chain

95.7% **Valid Data of Carbon Emissions Collected from Significant Tier-1 Suppliers**

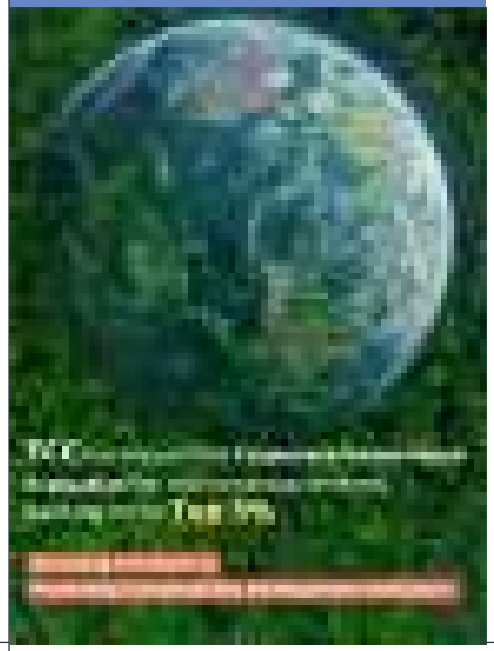
Capacity Building Programs

290 Suppliers Joined Exceeding the Target

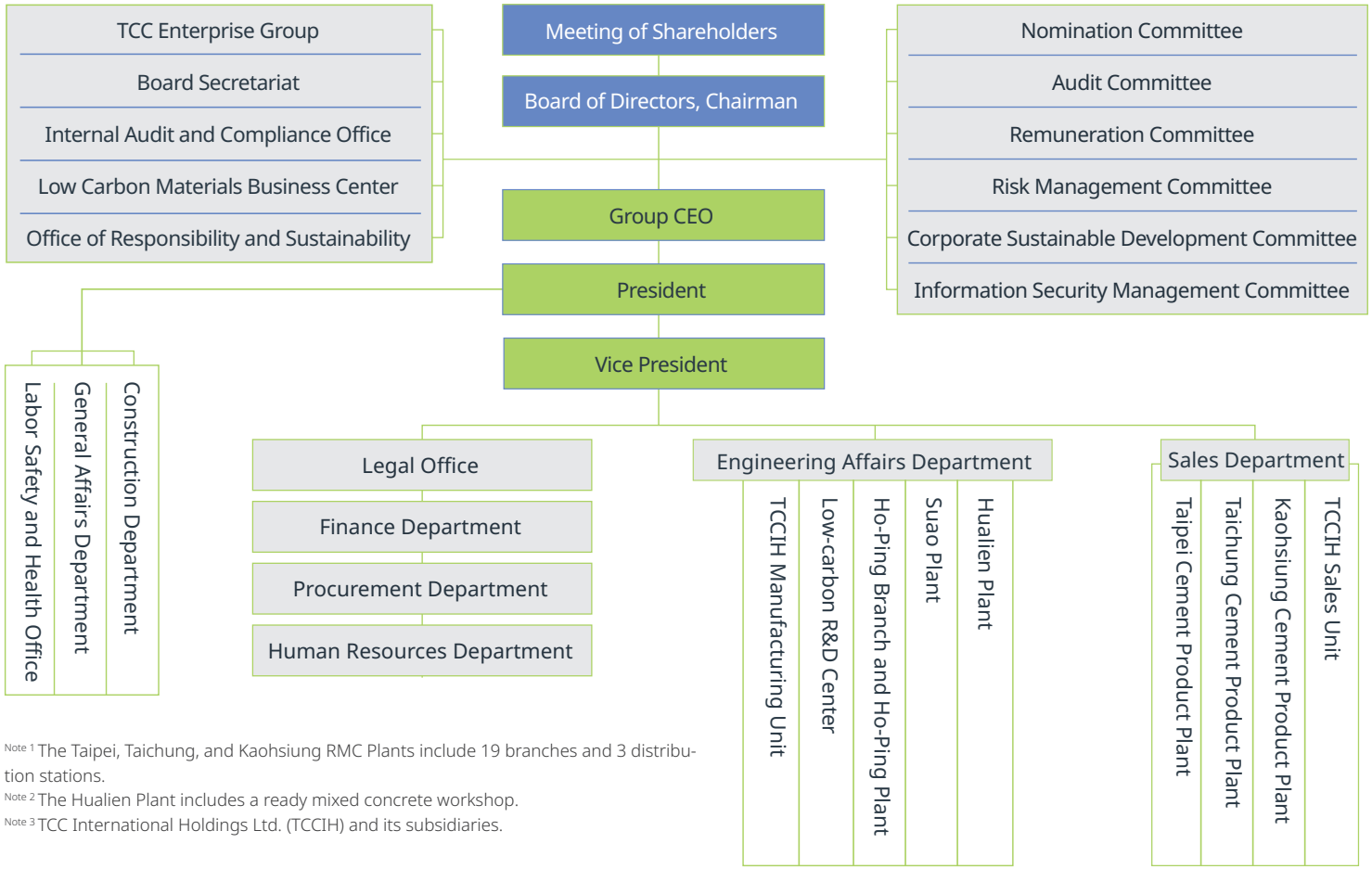
1.1_

Sustainable Governance

TCC is committed to building a robust governance system of diversity, resilience, and growth to ensure the transparency and efficiency of corporate operations.



→ TCC Organization chart



Note 1 The Taipei, Taichung, and Kaohsiung RMC Plants include 19 branches and 3 distribution stations.
Note 2 The Hualien Plant includes a ready mixed concrete workshop.
Note 3 TCC International Holdings Ltd. (TCCIH) and its subsidiaries.

Effective Board Operation and Financial Transparency

→ TCC Released Sustainability and Climate-related Financial Information According to IFRS S1 S2

TCC has consistently excelled in corporate governance, ranking in the top 5% for the 10th Corporate Governance Evaluation. This evaluation focuses on enhancing sustainable development awareness, with the 'promoting sustainable development' category's weight increasing from 24% to 28%, where TCC scored full marks. Additionally, TCC was an early adopter in distributing the chapter on sustainability and climate-related financial information in its 2023 Annual Report, aligning with the International Sustainability Standards Board (ISSB) IFRS S1 and S2 standards. This initiative demonstrates TCC's commitment to financial transparency, effective board operation, and its long-term dedication to sustainable development.

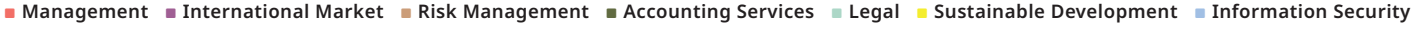
25th Board of Directors

Composed of 15 Directors, including 5 Independent Directors and 4 female Directors

The TCC Board of Directors nomination undergoes a strict selection process, adhering to criteria from the Nomination Committee, considering professional expertise, skills, experience, gender, independence, and aligning with the Company's development strategies. The list of independent directors, recommended by the Nomination Committee, complies with the Securities and Exchange Act, Public Companies' Independent Directors Appointment Regulations, and Taiwan Stock Exchange criteria. In line with its industrial characteristics and future strategies, TCC carefully selects Board members with expertise in cement, accounting, legal, finance, international markets, AI, and IT, ensuring a diverse and skilled Board. The members on the TCC Board of Directors serve a tenure of 3 years, eligible for re-election. The Board members of the 25th Board of Directors were re-elected on May 21st, 2024. There is 15 seats in total, among whom 6 seats are replete with practical experience in the raw material industry. The Board has 5 Independent Directors, making up 33% of its total, surpassing the FSC's Sustainable Development Action Plans for TWSE- and TPEx-Listed Companies ahead of schedule. Additionally, there are 4 female Directors, representing 27% of the Board's seats. TCC aims to have at least 33% female Directors on the Board moving forward.

→ Table of the 25th Board of Directors

Title	Name	Gender	Age [4] 31-50	Age [4] 51-70	Age [4] >71	Juristic Person Average Tenure	External Independence [5]	Industry Experience [6]	Expertise
Juristic Person Director Representative	An-ping (Nelson) CHANG	M			v	5.7	Non Executive Director	Raw materials industry	
	Kenneth C.M. LO	M			v	21.7	Director with independence	Finance industry	
	Yu-Cheng Chiao[8]	M		v		0	Director with independence	IT industry	
	Eric CHEN Sun Te	M		v		7.7	Director with independence	Finance industry	
	Kang-Lung (Jason) CHANG	M		v		11.7	Director with independence	Raw materials industry	
	Liz WANG	W		v		11.7	Director with independence	Raw materials industry	
	Roman CHENG	M		v		5.7	Executive Director	Finance industry	
	Kung-Yi KOO[8]	M	v			0	Executive Director	Raw materials industry	
	Por-Yuan WANG	M			v	20.7	Director with independence	IT industry	
	Chien WEN	M			v	20.7	Director with independence	Raw materials industry	
Independent Director	Victor WANG	M			v	10.7	Director with independence	Industrial - Professional Services	
	Lynette Ling-Tai CHOU	W		v		5.7	Director with independence	Public Utilities - Educational Services	
	Sherry S. L. LIN	W			v	2.6	Director with independence	Industrial - Professional Services	
	Nigel N. T. LI[8]	M		v		0	Director with independence	Industrial - Professional Services	
	Ruu-Tian CHANG[8]	W		v		0	Director with independence	IT industry	



Note4 Age distribution of directors: aged 71 and above account for 40%; aged 51 to 70 account for 53%; aged 31 to 50 account for 7%.

Note5 The external independence of a director is determined based on the following criteria, the non-executive director is required to meet at least 4 of the following 9 indicators, of which at least 2 of the first 3 indicators must be met:
(1)The director must not have held an executive position at the company in the past year. (2)The director, or any family member, must not receive payments exceeding US$60,000 from the company or its affiliates during the current fiscal year, except as allowed under SEC Rule 4200 Definitions. (3)No family member of the director was employed as an executive officer by the company or any of its subsidiaries during the year. (4)The director must not be, or be associated with a company that is, an adviser, consultant, or part of the company's senior management. (5)The director must not be affiliated with a significant customer or supplier of the company. (6)The director must have no personal services contract(s) with the company or its senior management. (7)The director must not be affiliated with a not-for-profit entity that receives significant contributions from the company. (8)The director must not have been a partner or employee of the company's outside auditor during the past year. (9)The director must not have any other conflict of interest that the board itself determines to mean they cannot be considered independent.

Note6 A director's industry experience is identified in accordance with the Tier-1 of the GICS.

Note7 All board members, including the Representative of the Juristic Person Director and Independent Directors, hold Taiwanese nationality.

Note8 The new directors assumed their positions at the AGM on May 21, 2024.

→ The 24th Board Operation

The TCC Board of Directors, with an average tenure of 12 years, meets quarterly, receiving reports on management improvements. In 2023, the 24th Board convened 12 times, achieving an average attendance of 88.72%, or 98.97% including proxies. The TCC Board of Directors' key resolutions have been promptly and accurately disclosed on the Market Observation Post System and the **"Investors" section of the TCC Corporate Website**. When discussing matters involving a Director or their represented legal entity, the Director must abstain from voting due to conflict of interest. To enhance the Board of Directors' effectiveness, functional committees aligned with specific roles and responsibilities have been set up. These committees aid in evaluating proposals and ensuring the Board's decision-making quality.

The "Remuneration Committee Charter of Taiwan Cement Corporation" mandates regular evaluations of Directors' performance targets, aligning their remuneration with these evaluations to reinforce the link between Directors' performance and their compensation.

→ ESG Professional Development Program for Board Members

TCC is committed to improving its Board Members' sustainability knowledge, focusing on trends in sustainability-related risks to aid Directors in their supervisory roles and ensure compliance with laws and regulations. In 2023, the ESG training hours were 48 hours, totaled 111.5 hours for training. For more detailed information on professional development, please see **TCC 2023 Annual Report**.

→ External Evaluation of the Board of Directors – Excellent

TCC has implemented the "Rules of Performance Evaluation of Board of Directors" for regular assessments, including annual internal evaluations and external reviews by experts every three years. The evaluations cover five areas: corporate engagement, decision-making quality, board composition and structure, member election and development, and internal controls. An external entity conducted the 2023 Board Performance Evaluation, presenting its report as "Excellent" on Jan 31, 2024, which was then submitted to the Board on Feb 27, 2024.

Board Performance Evaluation Report
↓

→ Functional Committees

Audit Committee

Responsibilities

Stipulation and amendment to the internal control system and protocols for significant financial and business activities, auditing of marketable securities, financial statements, and matters involving Director's conflict of interest, etc.

Presence in person **94.3%**
Presence by proxy included **100%**

Charter of Committee

Remuneration Committee

Responsibilities

Formulation and review of policies concerning the performance evaluations of Directors and managers as well as their compensation; evaluation and stipulation of the compensation for Directors and managers on a regular basis

Presence in person **97.14%**
Presence by proxy included **100%**

Charter of Committee

Risk Management Committee

Responsibilities

Execution of the risk management decisions approved by the Board of Directors and supervision of the establishment of TCC's risk management mechanisms; oversight of the execution and coordination of the overall risk management

Presence in person **100%**
Presence by proxy included **100%**

Charter of Committee

Corporate Sustainable Development (CSD) Committee[9]

Responsibilities

A decision-making and supervisory body over the Company's efforts in sustainable development, contribute to environmental conservation, and exercise social responsibilities for the BOD to fulfill its responsibilities in the protection of the interests of the Company as well as the employees, shareholders, and stakeholders thereof

Presence in person **83.88%**
Presence by proxy included **100%**

Charter of Committee

Nomination Committee

Responsibilities

Regular stipulation and review of Director elections (Independent Directors included), senior management appointments, ESG Professional Development Program for Directors, Director performance, BOD member evaluations, and senior management succession planning.

Presence in person **100%**
Presence by proxy included **100%**

Charter of Committee

Note 9 On December 21, 2023, the Board added 2 seats, filled by Independent Directors Lynette Ling-Tai CHOU and Sherry S. L. LIN.

1.2_

Sustainable Development Implementation Framework

The Board of Directors is the top decision-making and oversight body for the sustainable development affairs at TCC. The Board of Directors verifies the progresses of sustainability projects via the annual report by the CSO or the CSD Committee, discussing management strategies and monitoring implementations. It decided to include 2 additional Independent Director seats in the CSD Committee. Currently, the committee is composed of the Chairman, President, and 3 Independent Directors, with Independent Directors making up 60% of the committee and the Chairman serving as the convener. The experiences of the committee members encompass areas of risk management, management, energy technology, environmental protection, ESG, etc.

Corporate Social Responsibility Best Practice Guidelines

→ Sustainability Management Implementation

Board of Directors
The highest decision-making body in TCC's sustainable development

↓

CORPORATE SUSTAINABLE DEVELOPMENT COMMITTEE
Responsible for the approval and supervision of sustainable development promotion

↓

OFFICE OF RESPONSIBILITY AND SUSTAINABILITY CSO

SUSTAINABLE DEVELOPMENT WORKING GROUP
Responsible for sustainable projects and proposing key indicators and goals

↓

FUNCTIONAL GROUPS
Corporate Integrity and Risk Management Group
Eco-Manufacturing Group
Sustainable Products Group
Employee Care Group
Social Care Group
TCFD Group
Information Security Group
Supply Chain Group
Biodiversity Group

There are nine functional groups under the CSD Committee, including "Corporate Integrity and Risk Management," "Eco-Manufacturing," "Sustainable Products," "Employee Care," "Social Care," "TCFD," "Information Security," "Supply Chain," and "Biodiversity." The functional groups consist of level-1 supervisors and senior staff from relevant departments or subsidiaries, tasked with ESG matters related to their departmental roles, extending to TCC Group Holdings' subsidiaries. To view the CSD Committee's resolutions and board meeting minutes, see **the "Investors" section on TCC Corporate Website**.

→ 2023 Sustainability Project Promotion Results

Sustainable Development Pathway of FSC
- The progress of GHG inventory from 2022 Q4 to 2023 Q2 tracked

IFRS S1 & S2
- TCC's responses to risks and recommended approaches
- Invited to the initiative to advance the adoption or use of the ISSB's Climate Standard

Sustainable Trends Assessment
- The latest results, analysis and response measures to TCC's International ESG assessment
- The plan addresses the MOE's 2025 carbon fee and the EU's regulations requiring EV battery carbon footprint disclosure

Low-carbon and Green Products
- Analysis of CIMPOR's low-carbon cement development opportunities
- Outline of GCCA's focus on net-zero buildings and development of low-carbon construction materials
- Status of low-carbon certification for sustainable products

Biodiversity
- "TCC Nature & Biodiversity Report-TNFD Pilot Program" released
- The Biodiversity Functional Group established

→ Succession Plan for Key Management Personnel

TCC conducts annual training for key management personnel, including the Chairman and President, to enhance leadership and achieve performance goals. Meanwhile, with the annual performance evaluation combined, these serve as the basis for the succession of key management positions.

Inventory the current talent landscape for key roles and management, identifying necessary expertise and leadership qualities.

Establish a talent pool of potential candidates through the discussions and selections among the management.

Organize strategy consensus camps for mid-senior managers and potential talents.

Promote the cross-disciplinary management program.
In 2023, the program totaled 84 hours for 343 participants, accumulating 28,812 learning hours.

Review the functions and roles of candidates promptly; those approved by their superiors will succeed the target positions.

→ Management Remuneration Policy

The remuneration policy for the President, Vice President, and managers is presented to the Remuneration Committee with reasonable recommendations based on the Company's business strategy, profitability, personal performance, salary market standards, etc., before the Board's approval. Compensation includes variable parts based on short-term (quarterly and year-end bonuses) and long-term performance, with a treasury stock plan for long-term incentives. Additionally, evaluations cover financial performance, including corporate governance, green finance, social care, and environmental sustainability.

The compensation for the President includes stocks subscribed for a consideration using treasury shares, which are deferred and distributed over a period of three years, with the shares being returned to the President 's stock account annually. Also, there is a long-term incentive bonus, performance measured over a three-year period, accounting for approx. 10% of the total annual bonus.

Financial and operational performance indicators
Net profit after tax
Growth rate
ROA
ROE

Talent development indicators
Talent cultivation
Enhancement of employee capabilities and qualities
Cultivation of global perspectives

Risk indicators
Legal compliance and risk prevention
Long-term risk assessment

Strategic or sustainability goals
Achieving circular sustainability through the development of a circular economy
Carbon reduction results, alternative fuel applications, Biodiversity Management Plans

1.3_

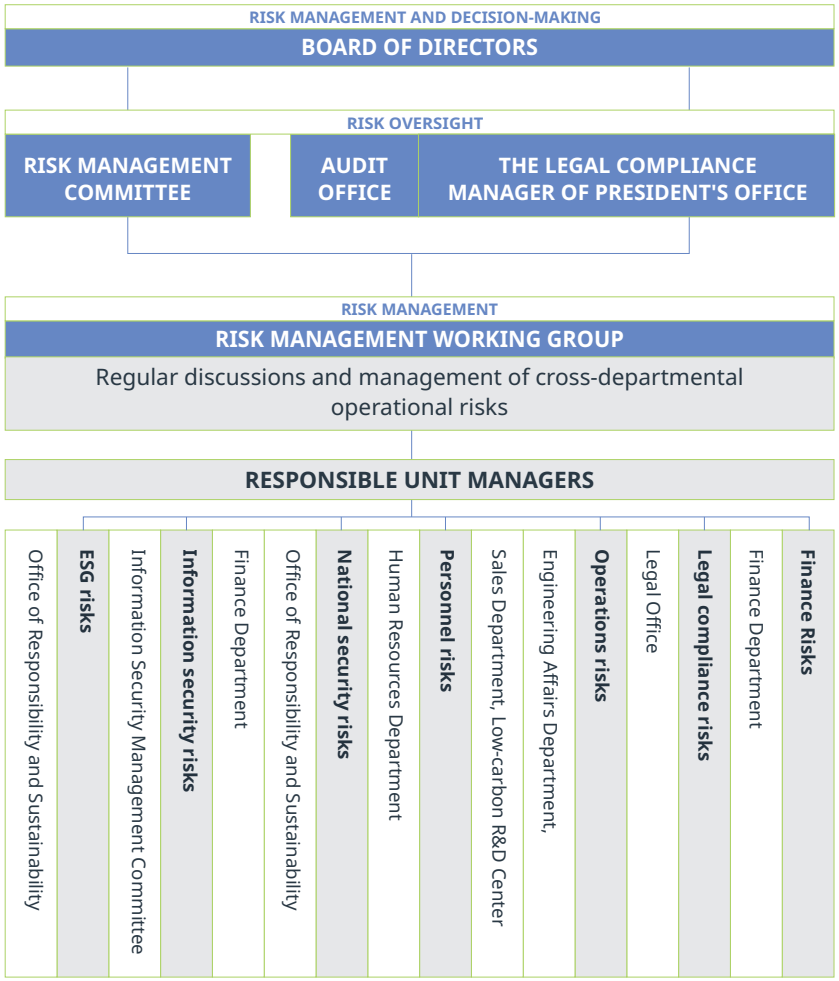
Risk Management Implementation Framework

The "Risk Management Committee" is responsible for identification and management of risks associated with corporate operations, including the physical, transition, and emerging risks potentially arising from climate change, and leads the planning for relevant response measures. "TCC Risk Management Policy" and "TCC Risk Management Committee Charter" were adopted to mitigate business risks to a tolerable level and establish robust risk management guidelines.

Risk Management Policy

The Board of Directors is the highest decision-making body for risk management, overseeing the three lines of defense in risk management. The first line entails department managers periodically assessing operational risks. The second line involves cross-departmental risk management working group. The third line mandates regular oversight of overall risk management by the Risk Management Committee, Internal Audit and Compliance Office, and the legal compliance manager of the President's office.

→ TCC Risk Governance and Management



The Risk Management Committee aligns with departmental scopes to identify and analyze risks across seven areas: operations, finance, national security, legal compliance, ESG (including biodiversity), personnel, and information security, also updating the risk matrix annually. Departments then devise coping strategies based on these identifications, managing risks that could affect operations and profits. The Committee reports on risk management to the Board of Directors at least twice annually, monitoring and reviewing the management team's risk status.

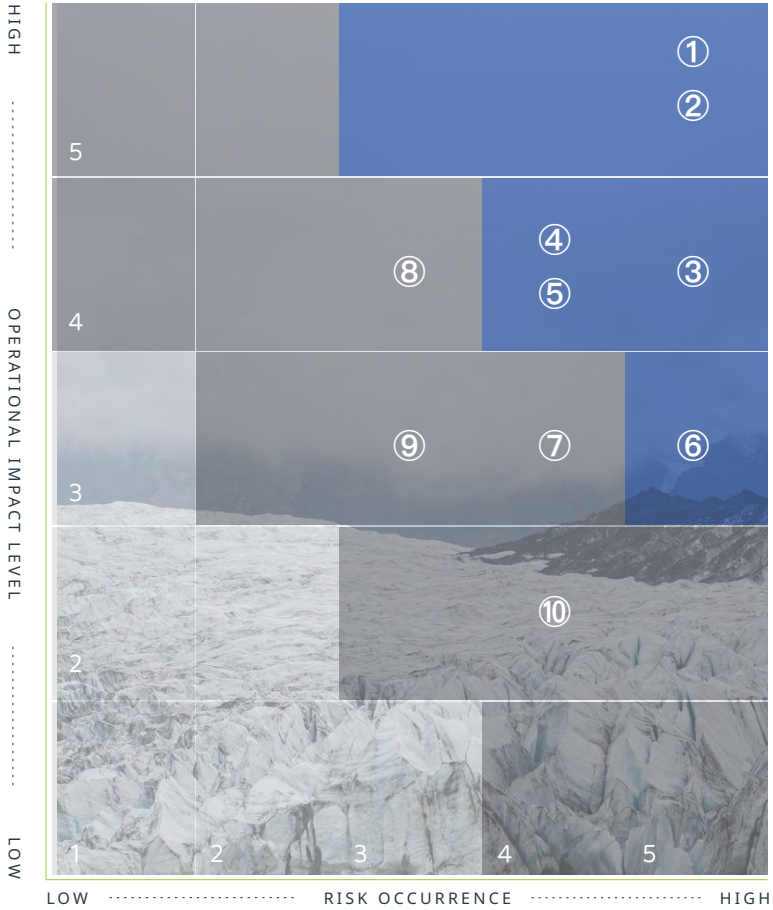
→ Business Continuity Plan (BCP)

To mitigate business disruption risks and ensure timely resumption of critical activities, TCC has established a business continuity management policy with clear objectives. This includes preventive plans to maintain client services and minimize disruptions, focusing on BCP for vital information systems and network services. For more details, please visit **CH1.5 Information Security**.

→ Risk Identification Process

Referencing the *Global Risks Report 2023-2024* by the WEF, industry risk reports, and international trends, TCC has developed the 2023 Risk Matrix for TCC Group Holdings, aligning with seven risk identification and analysis aspects. TCC has identified high-risk areas, including information/technology security and climate change, and planned coping strategies. For responses and preventive measures, see **CH1.4**; for financial risks, please visit TCC 2023 Annual Report. Additionally, TCC conducts comprehensive risk management and impact analyses on sustainability issues during materiality identification, detailed in **TCC Material Topics & Stakeholder Engagement**.

→ 2023 Risk Matrix



① Risks in the development of the cement industry in Mainland China
② Carbon fee / Carbon trading
③ Exchange rate, interest rate, and fundraising risks
④ IT security risks
⑤ Water resource management risks
⑥ Climate change risks
⑦ Supply and demand prices of raw materials (fuels) and substitutes
⑧ Talent recruitment and succession (including salary and incentives)
⑨ Compliance and litigation risk
⑩ Warfare and geopolitical conflicts

TCC risk matrix also identifies emerging risks that could impact the Company within the next 3 to 5 years, including "warfare and geopolitical conflicts" and "talent recruitment and succession", facilitating early monitoring and the development of mitigation measures.

→ Emerging Risk

■ Risk factor description ■ Impact ■ Mitigation measures

Warfare and Geopolitical conflicts | Geopolitical

Recent years have seen ongoing conflicts in the South China Sea over island sovereignty, maritime boundaries, and marine rights, leading to political risks, supply chain disruptions, and market uncertainties for businesses.

The South China Sea's strategic importance means geopolitical conflicts there could disrupt Taiwan's energy supply and TCC's access to energy resources. Additionally, these conflicts could hinder the import of 'low-alkali sand,' crucial for Taiwanese cement production, affecting the stable supply of this vital raw material.

- Seek an alternative low-alkali sand source to reduce raw material supply disruption impacts.
- Plan alternative shipping routes to mitigate South China Sea conflicts' impact on transport.

Talent Recruitment and Succession | Social

Recent statistics from Taiwan's MOI show a decline in newborns, with Taiwan expected to become a "super-aged society" by 2025, according to the National Development Council. Similarly, Mainland China saw a record low in newborns in 2023, entering a moderate aging stage. This trend of decreasing birth rates and an aging workforce is leading to a more pronounced labor shortage and recruitment challenges, posing a significant future labor crisis for businesses.

An imbalanced workforce supply-demand can disrupt corporate operations and make it challenging to recruit the necessary talent for future needs. As enterprises evolve, the demand for new skills increases, leading to higher personnel costs due to external talent recruitment and internal adjustments.

- Develop operation sites worldwide and recruit talents internationally.
- Continuously improve pay structure to boost salary competitiveness.
- Conduct on-campus recruitment to proactively secure talents.
- Enhance talent retention through better development, benefits, incentives, and bonuses.
- Hire experienced personnel for knowledge transfer and succession planning.

1.4_ TCFD for Climate-related Risks & Opportunities

Climate Governance

The Board of Directors at TCC oversees all economic, environmental, and social risks, including climate risks and opportunities. The Corporate Sustainable Development Committee and Risk Management Committee support climate strategy. The Corporate Sustainability Committee directs sustainable development, including climate governance and low-carbon transition planning, meeting at least twice a year to report to the Board. The Board monitors alignment with sustainable strategies. In 2022, the Office of Responsibility and Sustainability was established for cross-departmental coordination and resource integration to promote sustainability projects and propose improvements.

The Risk Management Committee oversees risk control and governance. Led by the President, the committee manages operational and climate-related risks and plans response measures. It reports to the Board at least annually on performance and risk control. In 2023, the Board adopted climate-related performance indicators and targets. Progress will be tracked and regularly reported to the Board.

TCC 2023 TCFD Report

→ Management Processes for Climate-related Risks and Opportunities

"TCC Risk Management Policy" and "TCC Risk Management Committee Charter" have been adopted at TCC. Meetings are called on a regular basis to track outcomes of climate actions, contain the risks potentially arising from various businesses to a tolerable extent, and establish sound risk management operating principles.

STEP 1 — Risk and Opportunity Identification

Update climate risk and opportunity issues in accordance with the results of the previous climate risk and opportunity identification, international scientific and technological reports, industry trends in local laws and regulations where TCC operates, etc.

OUTCOME |

13 key climate risks and 8 climate opportunities listed per the TCFD taxonomy

STEP 2 — Risk and Opportunity Assessment

- Conduct cross-departmental workshops to probe into the actual impacts, timing, sources, and expected financial impact of various risks/opportunities at TCC.
- Analyze and assess questionnaire results, incorporating the perspectives of external experts and executives, to identify key risks/opportunities.

OUTCOME |

16 internal assessment questionnaires sent, with 11 key risks and 7 opportunities identified in the end

STEP 3 — Response and Adaptation

Link the climate policy, operation and production, products and services, and external communication to the existing climate mitigation and adaptation strategies to formulate and execute six climate action plans.

OUTCOME |

Six Climate Actions

STEP 4 — Management and Supervision

Call meetings on a regular basis to track the progresses of the Six Climate Actions in response to risks and opportunities, track the carbon reduced by each plant via the Carbon Reduction Management Platform, and present the risk control report to the Board of Directors by the Risk Management Committee.

OUTCOME |

Performances against the management indicators and non-financial performance indicators of the Six Climate Actions

→ Climate Risk and Opportunity Identification and Assessment Methodology

In response to rapid policy and market changes and high climate uncertainty, TCC identifies and assesses climate risks. The TCC Board, the highest risk decision-making body, analyzes risks in seven areas: operation, finance, state, legal compliance, ESG, human resources, and information security. Climate risks are integrated into overall risk management. Types of climate-related risk included in risk assessment: current regulation, emerging regulation, technology risk, legal risk, market risk, reputational risk, acute physical risk, and chronic physical risk. Time horizons covered by climate risk assessment: short-term, medium-term, and long-term. TCC follows the TCFD framework to assess climate risks and opportunities every two years. This assessment includes the cement business in Taiwan and Mainland China, considering the concentration of carbon emissions and revenue sources. TCC identifies climate-related transition and physical risks, as well as opportunities, through discussions with senior managers, considering external policy, market changes, climate disasters, and internal strategies.

→ Climate Risk Matrix | Climate Opportunity Matrix

Short-, Medium-, and Long-Term Climate-related Risks and Opportunities

TCC has integrated climate risks into its overall risk management policy to address impacts from climate extreme and net-zero transition. According to the TCFD framework, TCC identified 11 key climate risks and 7 derivative opportunities. Beyond existing strategies, TCC formulated Six Climate Actions: Low-Carbon Circular Production, Industry-Leading Low-Carbon Construction Materials, Low-Carbon and Carbon Negative Technology Innovation, Smart New Energy Business, Low-Carbon Supply Chain, and Climate Disaster Adaptation. These actions aim to enhance resilience and adaptability, driving transformational deployment and strengthening operational resilience.

→ Climate Risk Matrix

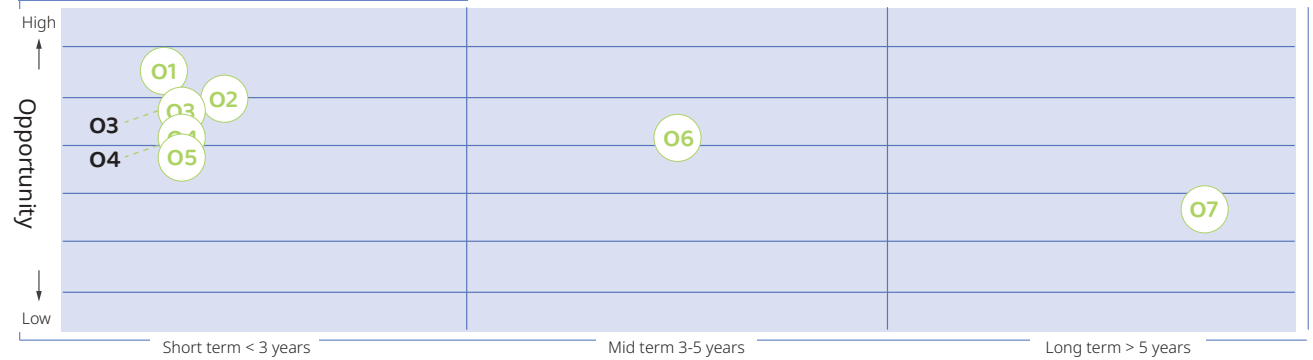
Transition Risk

R1 Carbon trading/carbon fee/carbon tax for Cap and Trade
R2 Costs in the low-carbon technologies, equipment and management
R3 Rising prices of raw materials and energy
R4 Impacts to corporate reputation
R5 Impacts on the strength of supports from financial institutions in investment, financing, and insurance
R8 Regulations and procurement of renewable energy
R10 Transformation of the coal-fired Hoping Plant
R11 Transition Risk – Breakthrough in the advanced technology of carbon capture and storage (CCS)

Physical Risk

R6 Drought (Production)
R7 Flood (Production)
R9 Changes in precipitation patterns and extreme changes in climate patterns (Transportation)

→ Climate Opportunity Matrix



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

→ Climate Risks Faced at TCC

● Low-Carbon Circular Production ● Industry-Leading Low-Carbon Construction Materials ● Low-Carbon Supply Chain ● Smart New Energy Business
● Low-Carbon and Carbon Negative Technology Innovation ● Climate Disaster Adaptation

R1 Carbon trading/carbon fee/carbon tax for Cap and Trade

- Carbon trading, taxes, and fees to limit GHG emissions increase costs.
- Emerging regulations on carbon trading, taxes, and fees will raise costs. If costs can't be passed through to prices, profits may decline.
- Without CBAM or carbon costs on imports, business risks increase.

Actions in Response | ● ●

R2 Costs in the low-carbon technologies, equipment and management

Most cement and concrete plant equipment exceeds energy consumption regulations. Replacing it incurs extra costs. Competitors have lower production costs, disadvantaging us.

Actions in Response | ● ● ●

R3 Rising prices of raw materials and energy

Coal is the main energy source for clinker production. With the net-zero trend, coal supply will decrease yearly, raising coal and alternative fuel prices, pressuring operations.

Actions in Response | ● ● ●

R4 Impacts to corporate reputation

Failure to meet CO_2 standards or having weak reduction targets may lower evaluations by stakeholders, harming corporate reputation.

Actions in Response | ● ● ●

R5 Impacts on the strength of supports from financial institutions in investment, financing, and insurance

Without low-carbon strategies, TCC's high-carbon industry will deter financial institutions, reduce investor interest, and cause financing and insurance difficulties, severely impacting operations.

Actions in Response | ● ● ● ●

R6 Drought (Production)

- Waste heat recovery needs significant cooling water; drought halts these systems, raising electricity costs.
- Water is essential for concrete plants; drought severely impacts production and sales.

Actions in Response | ●

R7 Flood (Production)

Floods may affect raw material quality or damage equipment, causing temporary concrete operation disruptions.

Actions in Response | ●

R8 Regulations and procurement of renewable energy

Large electricity consumers (5,000kW+)must install 10% renewable energy in five years and save 1% annually, or face penalties.

Actions in Response | ● ●

R9 Changes in precipitation patterns and extreme changes in climate patterns (Transportation)

Extreme weather event or precipitation changes may delay or disrupt product delivery, impacting operations.

Actions in Response | ●

R10 Transformation of the coal-fired Hoping Plant

The Hoping Power Plant's agreement with Taipower expires in 2027. Non-renewal will impact TCC's revenue and profit. This transition may also affect raw material supply (fly ash, bottom ash, gypsum), requiring external procurement and raising costs.

Actions in Response | ●

R11 Breakthrough in the advanced technology of carbon capture and storage (CCS)

In 2011, the calcium looping carbon capture project was initiated with ITRI and the Bureau of Energy. However, due to the lack of a scaled capture process, poor thermal efficiency, and low CO_2 concentration under negative pressure, purification costs remain high.

Actions in Response | ●

→ Climate Opportunities Harnessed by TCC

For detailed information about opportunities, please refer to the **TCC 2023 TCFD Report**.

O1 Smart low-carbon production and waste co-processing

O2 Securing investors' willingness for long-term investment

O3 Electricity trading market involvement

O4 Carbon trading market involvement

O5 Installation of new energy projects

O6 Exploration of the market for low-carbon products

O7 Oxygen enriched and oxy-fuel combustion for carbon capture

→ Scenario Analysis

TCC assessed financial impacts from climate-related transition and physical risks, analyzing their level and time horizons. To address these impacts, TCC conducts future scenario analyses, examining potential financial effects under different global warming scenarios and policy environments. These results are integrated into resilience strategies to achieve net-zero targets. Considering different future climate scenarios, TCC selected multiple scenarios for physical and transition risks to develop response strategies. The highest-impact transition risk, "Carbon Trading/Carbon Fee/Carbon Tax for Cap and Trade," is the primary focus. Using IEA scenarios (STEPS, APS, and NZE 2050), TCC assessed the financial impacts of carbon pricing trends on operations in Taiwan and Mainland China. For physical risks, TCC considered its locations in Taiwan and Mainland China and potential impacts of future climate disasters (droughts and floods). TCC selected the IPCC's low GHG emissions scenario (SSP1-2.6) and high GHG emissions scenario (SSP5-8.5). This multi-scenario assessment helps TCC plan strategies to mitigate financial and operational risks and understand future climate trends.

Risk Category	Scenario Description	Key Parameters	Impact Description	Estimated Temperature Increase	Source of Scenario
Transition Risks	**STEPS** The climate change response measures in force and concrete policies enacted by governments around the world	Carbon price variation across regions [10]	Additional costs in 5-10 years due to carbon fees or carbon trading	2.5°C	IEA[11]
	APS The latest climate commitments of countries, including the NDCs and long-term net-zero goals.			1.7°C	
	NZE 2050 Realization of net-zero CO2 emissions of the global energy sector by 2050			1.5°C	
Physical Risks	**SSP1-2.6** The low emissions scenario with a global effort to achieve sustainability goals, but in a slow progress	Droughts and precipitation changes caused by climate extreme events [12]	Operational disruptions and asset impairments due to drought and flooding	1.8°C	IPCC[13]
	SSP5-8.5 The extremely high emissions scenario with ultra-high emissions brought by the extensive use of fossil fuels in the absence of climate policies globally			4.4°C	

Note10 References from the IEA World Energy Outlook (WEO) 2023; Carbon Pricing Options for Taiwan (2020)

Note11 Reference from World Energy Outlook (WEO) 2023, International Energy Agency (IEA)

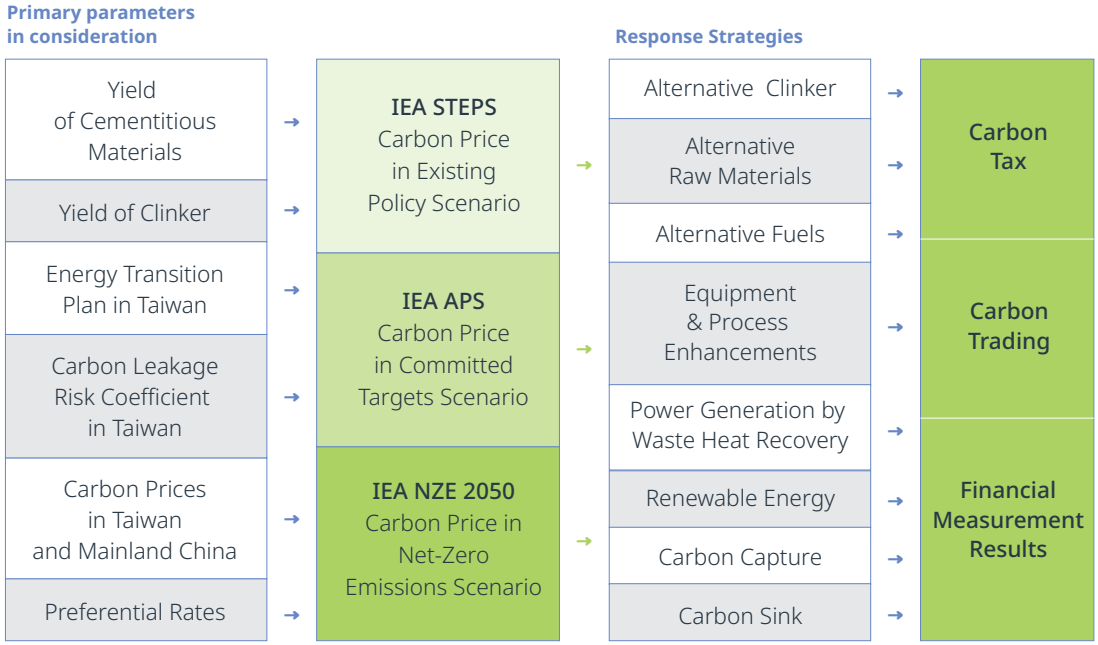
Note12 Reference from the Central Weather Administration, Ministry of Transportation and Communications

Note13 Reference from the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) in 2021

→ Transition Risk:

Carbon Price Impacts –
the Carbon Fee in Taiwan
& the Carbon Trading in Mainland China

The cement sector has high carbon emissions, so TCC must monitor GHG regulations where it operates. In 2023, Taiwan adopted the "Climate Change Response Act." The "Regulations Governing the Collection of Carbon Fees (Draft)" will take effect in 2024-2025. The cement sector is considered as a sector at a high risk of carbon leakage. The risk coefficient of carbon leakage may apply if the voluntary emission reduction plan of the Company is approved, helping mitigate the financial impact from the carbon fee. China's carbon trading market, established in 2021, may expand to include high-emitting industries like cement. China will relaunch its voluntary carbon trading market in 2024, strengthening its carbon trading mechanism. TCC uses BAU and corporate target scenarios to estimate future carbon emissions and analyzes carbon pricing scenarios (STEPS, APS, NZE) from the IEA for Taiwan and China to calculate the financial impacts of carbon fees and trading.



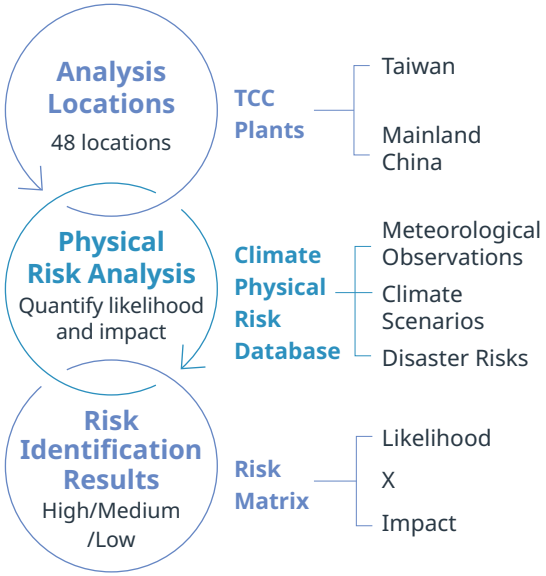
Note14 Financial impact compared to not taking carbon reduction measures

Analysis shows that all BAU scenarios have higher carbon costs than corporate target scenarios. The NZE scenario incurs higher costs than the SPS and APS scenarios. If TCC's Taiwan and Mainland China sites meet internal targets, carbon fee and credit purchase expenses can be reduced. Estimated savings will be disclosed in the **TCC 2023 TCFD report**.

Without carbon reduction efforts, TCC's Taiwan and Mainland China sites will face severe financial impacts. Thus, TCC has set active carbon reduction targets. Through its Carbon Reduction Strategies, TCC aims for net-zero emissions to mitigate regulatory carbon pricing risks.

→ Physical Risks: Flood and Drought Risks

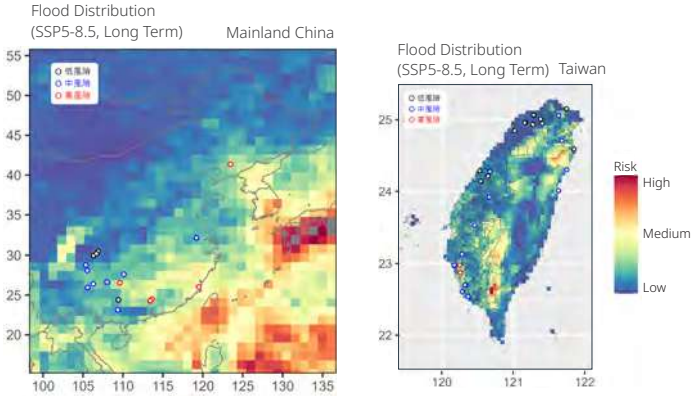
TCC emphasizes physical risks from climate change, regularly reviewing their impact on operations. TCC analyzed 48 sites in Taiwan and Mainland China, using climate risk databases, meteorological data, and climate scenarios(IPCC SSP1-2.6 and SSP5-8.5). Finally, a matrix of physical risks is mapped out based on the likelihood and level of impact in the analysis to classify risks into high, medium, and low risks. In 2023, "flood" and "drought" were identified as significant risks. The impact on net asset value and operating revenue was assessed, and results were incorporated into future climate adaptation strategies to strengthen operational resilience.



→ Flood Risk

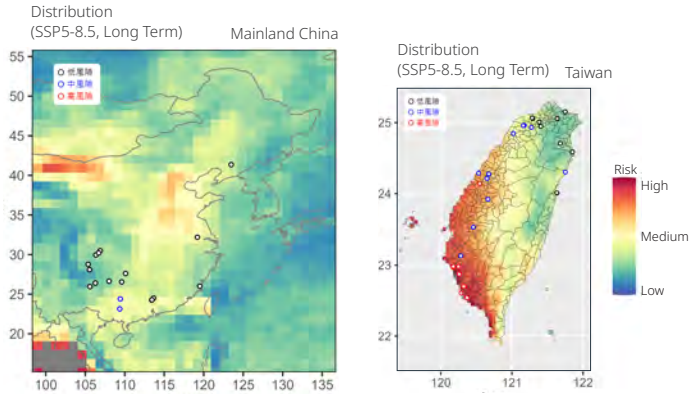
In the SSP8.5 scenario, TCC's sites in Taiwan and Mainland China will face more frequent droughts, affecting water use, production schedules, and revenue. The assessment shows 9 sites in Taiwan, mostly in Tainan and Kaohsiung, are at high drought risk, while the remaining 39 sites face medium to low risk. Long-term droughts will cause operational disruptions, with financial impacts disclosed in the **TCC 2023 TCFD Report**.

Water use management at high-risk sites will be regularly reviewed and adapted for drought conditions.



→ Drought Risk

In the SSP8.5 scenario, TCC's sites in Taiwan and Mainland China will face more frequent droughts, affecting water use, production schedules, and revenue. The assessment shows 9 sites in Taiwan, mostly in Tainan and Kaohsiung, are at high drought risk, while the remaining 39 sites face medium to low risk. Long-term droughts will cause operational disruptions, with financial impacts disclosed in the **TCC 2023 TCFD report**. Water use management at high-risk sites will be regularly reviewed and adapted for drought conditions.



→ Metrics and Targets

Climate-Related Management Metrics

TCC commits to strict scientific standards, including the 2050 net-zero target, concrete carbon neutrality, and 2025 science-based carbon reduction targets (SBTs). These serve as goals for comprehensive carbon reduction strategies. TCC aims to promote energy transition by expanding green energy solutions for national energy, cities, businesses, and EV consumers.

To address risks and opportunities, TCC tracks progress of six climate actions in regular meetings. Carbon reduction targets are tied to annual performance evaluations and compensation. For details, see **TCC Sustainability Targets and Performance Tracking.**

Internal Carbon Pricing

To drive low-carbon investments, improve energy use efficiency, and incentivize carbon-reducing actions internally, TCC set an internal carbon price. Please refer to **2.1 Low-carbon Construction Materials.**

1.5_

Information Security

→ Information Security Management Committee Implementation Framework

Oversight by Professional Independent Directors

In 2020, TCC formed the Information Security Management Committee and introduced the Chief Information Security Officer (CISO) role and a specialized information security unit in 2022. This group manages the Company's information security framework, operations, and incident response. Led by CISO, the committee frequently updates the BOD, which includes a Director skilled in AI and information security, ensuring thorough management of information security activities.

Information Security Policy

In 2023, our 6 information security members and 20 support team members held 40 weekly, 6 monthly, and 3 quarterly information security meetings. TCC also encouraged obtaining international information security certifications, including ISO 27001 and EC-Council Certified Incident Handler (ECIH).

TCC KEY FACT

No critical information security incident[15] reported in 2023

Up to 83% of information security members certified

ISO 27001 Information Security Management System certified

→ Information Security Incident Handling Mechanism

TCC has a clear process for information security incidents, including analysis and identification via the Flow Chart for Notification of Information Security to minimize misjudgment. Verified incidents trigger responses based on their security level (1 to 4). Post-resolution, incidents are monitored, reported, and corrected to prevent recurrence.

Note 15 Critical Information Security Incident at TCC is defined as a breach of sensitive data or trade secrets, or a ransomware attack causing significant business disruption due to widespread device encryption or major system/network paralysis. In 2023, TCC had no information security breaches, nor clients, customers and employees affected by the breaches.

→ Information Security Enhancement Strategy

To support business transformation, TCC will initiate an information security audit for its energy sector to enhance security practices. It will also create a platform for auditing, integrating, and collecting data to promptly address system anomalies and prevent security incidents. Additionally, TCC will implement specialized generative AI tools for its battery business, limit access, safeguard sensitive data, and reinforce trade secret protection.

→ Information Security-Business Continuity Plan (BCP)

Disaster Recovery (DR) Dril

- An annual DR drill for core systems (ERP, AD, and network equipment) simulates a switch to a remote Internet Data Center (IDC) in disaster scenarios, ensuring system continuity
- A post-drill review meeting was conducted to refine the response and notification process and update BCP documents according to ISO 27001:2022
- Evaluate future overseas backup for core systems to reduce geopolitical risks

Operational Technology (OT) Security Measures

- OT security measures have been implemented to protect production line security and prevent disruptions due to virus-infected equipment. This includes the use of anti-virus flash drives to scan new equipment and machines for viruses before connecting them to the intranet

→ Information Security Management Performances in 2023

In 2023, TCC conducted 4 information security checks and 6 social engineering drills, achieving a violation rate of 3.15%. Violators received priority for security awareness training. Future plans include additional sessions for the new energy business, targeting a violation rate under 3%.

ISO 27001:2002

→ Information Security Management

PREVENTION

Internal education & training

- Annual information security training in 2023 included 4 sessions on AI hacking, responses, and protection, training around 1,600 participants for a total of 1,800 hours cumulatively
- Irregular expert-led information security training and distribution of security policies and measures
- 100% new recruits signing the Information Security Statement

Information security risk assessment mechanism

- Annual IT asset inventory and information security risk analysis, focusing on Assets x Vulnerabilities x Threats, according to the information security risk assessment mechanism
- Risk improvement through management tools
- Introduced asset software/hardware inventory tools in 2022 for effectively access information tracking

Network-related security procedures

- Network security operations established, including firewall management, VPN security settings, and intrusion detection and prevention mechanisms
- Web Application Firewall and online behavior monitoring mitigate external hacking risks
- Anti-virus software is installed on all office PCs, with regular system and virus code updates to minimize the risk of hacker attacks and ransomware threats

Ransomware protection

Computer logs collected, automatically detecting and responding to security threats, with 16 cybersecurity threats immediately detected and blocked

Regular review of audit trails

Regularly review core systems and equipment audit trails to detect any abnormal access, internally or externally

Joining cyber threat intelligence centers

- Joining TW-CERT, Trend Micro, and other centers to monitor the latest cybersecurity threats promptly
- 6 reported critical vulnerabilities corrected in 2023

Non-camera smartphone project

- A ban on IT personnel bringing camera-equipped devices into sensitive or office areas was enforced in 2022 to protect sensitive information
- Extended to the MOLICEL Xiaogang Plant in 2023 with metal detectors

DETECTION

Vulnerability scanning and penetration testing

Core systems undergo penetration testing to address medium- and high-risk vulnerabilities, followed by continuous retests to ensure these vulnerabilities are fully resolved

Red Team vs. Blue Team cybersecurity exercise

- No high-risk vulnerabilities detected; 33 vulnerabilities patched
- All vulnerabilities patched and rescanned till zero risk within a month

Honeypots and simulated hacker attacks

2 attacks, including internal Red Team exercise and external Red Team testing, successfully blocked in 2023, ensuring the effectiveness and sensitivity of the cybersecurity defense system

Expanded endpoint cybersecurity review

- Introduction of malicious connection, DDI, and EDR technologies, along with MxDR services, by a team of experts to monitor endpoint device security
- In 2023, expanded full-time monitoring to include Hoping Power Plant and battery business subsidiary

MAINTENANCE & PROTECTION

Privileged Access Management (PAM)

Annual inventory and need-based permission assignment for core business system access accounts; high-privilege account security managed through the PAM system

Encryption system for sensitive data Control of external data access

- A sensitive data encryption system introduced to protect core businesses data and prevent trade secret theft and operational disruptions by hackers
- Strict control of external accesses, including portable devices (i.e., USB drives), cloud storage services, IM services, FTP, and email delivery mechanism

Two-factor authentication mechanism

The MOTP system, combined with biometrics for two-factor authentication, reduces the risk of forgotten or compromised passwords

Real-time monitoring & alerting mechanism

- Core business systems and equipment all equipped with PRTG system, ensuring system administrators are promptly notified for emergency responses, supported by adequate backup solutions and regular drills
- Vulnerability scanning and penetration testing performed regularly to identify and promptly patch system vulnerabilities

Exclusive ChatGPT

- The exclusive ChatGPT for TCC Group Holdings underwent thorough vulnerability scanning and penetration testing before its launch
- Two-factor authentication and user login audit trail adopted

1.6_

Ethical Management

TCC prioritizes professional ethics, legal compliance, and integrity principles. "Anti-Corruption and Anti-Bribery Policy," "Procedures for Anti-corruption and Anti-bribery Management," and "Anti-corruption and Anti-bribery System Management Manual" have been stipulated. With ISO 37001 introduced, TCC is Taiwan's first enterprise certified by a third-party entity.

TCC KEY FACT

No Incident of Corruption Reported

Employee Signing Rate of "Statement of Integrity and Ethical Conduct" and "Integrity Code"

100%

ISO 37001 Certified

Ethical Corporate Management Best Practice Principles

Anti-Corruption and Anti-Bribery Policy

→ "Zero Tolerance" for Corruption and Bribery

Due Diligence Expanded to Business Partners

TCC has established an "Anti-Corruption and Anti-Bribery Promotion Team" led by the President, with the Legal Office overseeing. Department supervisors monitor daily corruption and bribery risks, reporting to the Audit Committee and Board of Directors at least annually. Employee performance appraisals incorporate ethical management indicators, including anti-corruption, anti-bribery, and legal compliance. In 2023, TCC updated "Business Partner Corruption Risk Assessment and Due Diligence Procedures" to include countermeasures for non-compliant suppliers, contractors, and customers. TCC will also develop a digital business partner risk assessment procedure.

Corruption & Bribery Risk Assessment

The Legal Office updates operating procedures annually through the "Internal/External Issues Registry," now including RMC plants. It oversees legal updates and authority requirements, reviewing last year's risk control measures. In 2023, TCC initiated bribery risk assessments at operation headquarters and RMC parent plants in Taiwan, planning to extend this to all sites. TCC conducts annual corruption and bribery risk assessments for employees and business partners. Departments and subsidiaries must monthly update and promptly report controversies to the Legal Office for quick legal or compliance issue resolution. Additionally, personnel promoted or transferred to medium- or high-risk positions undergo periodic assessments.

All Employees

TCC employees must sign the Statement of Integrity and Ethical Conduct. Those with medium- or high-risk levels and are directly involved in business relationships with suppliers and clients are additionally required to sign the Integrity Code.

Medium- or High-risk Business Partners

Departments working with medium- or high-risk suppliers or clients must conduct a full assessment, detail their cooperation rationale in the due diligence opinion field, and submit it for approval.

Business Partner Integrity Statement for Enhanced Management of Related Party Transaction

TCC has revised the Business Partner Integrity Statement to clarify ambiguities and prevent improper transactions. The "Related Party Transaction Procedure Management Directions" were enacted to strengthen the supervision of related party transactions. Also, the "Related Party Transaction Database" was established to aid employees in determining the necessity for submitting relevant documents or for a resolution adopted by the Board of Directors. In 2024, TCC will merge the related party database with the SAP system to help employees recognize the necessity of related party transaction control.

Education and Trainings on Ethical Management

In 2023, 17,592 individuals including Directors, business partners, employees, new recruits, and interns completed ISO 37001 training, with the General Administration Division achieving a 100% completion rate. An ISO37001 Promotion Team was formed, with 100% participation on "risk assessment operation" trainings. Education and training expanded to contractors; as of Q1 2024, 22 contractors have been trained, totaling 18.7 hours cumulatively.

In terms of anti-competition and anti-trust, for the sales department staff in direct contact with clients, TCC introduced the legal basics and key components of concerted action, along with court rulings and examples, to teach avoidance and response strategies for discussions of sensitive information with competitors, ensuring constant vigilance. A 100% training completion rate was achieved.

Topic	No. of people who completed the course	Training Hours
Ethical Management Trainings & Tests	15,684	784.2
ISO37001 Education and Training	921	767.5
Legal Compliance Training Course on the Fair Trade Act	313	626
ISO 37001 Education and Training-Promotion Team Members	21	31.5
Introduction of Related Party Transaction Management	264	528
Interests of Insider Trading	389	1,167
Total	**17,592**	**3,904.2**

→ Reporting System & Whistleblower Protection

TCC promotes reporting of misconduct by anyone connected to the Company through its "Reporting Mechanism for Violation of Code of Conduct," which outlines procedures and channels like email, written, and on-site reports. Reports can be made anonymously or with identification, but anonymous reports require full information and documents to prevent misuse. Whistleblower identities and report details are kept confidential with restricted access. TCC ensures whistleblower protection against retaliation. If a report concerns senior management, it can also be directed to the Company's Audit Committee, in addition to the aforementioned channels.

Reporting Mailbox: mp.buster@taiwancement.com
Reporting mailbox for matters involving ethical issues of senior management: tccwhistle@taiwancement.com

→ Reports and Grievances in 2023

Reporting and grievance channel	Number of cases	Cases involving violation of ethical management	Cases involving discrimination or harassment
Reporting Mailbox	16	13	0
Audit Committee Mailbox	4		
Employee Grievance Mailbox	15		

Violation of internal guidelines

TYPE OF PENALTY	CASES
Corruption or bribery;	0
Discrimination or harassment;	0
Customer privacy data;	0
Conflicts of interest;	0
Money laundering or insider trading.	0

Cases with Penalties in 2023

In 2023, TCC faced 9 penalties, including 2 for environmental issues, 6 for social concerns, and 1 significant anti-competition/anti-trust case with a fine over NT$1,000,000. Concerning the case of concerted action made by the Fair Trade Commission, TCC has taken necessary corrective measures for relevant violations, strengthened education and training, and filed for legal remedies. For more details, visit the "Material Information" and **"ESG – Ethical Management" sections on TCC Corporate Website**.

TYPE OF PENALTY	CASES	DESCRIPTION	RESPONSES
Violation of external penalties			
Environmental	2	EIA related violations: 1 waste related violations: 1	Strengthen employee training to boost relevant awareness in daily operations
Social	6	Labor working hours violations: 1 Safety and OHS violations: 1	Strengthen employee training to boost relevant awareness in daily operations
Anti-competition or anti-trust	1 (Legal remedies Filed)	—	The “Code of Fair Trade and Anti-trust Compliance” has been formulated. In employee education and training, this case serves as a teaching material to remind employees of being vigilant in discussing sensitive information with competitors and refusing to attend occasions involving any of the above. How to report and keep evidence while clients demanding the same price is emphasized to protect the Company’s interests.

→ Audit Management System

The Internal Audit and Compliance Office at, under the BOD, develops its annual audit plan based on risk assessments and business types of audited entity. Non-conformities and anomalies identified during audits prompt a correction notice to the audited entity, with a set rectification deadline. A report documenting corrective actions is compiled and, upon completion, submitted to the Audit Committee for review.

In 2023, TCC enhanced ESG and alternative fuel oversight, addressing non-conformities promptly and continuously tracking unresolved issues. The remote audit system improved, enabling extra audits of trusteeship plants, exceeding yearly goals. Audit training saw full attendance, with 17 attendees completing 108 hours, surpassing the 12-hour legal mandate. Additionally, training in carbon emission data verification was conducted, with future sessions to concentrate on data analysis and audit techniques.

→ Key ESG Audit Items in 2023

- A. Cost control design and execution
- B. Carbon reduction data and result
- C. Capex (budget) execution and clearance
- D. Slow-moving inventory and idle assets
- E. Solar: Efficiency, management, and cleaning in power generation
- F. Alternative fuel process design, execution, and TSR
- G. EHS and emergency preparedness exercise, training, and results

1.7_

Sustainable Supply Chain Management

The 2023 BCI Supply Chain Resilience Report highlights that global industry supply chains were impacted by the pandemic, which notably enhanced the resilience. However, physical, geopolitical, and other risks remain potential threats to supply chain stability.

Supplier Management Policy

TCC Procurement Portal

→ ESG performance of suppliers is now part of procurement criteria, with substandard suppliers being phased out.

TCC collaborates closely with its supply chain towards sustainability, guided by "sustainable supplier management" and "local and green procurement" strategies. Internally, TCC elevates the management level and processes of its supply chain with the Board of Directors serving as the highest decision-making body. Externally, the supplier selection criteria are hooked with the supply chain sustainability actions to drive carbon inventory and ESG actions of business partners.

In 2023, after failing to improve despite TCC's continuous support for corrective actions, one supplier was terminated for significant negative impacts. Upholding high ESG standards, TCC has decided to discontinue 12 suppliers by April 2024 for not meeting TCC carbon management and sustainability criteria.

Significant Supplier →

A Significant Supplier is one crucial to product quality and delivery, meets specific procurement amount or ratio, or poses a high ESG risk, requiring management and evaluation.

→ Human Rights Due Diligence of Supply Chain

In 2024, TCC enhanced supply chain human rights protection through due diligence (please visit **CH5.5**), working with suppliers to foster a mutually beneficial and prosperous long-term partnership.

TCC KEY FACT

Sustainable Supply Chain Management Goals Setting

7 TARGETS |	Achievement Rate in 2023
95% Locally-procured non-raw materials	← 98.7%
100% New suppliers & existing Significant Suppliers signed the Supplier Code of Conduct (excluding state-owned enterprises)	← 100%
100% contractors signed the Letter of Undertaking for Health, Safety, and Environment(HSE)	← 100%
100% Review conducted to Significant Tier-1 Supplier (written/on-site) (excluding state-owned enterprises)	← 93% [16]
100% High-risk significant suppliers supported by improvement plans	← 100%
78% Valid carbon emissions data collected from Significant Tier-1 Suppliers by 2023	← 95.7%
30 Significant Tier-1 Suppliers subject to carbon questionnaires and on-site inspections by 2023	← 30

Note16 Subjects of the 2023 inspection are 2022 Significant Tier-1 Suppliers. The achievement rate didn't reach 100% because transactions between some suppliers has been completely canceled in 2023 or they have been removed from the Significant Tier-1 Suppliers List, hence the abortion on inspecting these suppliers.

→ Sustainable Supplier Management Process

TCC refers to UNGC and integrates the principles of the ISO 20400 into its procurement processes. Meanwhile, TCC conducts written reviews of the supply chain based on CSDDD, promoting the ESG supplier program through five major steps, and strengthen its influence over suppliers.

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
	Risk and Impact Assessment	**Sustainability Performance Evaluation**	**Correction and Improvement**	**Training, Empowerment, and Cooperation Capacity-building Program**	**Supervision, Assessment, and Mutual Learning**
APPROACHES AT TCC	Identify and classify the ESG risks of existing suppliers, ensuring low sustainability risks among all significant Tier-1 Suppliers. New suppliers must sign the "Supplier Code of Conduct" and complete the Simplified Supplier Sustainability Self-Evaluation Questionnaire. Failure to comply will be excluded from the supplier list. Annually identify ESG risks for current suppliers. Evaluation based on the likelihood to risks, impact, and vulnerability.	Develop and require suppliers to complete the Supplier Sustainability Self-Evaluation Questionnaire, based on OECD guidelines. The surveyed risk facets include: geopolitical, industry-specific, and commodity-specific risks Written review or on-site inspection (on-site audit)	**High-risk suppliers** ▌Counseling suppliers submit action plans and complete corrections within a set timeframe ▌Prioritized for the Supplier Sustainability Governance Workshop or other capacity-building program and review next year ▌"Terminated" if lack of improvement	**Supplier GHG Inventory Counseling:** Counsel suppliers on carbon emissions calculation, prioritizing significant Taiwanese suppliers for on-site inspections. **GHG Workshop:** Assist RMC plant transporters enhance carbon data quality and develop carbon reduction strategies. **Sustainability Governance Workshop:** Organize biannual sessions to help SMEs and significant Tier-1 suppliers develop sustainability systems, policies and goals. **Supplier Convention:** Emphasize TCC's requirements covering human rights due diligence and biodiversity. External experts will conduct related training sessions.	The Procurement Department's senior management, along with external consultants, assess sustainable procurement's key issues across 7 major areas, including human rights. Purchasing practices towards suppliers are continuously reviewed to ensure alignment with the Supplier Code of Conduct and to avoid potential conflicts with ESG requirements. Hold the Supplier Convention to recognize outstanding suppliers, featuring a keynote. In 2023, Zefeng Mining's VP Roy Lin discussed establishing a sustainability unit, formulating policies, and performing audits **Suppliers with excellent performance** ▌First negotiation right ▌Public recognition and invitation to present practices at the Supplier Convention
PERFORMANCE	**Suppliers with potential/actual significant negative impacts: 12**	**Suppliers assessed via desk assessments/on-site assessments: 301**	**Suppliers supported in corrective action plan implementation: 11 (100%)** **Suppliers with substantial actual/potential negative impacts that were terminated: 1 (8.3%)**	**Valid carbon data from Significant Tier-1 Suppliers: 95.7%** **Outsourced transporters entering TCC plants with Phase 5 vehicles: 77** **The 2023 Capacity Building Program included 290 enterprises, with 190 significant Tier-1 suppliers, exceeding the target of 183.**	**150+ suppliers attended Supplier Convention**

→ AI Procurement Portal Improvement to the Supply Chain Screening Mechanism

TCC launched the "Procurement Portal" with AI technology to streamline supplier selection and bidding. This digital platform facilitates real-time bilateral communication, boosting transparency and efficiency in procurement. In 2024, it will expand to affiliated enterprises and integrate supplier evaluation results and procurement planning for coal and other raw materials.

TCC KEY FACT

100% BLACKLISTED **Blacklisted suppliers and associated suppliers blocked after a full screening in 2023**

→ Education and Training for Company's Buyer

TCC annually conducts education and training for procurement personnel to enhance their sustainability skills. In 2023, a training on sustainable supply chain management was held for Mainland China's team, alongside human rights education to emphasize its importance in supply chain management. The future goal is to organize at least one sustainable supply chain management training yearly in both Taiwan and Mainland China.

→ Training for Company's Buyer 2023
Global carbon reduction trend and necessities
Cement industry transition
Requirements of sustainable supplier chain management and international ESG indicators
TCC sustainability development and challenges

→ Local and Green Procurement

TCC is dedicated to enhancing its supply chain's resilience by collaborating with suppliers to foster an eco-friendly, human rights-respecting, safe, and healthy value chain. Through its "Green Procurement Policy," TCC prioritizes energy-efficient, low-pollution, and renewable products and services, while also promoting supply chain localization. This approach aims to boost service efficiency, reduce delivery times, cut transportation distances and carbon emissions, and increase local job opportunities.

→ Procurement Percentages in 2023	TAIWAN	MAINLAND CHINA	TOTAL
Raw material local procurement	84.7%	100.0%	**94.6%**
Non-raw material local procurement	97.7%	99.7%	**98.7%**
Raw material green procurement	9.9%	0.21%	**3.5%**
Non-raw material green procurement	2.5%		**1.7%**

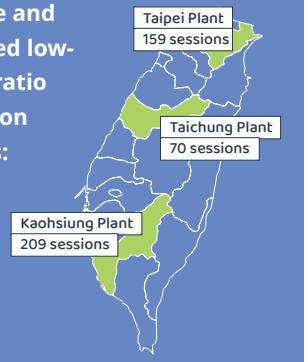
Note17 Due to the absence of green material certification in Mainland China, only the green procurement amount of non-raw materials is considered.

1.8_

Client Communication

With “reducing carbon without reducing strength” at the core for its products, TCC promotes products with emphasis on low carbon. Also, it explains the practices that puts carbon reduction into action from raw materials to manufacturing processes, finished product transportation, etc. By using TCC's low-carbon products, clients can maintain structural strength while reducing carbon emissions in construction.
TCC attaches great importance to client feedback. Clients’ opinions are collected and included in the agenda of the monthly operation meetings for improvement.

2023 RMC plants’ IL concrete and optimized low-carbon ratio promotion sessions:



→ Faithful Disclosure of Carbon Emissions on Delivery Notes

Share Carbon Reduction Benefits with Clients

Starting in 2023, TCC discloses carbon footprints on all cement and concrete delivery notes and prints a 50% Carbon Footprint Reduction Label on various cement products. This initiative aims to raise client awareness about carbon issues. The 2023 Total Climate product series—the Portland limestone cement (IL) & concrete with the lowest carbon in Taiwan at present—will also disclose carbon footprint data verified by a third party.

Product Health and Safety Management

With the ISO 9001 100% introduced in the cement plants, TCC ensures the health and safety of its products at all levels. It enforces six quality assurance and certifications with the strict three-tier quality control system and autonomous inspection system, including six raw material inspections, six third-party certifications, as well as the “Carbon Footprint Label” and “Carbon Footprint Reduction Label”. Hence, TCC warrants not only its product strength but also zero negative impact.

TCC's concrete products achieved health product verification, including the TCLP report. TCC provides 'Safety Data Sheet' for its 100% cement products and shares third-party test results, labeling all relevant substances of concern in local languages to ensure clients of their safety, non-toxicity, and no risk to human health.

In addition, TCC conducts long-term training for employees to offer supports regarding health and safety issues of products for clients like on-site cement application consultation and ready-mixed concrete formula adjustment advice. TCC arranges the client service groups on a monthly basis to care for clients’ use of products and provide FAQ sections regarding product ingredients and dosage instructions. The Client Service Planning and Follow-Up Chart is employed for monitor the safety performance of products during their use phase. Additionally, TCC offers a convenient ordering platform featuring "TCC News" for the latest updates and shares its achievements in science-based carbon reduction and circular economy practices to improve client communication frequency and effectiveness.

Management Mechanism		Inspection Systems
Three-tier Quality Control System		Tier 1: Branch plants conduct material inspections according to SOP Tier 2: The parent plant goes to the branch plant for regular random inspections Tier 3: The independent third-party research laboratory performs irregular visits to plant for random inspections
THE PORTLAND SERIES	**TCC Cement** ISO 14046 ISO 14067	Carbon Footprint Label, MOE Taiwan Carbon Footprint Reduction Label, MOE Taiwan Gold-rated Green Mark, MOE Taiwan Low-carbon product certification, Mainland China
	Concrete ISO 14067	Carbon Footprint Label, MOE Taiwan Carbon Footprint Reduction Label, MOE Taiwan Green Building Material Label, MOI Taiwan
Six Raw Material Inspections		Cement, sand and gravel, slag, fly ash, chemicals, and mixing water, passed the tests by TAF laboratories like those of TCC, SGS, etc.
Third-Party Product Certifications		Concrete specimen compressive strength report Good Ready-Mixed Concrete (GRMC) Label TCRI product traceability certification

→ Cement Compressive Strengths (MPa) of TCC Cement

Cement Type	3 Days	7 Days	28 Days
Type I Cement	24	32	41
Low-alkali Cement (Type I)	24	32	42
Type II (MH) Cement	23	31	40
Limestone (IL) Cement	27	33	42

TCC's cement products exhibit superior strength compared to the CNS standard values, regardless of the 3-day, 7-day, or 28-day.

→ Product Traceability System for Information Transparency

An AI-powered product safety traceability system with a user-friendly interface has been launched, allowing clients to scan a QR-Code for detailed information on materials' origins, mixing ratios, carbon emissions, and inspection data. In 2023, the Portland Limestone Cement (IL) carbon emission database was integrated, and the transparency is akin to food traceability systems.

Content of Product Traceability

Strength information, cement, slag, chemical admixtures, quality assurance certificates, sand and gravel, fly ash, aggregates, carbon emissions information, chloride reports, 28-day strength test report, certificates of external certification, TCRI product traceability certification

TCC KEY FACT

Percentage of Clients Reporting Scores of Satisfied (Taiwan and Mainland China Weighted Average) **95.4%**

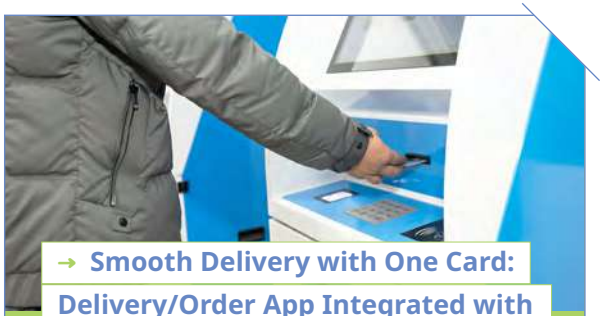
→ Client Satisfaction Survey

TCC annually conducts client satisfaction surveys, targeted at 90%. In 2023, the survey included carbon emissions data and product mixing ratios on delivery notes, and expanded to Mainland China to better meet all client expectations within its operational scope.

→ Client Satisfaction Survey Results in 2023

Survey Item	Concrete	Cement	
	Taiwan	Taiwan	Mainland China
Surveyed Market and Coverage	51.27%	99.99%	72.05%
Brand Reputation	94.06%	92.13%	-
Quality Stability	91.56%	92.55%	90.87%
Client Complaint Response Time | Sales Process	92.41%	88.94%	91.94%
After-sales Service	92.15%	89.79%	92.39%
Disclosure of Carbon Emissions on Delivery Order/Note	90.30%	89.36%	-
Concrete Delivery Note | Honest Disclosure of Product Information	90.30%	-	-
Concrete Product Traceability Online Inquiry System | Presenting Product and Raw Material Data	89.28%	-	-
Reporting Scores of "Satisfied" (%)	**99.37%**	**96.81%**	**89.44%**

Note 18 The denominator is the total questionnaires recovered times the full score (5), and the numerator is the sum of client scores.
Note 19 "Satisfied" is defined as 4 points or above.
Note 20 The scope of Clients Satisfaction Survey for Cement encompasses the domestic clients (sales to clients of other cement companies, their affiliates, and purchases under 100 metric tons are excluded).
Note 21 The Concrete Client Satisfaction Survey samples clients who purchase 500 cubic meters or more.
Note 22 2023 client satisfaction weighted average calculation: Denominator is the total responding cement and concrete clients; Numerator is those reporting satisfaction.
Note 23 The Customer Satisfaction Survey for Mainland China is tailored for each plant's unique customer characteristics. In 2024, TCC Group Holdings will uniformly plan this survey.



→ Smooth Delivery with One Card: Delivery/Order App Integrated with Automatic Dispatch

TCC ceaselessly improves its delivery system automation. The Yingde Plant (Guangdong), Jurong Plant (Jiangsu), and Chongqing Plant have introduced the automated delivery system that integrates the autonomous weighing system, automatic delivery system, and app-based ordering system, etc.

When clients procure products, what it takes for a driver is to visit the plant's autonomous dispatch office, enter basic information and collect IC cards containing client and product information. This IC card enables "Smooth Delivery with One Card" across different stations, eliminating repeated data check process. Upon arriving at the loading bay, the driver taps the card and the cement loading process will complete automatically. It not only improves efficiency and reduces manpower requirements but also avoids the impact of flying dust on employees' respiratory tracts. Taking the Yingde Plant for example, automation has cut bagging manpower by 75% and halved loading staff. Thus, truck delivery efficiency and turnaround time have significantly improved. In 2024, automation will extend to clinker and bulk cement.

1.9_

Intellectual Property Management

TCC is advancing its technology strategy by focusing on low-carbon construction materials and new energy sectors, enhancing R&D, energy efficiency, and fire-resistant innovations. In 2024, TCC will implement the Taiwan Intellectual Property Management System (TIPS) to thoroughly manage its trade secrets and patents in energy storage, batteries, and low-carbon materials development.

→ Performances in 2023

Trademarks

- 528 approved
- 81 applications pending
- Filed in more than 25 markets worldwide, including Taiwan, Mainland China, USA, UK, EU, Switzerland, Japan, etc.

Invention Patents

- 82 approved (cumulatively)
- 61 applications pending (cumulatively)
- Filed across 6 markets worldwide, including Taiwan, Mainland China, USA, EU, Japan, and South Korea

Trade Secrets

- ISO 27001 Certification
- Confidentiality agreement
- R&D members required to sign non-competition clauses
- Filing for approval required for access to corporate document information

Copyrights

All R&D and creative outcomes by business partners for TCC are specified as TCC's intellectual property in standard contracts and procurement orders.

EnergyArk

Energy Storage Cabinet Patent Family

In 2023, TCC prioritized the EnergyArk energy storage cabinet within its patent portfolio, emphasizing safety, stability, fire resistance, and high performance. It sought patents across Taiwan, Mainland China, Japan, Hong Kong, South Korea, USA, and EU to safeguard its green product R&D intellectual properties:

← Internal System
Combining fire-resistant materials with high-strength concrete, while maintaining lightweight and easy assembly without compromising safety. Through mechanisms such as liquid immersion and pressure relief, disasters are quickly mitigated.

AI Technology
Employ AI and other methods such as energy dispersal between systems to effectively monitor critical heat points.

← System Structure
The designs of fire-resistant panels, pressure resistance, and water cooling are optimized to prevent battery thermal runaway.

Green Investment/Financing

Since its transformation in 2018, TCC has established a robust operating model and growth trajectory. By the end of 2023, TCC received an "International Investment Grade" BBB– credit rating with a "Stable" outlook from Fitch Ratings. This rating was primarily based on TCC's leading positions in the cement markets of Taiwan, Turkey, and Portugal, as well as its significant presence in the cement markets of southern and southwestern provinces of mainland China. Additionally, Fitch Ratings acknowledged TCC's profit model's ability to generate stable profits and cash flows. In April 2024, TCC's liquidity was upgraded to "Extremely Strong" by Taiwan Ratings. TCC's green transformation requires continuous investment, presenting endless opportunities for the company to build a future with more innovation and carbon competitiveness. All funds raised will be used for green and sustainable development-related projects.

Green/ Sustainable Financial Instruments	Fund Raised
Sustainable and Green Credits	**Sustainable and green financing amount NT$95,734,509 thousand** ⓐ TCC has requested financial institutions to add green or sustainable indicators to the credit amount of the Group. It is expected that over 30% of TCC Group Holdings' credit amount will be converted into green or sustainable credits by 2024. The purposes include, but are not limited to: → Reducing GHG emissions & air pollution → Promoting circular economy and waste reduction → Manufacturing, transmission, and related uses and products of renewable energy → Acquiring energy storage systems and charging stations → Purchasing EVs, using low-sulfur fuels in ships, implementing AMP systems, and manufacturing batteries for EVs → Green building construction → Biodiversity conservation ⓑ The Hoping Industrial EcoPort Corporation's investments in marine resources like corals, fish, and shellfish have led to its credit amount being classified as green credit by financial institutions.
Sustainability-linked Loan	**EUR800 million** In 2024, TCC's subsidiary signed an €800 million unsecured sustainability-linked loan, 1.5 times oversubscribed, with interest rates tied to Scope 1 and 2 carbon emission intensity, demonstrating TCC Group Holdings' commitment to carbon reduction and low-carbon transition.
Green Euro-Convertible Bond (Green ECB)	**US$420 million** ⓐ TCC became the first Taiwanese company to issue a Green ECB, certified by Sustainalytics, and launched a "Green Financing Framework" with Sustainalytics' Second-Party Opinion. This framework covers initiatives in alternative materials/fuels, energy efficiency, air pollution control, water management, renewable energy, clean transport, green building, and sustainable natural resource management. ⓑ TCC will invest US$420 million in green projects within this framework and obtain certification from a third party. ⓒ Regularly disclose the progress and execution details of these green projects and allow audits by independent third-party entities.
Global Depositary Receipt (GDR)	**US$384.7 million** TCC's GDR issued in October 2023 was the largest GDR issued in Asia in the past two years. It is one of the few cases that the ratio of subscription from long-only funds and ESG investment institutions exceeded double digits, mainly for energy storage, EVs, and charging stations in subsidiaries.

CHAPTER 2

DECARBONIZATION

Low-carbon Construction Materials Protect the Ecosystem

TCC HOPING LOW-CARBON GREEN ENERGY PARK

Targets

SBT Carbon Reduction Target

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

2025 — 2030 — 2050

1.5℃ PATHWAY **NET ZERO**

EP100 Energy Productivity

Energy productivity +50% in 2040| Base year: 2016

Low-Carbon Products

→Portland Limestone Type IL Cement (-15% CO_2e)
→Portland Limestone Type IL Cement Concrete (-40% CO_2e)
100% Replacement of Portland Type I Cement by 2026

Clinker to Cement Ratio 2030 0.780

Water Resource Management

2030

→ Water Consumption Intensity: 0.000225 Million Liters/ Metric Ton of Cementitious Materials |Taiwan & Mainland China

→ Water Withdrawal Intensity:Plants in Taiwan -50%; Plants in Mainland China -30% | Base year: 2016

2023/ Performance Highlights

Greenhouse Gas Emissions ↘

Carbon Emission Intensity of Cement **-9.1%**
0.686 Metric Tons CO_2e/ Metric Ton of Cementitious Materials

Carbon Emission Intensity of Concrete **-8.53%**
247.93 kg of CO_2e/ m^3 of Concrete

Taiwan & Mainland China Scope 1&2
Base year: 2016
Compared to 2021

Air Pollution Management →

Cement Plants in Taiwan & Mainland China

NOx 383
SOx 41
TSP 22

Unit: g/t Clinker

Energy Management

Cement Plants in Taiwan & Mainland China

CLIMATE GROUP EP100

Energy Productivity 0.477 Thousand of NTD of Revenues/GJ

+45.9%

Base year: 2016

Power Generation by Waste Heat Recovery Equivalent to Purchased Electricity

35%

Water Resource Management ↘

Cement Plants

Water Consumption Intensity
Cement Plants in Taiwan & Mainland China

0.000236 Million Liters/Metric Ton of Cementitious Materials
(Environmental Water Used on the Plants Excluded)

Water Withdrawal Intensity
Base year: 2016

0.000245 Million Liters /Metric Ton of Cementitious Materials

Taiwan -35.50%
Mainland China -5.14%

RMC Plants Water Withdrawal 100%

Intensity
0.00013 Million Liters/ m^3 of Concrete

RESOURCE RECYCLING

Targets

Ratio of Alternative Raw Materials

22% by 2030 | Taiwan & Mainland China

The Thermal Substitution Rate (TSR) of Alternative Fuels

35% by 2030 | Taiwan & Mainland China

Overseas Cement Business

OYAK

- 2030
  - Aslan Plant 70%
  - Ankara Plant 65%

CIMPOR

- 2025
  - Alhandra Plant 80%
- 2024
  - Souselas Plant 65%

2023/ RESOURCE RECYCLING

Performance Highlights

Cement ↘

Resource Recycling Rate **24.78%**

TSR of Alternative Fuels **13%**

Alternative Raw Materials Contained **19%**

Taiwan & Mainland China

↙Concrete

Alternative Raw Materials Contained **43.25%**

Waste Treated for Industries

1,155,684 Tons

Equivalent to Taiwan's Total Industrial Waste **5.77%**

Household Waste Processed 13,762 Tons

OVERSEAS CEMENT BUSINESS

OYAK
Aslan Plant_61% | Ankara Plant_40%

CIMPOR Overall
36%
Alhandra Plant_32%
Souselas Plant_43%
Loule Plant_33%

2.1_

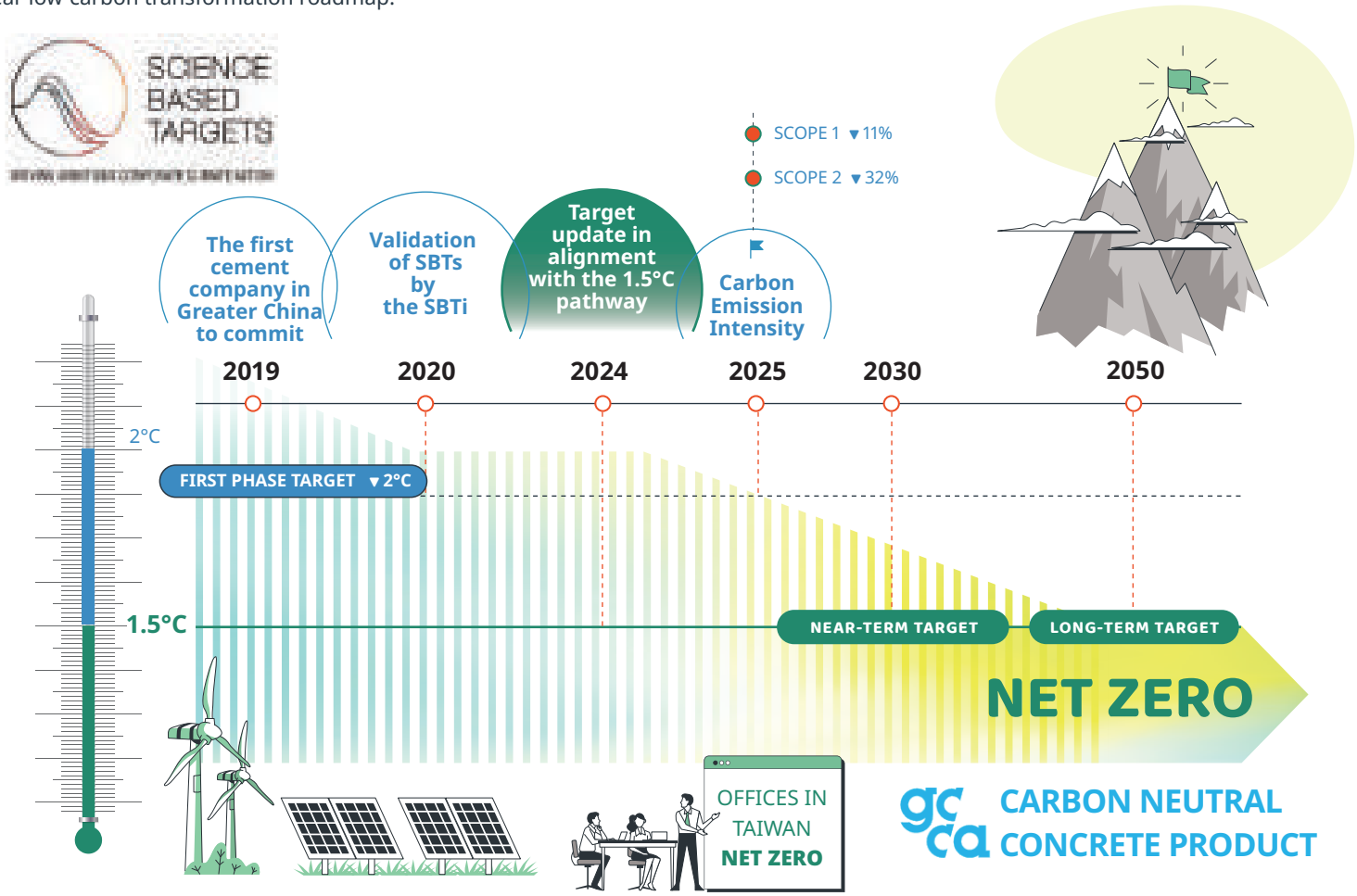
Low-carbon Construction Materials

In the new global carbon pricing era, TCC supports carbon pricing policies to curb carbon leakage and leverages carbon strategies to boost corporate innovation and national industry competitiveness.

→ Science Based Targets & Management System for Carbon Reduction

TCC initiated the Science Based Target (SBT) project in 2019, aligning with Intergovernmental Panel on Climate Change (IPCC) and International Energy Agency (IEA) methods to adopt a Well-Bellow 2°C scenario (WB2D) for 2025 carbon reduction goals. TCC commits to reducing Scope 1 and 2 GHG emissions by 11% and 32% per ton of cementitious materials by 2025 from a 2016 base year. TCC was validated one and a half year ahead of schedule in 2020. Alongside 40 global cement firms within Global Cement and Concrete Association (GCCA), TCC aims for carbon-neutral concrete by 2050, setting a 30-year low-carbon transformation roadmap.

TCC aims to revise its 2030 SBT to meet **THE 1.5°C TARGET** by 2024. Concurrently, TCC will commit to 2050 net-zero goals and join the SBTi validation pilot, ensuring consistent carbon reduction monitoring.



→ AI-powered Carbon Management Platform

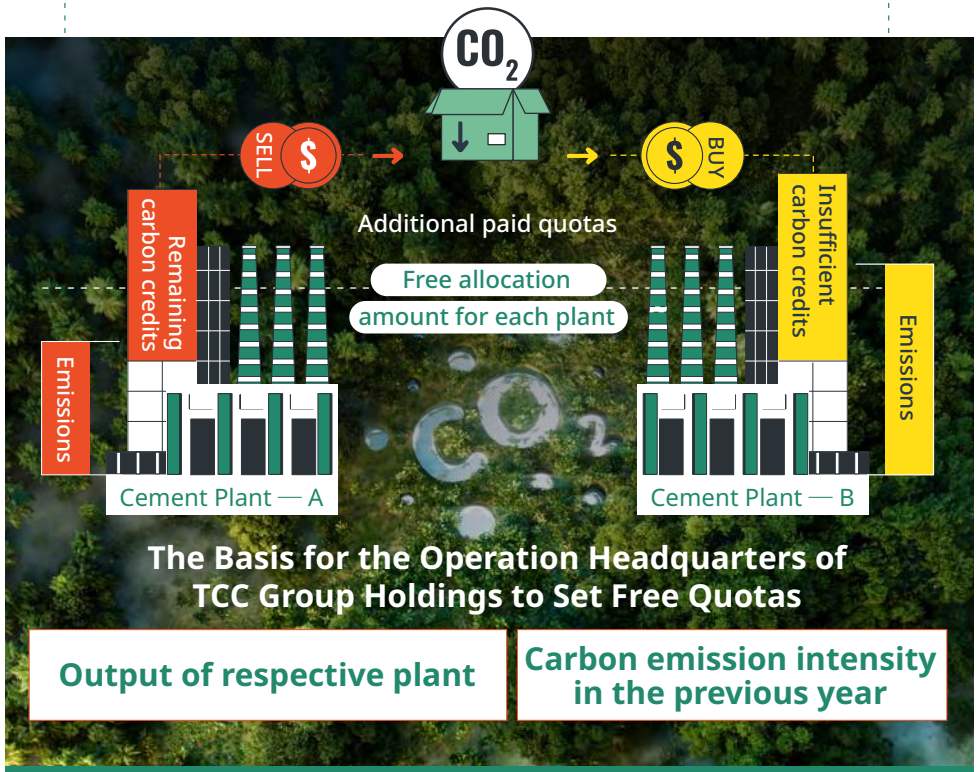
TCC's AI platform, launched in 2019, automates daily carbon emission calculations for cement and concrete using the Cradle-to-Gate LCA method. Plants send production data daily, which the platform uses to compute raw material, fuel, and energy carbon emissions, and advises on optimal alternative raw material and fuel use. By 2024, environmental tech firms under TCC Group Holdings and TCC DAKA Renewable Resource Recycling Center will join the system to enhance carbon management.

Compensation at TCC is tied to SBTs and alternative fuel use KPIs. Quarterly and annual bonus factors are set, and the platform provides a visual presentation of the achievement rate to encourage proactive measures.

SBT Carbon Reduction Progress Tracking

→ Internal Carbon Pricing

To promote eco-friendly investments and energy efficiency, TCC set an internal carbon price of NT$300/ton-$CO_2e$ in Taiwan, based on LSE's guidelines, and RMB101/ton-CO_2e in Mainland China, in anticipation of the cement industry's inclusion in carbon trading. This pricing aids in assessing the impact on capital investments and operations. To streamline budgeting for capital expenditures, maintenance, and energy saving projects, TCC factors in carbon costs alongside existing expenses. This inclusion in the internal rate of return calculation reinforces department-wide motivation for carbon reduction.



→ Internal Carbon Trading

In 2024, TCC introduced an internal carbon trading platform, inspired by Guangdong Pilot ETS and EU ETS, to help plants control emission intensity and align product sales with market needs. Starting in 2024, TCC's Finance Department will issue quarterly carbon budget reports to spur competition and collaboration among plants. Year-end carbon allowance settlements will influence performance appraisals. Cement plants in Taiwan and Mainland China can place orders and complete transactions on the platform to enhance operations.

TCC | Reducing Carbon without Reducing Strength

Total Climate SERIES

→ Low-carbon Products: Reducing Carbon without Reducing Strength

In Taiwan, a region frequently affected by earthquakes, TCC has demonstrated a firm commitment to the strength and safety of low-carbon products. TCC has introduced the 'Total Climate' series, which offers low-carbon options without compromising on strength. TCC, targeting corporate plants and offices as well as eco-conscious builders and construction companies, join hands with customers to embrace the era of carbon valuation. This strategy steers the industry towards sustainability and marks TCC's evolution from a volume-based supplier to a premium construction brand.

Portland Type I

-10.3%

Suitable for general construction and engineering

Portland Type II(MH)

-6.2%

Low hydration heat
Resistant to sulfate
Suitable for bridge piers and large dams

TCC Low-carbon Cement

Portland Limestone Type IL Cement

-15.4%

- Carbon reduced by 15.4% compared to Portland Type I (base year: 2016)
- Lower carbon, stronger early strength for general construction and engineering
- Cable of completely replacing the traditional Portland Type I
- Production in line with CNS 15286

TCC Low-Carbon Concrete
Portland Limestone Type IL Cement Concrete

Consistent slump, superior workability	Stronger early strength	More actionable, lower carbon emissions	High durability	For general construction and engineering

Item		TCC Low-carbon Ratio Concrete	Portland Limestone Type IL Cement & Concrete
Concrete Slump (cm)		26	26
Compressive Strengths (kgf/cm^2)	1-Day	104	110
	3-Day	260	330
	7-Day	403	488
	14-Day	535	586
	28-Day	611	646
Carbon Reduction Rate		Benchmark	≥8%

→ UHPC Construction Material

Ultra-High Performance Concrete (UHPC) is celebrated for its superior durability, strength, and mechanical properties. It transcends traditional construction material limits, revolutionizing the industry with its adaptability to diverse designs, infusing buildings with a new perspective and artistic allure. Esteemed by architects, it's a choice material for iconic global structures.

Comparison of UHPC and Traditional Concrete

Material Nature	Traditional Concrete	TCC UHPC
Compressivestrength (MPa)	20~40	≥120
Flexural strength (MPa)	≤4.5	≥15
Tensile strength (MPa)	<4	≥5
Shrinkage rate (μm/m)	>700	≤300
Impermeability (m^2/sec)	$10~50x10^{-13}$	$≤5x10^{-13}$

The test results of UHPC are superior to those of traditional concrete

TCC KEY FACT | UHPC Feature

Reduced the thickness of building walls by −75%

Extend the lifespan of a building ~120 years

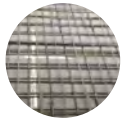
Reduced carbon emissions compared to traditional concrete −60%

→ UHPC Applications

UHPC KT Slab (Precast K-Truss Slab)

- Precast product, eliminating the need for formworkers and floor supports
- Reduce structural net load
- Reduced number of steel bar tying workers & low carbon emissions
- Shortened construction time

VS



Traditional Slabs

- Depression, water accumulation
- Insufficient carrying capacity

UHPC Bricks

Grass pavers

- With resistance to heavy pressure and high durability, allowing the land to breathe

Paving bricks

- High compressive and flexural strengths

VS

Traditional grass pavers & paving bricks

- Depression, water accumulation
- Insufficient load-bearing capacity than traditional paving bricks
- Uneven surfaces & prone to loosening

→ Ultra-High Performance Concrete (UHPC) Production Center

TCC inaugurated the largest Materials Process Center of UHPC at the Hoping Plant in Hualien in 2023. This center produces UHPC mosaic wall panels, KT slabs, grass pavers, and paving bricks. Notably, the EnergyArk Energy Storage Cabinet, a fireproof and fire-extinguishing product, showcases the integration of UHPC with new energy technologies. The smart production design includes an overhead crane system for enhanced process control. The center employs many tribal women, particularly in making UHPC grass pavers, reflecting TCC's commitment to gender inclusivity in its low-carbon transformation. Currently, these products are used in the exterior curtain walls of the TCC DAKA Renewable Resource Recycling Center, the 100-MW energy storage project at the Hoping Plant, and for external clients. TCC plans to further innovate by developing cement or UHPC permeable panels that incorporate recycled construction waste.

→ International TAF-accredited Low-carbon R&D Center

TCC's Low-carbon R&D Center, with top-tier lab equipment, conducts analyses of cement and concrete, ensures product quality, and fosters staff expertise, all while innovating in low-carbon solutions. The Center boasts TAF-accredited labs for material testing of cement, civil engineering and public works. Currently, the Center has 29 employees, nearly 70% of whom hold master's or doctoral degrees.

Following the release of TCC Portland Limestone Type IL Cement, the Center received the "CNS 15286 Blended hydraulic cements" certification in February 2024. TCC is assessing the setup of a TAF-certified SRF lab to address Taiwan's testing gap and boost product standardization and traceability.

Low Carbon Product Certifications

Cement	**Ministry of Environment**
	Gold-rated Green Mark
	Carbon Footprint Label
	Carbon Footprint Reduction Label
	ISO 14067 Carbon Footprint of Products
	Ministry of the Interior
	Green Building Material Label (to be issued in Q3 2024)
	Bureau of Standards, Metrology and Inspection
	CNS Mark
Concrete	**Ministry of Environment**
	Carbon Footprint Label
	Carbon Footprint Reduction Label
	Taiwan Architecture & Building Center
	Recycling Green Building Material Label
	ISO 14067 Carbon Footprint of Products
	Good Ready-Mixed Concrete (GRMC)
	Ministry of the Interior
	Green Building Material Label (to be issued in Q3 2024)
UHPC	**Ministry of the Interior**
	Low-carbon Construction Methods (to be completed in Q3 2024)

→ Civil Engineering Testing Laboratory (TAF Accreditation: 4169)

- Accredited with ISO/IEC 17025:2017 and CNS 17025:2018 quality system laboratory certifications
- Compliant with the S01 and S02 requirements of the "Accreditation Program for Public Construction Material Laboratory" of Taiwan Accreditation Foundation (TAF)
- All test methods in compliance with the CNS national standards
- 8 civil engineering test and experiment accreditation items passed successfully in 2023 (with more to come)

Low-carbon Product R&D

Alternative Raw Materials/Fuels

- Develop new alternative fuels to help reduce carbon emissions in cement and concrete.
- Develop alternative fuels in collaboration with CPC Corporation.
- Engage in the SRF development plan and cement kiln clean integration system in collaboration with the ITRI.
- Develop new alternative raw materials in cooperation with industrial associations.

Green Construction Materials Develop low-carbon cement and concrete while maintaining strength and safety.

Construction Concrete Recycling Converting waste concrete into RCA.

Quality Control

Inspect and control from time to time; improve and normalize machinery equipment.

Technical Talent Education and Training and Skills Assessment Incentive System

Organize professional education and training courses on ready-mixed concrete quarterly.

Establish quality control skills assessment system and link such to incentive system.

2.2_

Low-carbon Production Value Chain

TCC KEY FACT

5G Smart Mine
AI for Optimal Route
Production Efficiency Increased by 4%

Eco-friendly RMC Trucks (Phase 5 & 6) 79%

Automated Smart Warehouse

100% accuracy of inventory check 25% of time saved

Power Generation by Waste Heat Recovery | Taiwan & Mainland China Cut CO_2e

452,064 metric tons

→ AI-powered Low-carbon, Efficient Production at TCC

AI for Optimal Route and Mining Configuration

In 2022, the Jurong Plant (Jiangsu) became TCC's first 5G smart mine, introducing autonomous electric mining trucks equipped with advanced sensors and cameras for real-time environmental feedback via 5G. AI technology optimizes truck routes, and through software computation, achieves a 100% resource utilization rate.

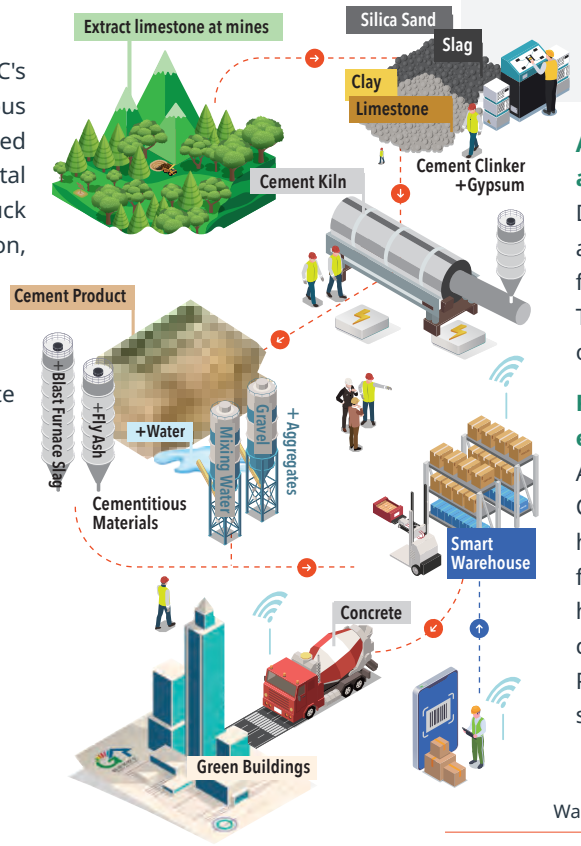
AI for Optimal Route:

- Automated route planning based on the current ore allocation plan execution rate
- Real-time update on vehicle location

14 Unmanned Electric Mining Trucks

- Approx. 805 metric tons of diesel saved compared to fuel-fired mining trucks
  Equivalent to 1,751 metric tons of carbon
- Workforce at the mine cut by 76.9%

Ongoingly plan to introduce electric mining trucks at suitable plants
Promote low-carbon mining



AI Platform for Alternative Raw Materials/Fuels Solutions

Daily production data is collected, automatically calculating carbon emissions from raw materials/fuels, and energy use. This enables the recommendation of optimal solutions for plants.

Power Generation by Waste Heat Recovery for EP100

All cement plants in Taiwan and Mainland China have implemented ISO 50001, waste heat recovery for power generation, and flash distillation technology, enhancing heat and power generation efficiency and cutting purchased electricity by 20-30%. Plants install solar PV systems with energy storage for self-consumption.

	Power Generation by Waste Heat Recovery (GWh)	Equivalent to Purchased Electricity
Taiwan	63.55	15%
Mainland China	737.63	40%

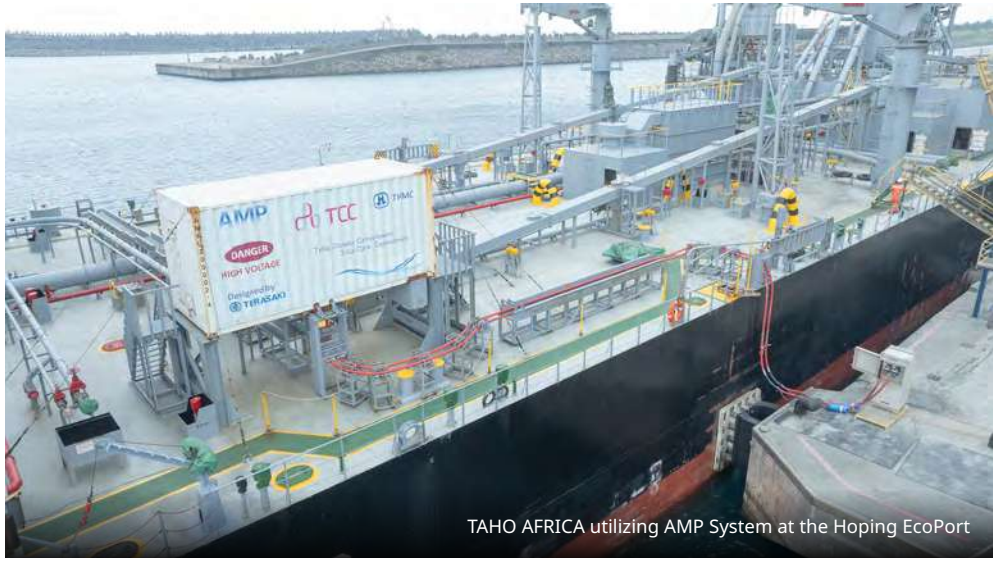
Land Transport Electrification
AI-powered Smart Logistics System

In April 2024, TCC introduced the first 43-ton bulk cement tractor and is upgrading RMC trucks to Phase 6 eco-friendly trucks, while replacing all corporate cars with EVs. TCC is exploring the acquisition of electric trucks, tractors, and mining trucks. TCC has implemented a logistics system that optimizes land, sea, and air transportation by matching cargo needs, reducing empty trips, and enhancing efficiency.

1,752 trips of transportation on land/at sea matched for the Yingde Plant (Guangdong) and Guigang Plant (Guangxi)
413,587.6km of empty trips reduced, carbon emissions -1,049.82 metric tons

Automated Smart Warehouse

At Hoping Plant (Hualien) and Shaoguan Plant (Guangdong), smart warehouses use autonomous forklifts for material handling and RFID tags for quick inventory checks. They feature ESL for real-time updates via mobile devices, ensuring a paperless, cloud-based operation. Access control automatically detects and alerts unauthorized access, enhancing security and inventory accuracy.



TAHO AFRICA utilizing AMP System at the Hoping EcoPort

→ Environmental Management

TCC is dedicated to minimizing its environmental footprint by managing across complete product life cycles. TCC enhances employee environmental knowledge and practices through certification courses, TCC Lyceum, new recruit training, and Town Hall Meetings, focusing on energy, water efficiency, and waste reduction. Plans are underway to boost employees' sustainability awareness and management skills.

- ISO 14001 Environmental Management
- ISO 14046 Water Footprint Verification
- ISO 14067 Product Carbon Footprint
- ISO 50001 Energy Management
- ISO 14064 GHG Emissions Inventory
- ISO 45001 Occupational Health and Safety Management
- ISO 46001 Water Efficiency Management System
- AWS Platinum Level
- BS 8001 Circular Economy
- Clean Production System of Green Factory Certification

Cement Plant

→ Optimized Maritime Routes

AMPs to Reduce Carbon Emissions in Port Berthing

Ta-Ho Maritime Corporation, a TCC Group Holdings subsidiary, operates 2 eco-friendly carriers. In 2023, Ta-Ho introduced the "NAPA Voyage Optimization" system for real-time fleet tracking, integrating weather, sea conditions, and port schedules for optimal routing. Additionally, the SEEMP PART III was implemented to reduce vessel carbon intensity. Ta-Ho's vessels, TAHO AFRICA and TAHO OCEANIA, along with TCC's Hoping EcoPort, and the Ports of Taichung and Kaohsiung, have all installed the Alternative Maritime Power (AMP) system in 2023.

TCC KEY FACT

A young fleet with an average age of 6 years

New carriers, daily fuel consumption -7.8%
set to launch in Q1 2025

Average Carbon Intensity Indicator (CII) -50%

Own ships and ports utilized AMPs for a total of 2,213.7 hours cutting carbon emission by 710.3 metric tons

Optimal routes varying with weather conditions cutting carbon emissions by 4-5%

- ISO 14001 Environmental Management
- ISO 14046 Water Footprint Verification
- ISO 14067 Product Carbon Footprint
- ISO 50001 Energy Management
- ISO 14064 GHG Emissions Inventory
- ISO 45001 Occupational Health and Safety Management
- ISO 46001 Water Efficiency Management System
- BS 8001 Circular Economy
- Clean Production System of Green Factory Certification

RMC Plants

→ Energy Efficiency Management

TCC cement plants in Taiwan and Mainland China are 100% ISO 50001 certified. TCC has joined EP100, targeting a 50% increase in energy productivity by 2040 from 2016. TCC will enhance waste heat recovery power generation, energy-saving technology, and expand alternative fuel use.

For the energy-saving projects and results.

See **CH 6**

Fulfill Obligations as Energy-heavy Industries with Self Use Renewable Energy Generation

T-REC procurement is not TCC's primary means to reduce carbon emissions. PV systems have been installed to the rooftops and idling spaces at the Headquarters, cement plants, RMC plants, and affiliated enterprises to realize renewable energy installation and generation for self-consumption. The Hoping Plant in Hualien and the Suao Plant in Yilan of TCC are the compulsory users of renewable energy. In 2023, both have fulfilled their obligations as energy-heavy industries ahead of schedule, with 2,803,569 kWh of renewable energy generated, accounting for 0.6% of the total electricity consumption.

TCC KEY FACT

TCC's Energy Efficiency Surpasses Targets, Featured in Progress and Insights Report

The Installation of Photovoltaic in Guigang Plant (Guangxi)

In addition, TCC is implementing the "photovoltaic + energy storage" strategy in Mainland China. The Yingde Plant (Guangdong) installed more than 8 MW of PV systems from 2022 to 2023, reducing purchased electricity by 7.1 million kWh in 2023. In August 2023, it unveiled Mainland China's largest cement industry energy storage system at 107.3 MWh, saving around RMB 21.3 million annually by optimizing off-peak/peak power usage.

The PV System on the Rooftop of Smart Warehouse in Hoping Plant (Hualien)

The Guigang Plant (Guangxi) installed PV and energy storage facilities, reaching 7.8 MW of PV and 33.54 MWh of energy storage by end of 2023. This setup generated 6.92 million kWh of electricity in 2023, cutting power losses by 59,000 kWh. The Jurong Mine (Jiangsu) aimed to become a "carbon-free mine" model. In 2023, Yingde (Guangdong), Guigang (Guangxi), and Jurong (Jiangsu) plants collectively produced 14,029,781 kWh of renewable energy for self-use, with clean energy making up 1.1% of usage.

Energy Storage System in Yingde Plant (Guangdong)

First in Industry

TCC Introduces Electric Tractors | Cutting Carbon by 32%

The transportation sector contributes to 12.8% of total GHG emissions, mainly from road transport, with heavy trucks and tractors being significant contributors at 18.31%. TCC is the first in Taiwan by using electric tractors for cement transportation, cutting carbon emissions by 32% and enhancing the carbon footprint of its low-carbon cement products.

In April 2024, Taiwan Transport and Storage Corp. (TTS), a TCC Group Holdings subsidiary, and VOLVO co-hosted the "Low-carbon EV Green Transportation Launch Ceremony" to introduce European electric tractors. The tractors can be attached to various types of semi-trailers, including flatbed trailers, bulk cement tankers, electric compressed garbage trailers, etc. Two electric tractors with mixers will be available this year for cement transportation of TCC.

TTS leads in Taiwan's logistics sector with the most diverse EV fleet, including 26-ton trucks and 43-ton tractors, significantly cutting Scope 3 emissions for key industries and reducing Taiwan's road transport carbon footprint. Planning to expand its electric fleet and offer bespoke solutions, TTS aims to assist corporate clients in achieving verifiable Scope 3 emission reductions. Furthermore, NHOA.TCC, a TCC Group Holdings subsidiary, has installed fast chargers at TCC's RMC plants, boosting vehicle efficiency and ensuring prompt deliveries.

TCC launches new low-carbon labeling, offering customers green services

→ Water Resources Management

TCC prioritizes water resource management, despite the cement industry being less water-intensive than the technology sector. TCC is enhancing its water management and efficiency. To enhance the communication with authorities on water scarcity, TCC holds water supervision meetings quarterly with the Industrial Development Administration, MOEA.

TCC cement plants and RMC plants in Taiwan and Mainland China have 100% ISO 14046 certification, with Taiwan's plants also certified to ISO 46001. In May 2024, Hoping Plant (Hualien) and Suao Plant (Yilan) received the highest Platinum level from the Alliance for Water Stewardship (AWS) after thorough evaluation. A water footprint management platform has been operational for cement plants, tracking water metrics (supply, use, reclamation, and discharge) to enhance water management by allowing real-time calculations of water reclamation rates and comparisons with industry peers. In 2023, Taiwan's cement plants qualified for a preferential water conservation charge rate from the Water Resources Agency due to superior water reclamation rates compared to the industry standard.

TCC is enhancing water efficiency by constructing recycling systems, optimizing pipelines and equipment, and installing water-saving devices. The future water supply was assessed based on the WRI's Aqueduct Water Risk Atlas. See **CH 6.1** for the analysis results.

Rainwater Recycling

Rainwater harvesting systems are installed at all operation sites, and reusing rainwater in RMC plants' mixing water, plant irrigation, or tire wash ponds.

Wastewater Management

Wastewater recycling and treatment equipment have installed to all RMC plants, collecting wastewater from manufacturing process. After sand and gravel separation, the wastewater is stored in the sewage ponds for reuse, so as to achieve 100% zero wastewater discharge.

The main sources of wastewater at cement plants are process cooling wastewater and domestic sewage. Various water pollution prevention and control measures are in force, including centralized treatment facilities and silting basins. Internal testing is carried out by the authorities to ensure that the discharged wastewater does not cause irreversible harm to water bodies, ecosystems, and human health.

Plant	2023 Performance	Project	Description	Use of Reclaimed Water
Yilan Suao Plant	▌100% process water zero discharge ▌721,287 m³ of water consumed, dropped by 108,000 m3 compared to 2022 ▌251,606 m³ of water discharged, cut by 33% compared to 2022. The effluent water, consisting of surface runoff and rainwater, undergoes purification process before being discharged into the Baimi River.	Increasing the utilization of reclaimed water from outfalls	Add pumps and reclaimed water pipelines at outfalls to increase water reclaimed and reduce the use of groundwater.	▌For the sprinklers, the tire wash ponds, etc. ▌For the flowers and the environment of the nearby community
		Effluent reclamation from power generation by waste heat recovery	Reclaim effluent from cooling towers.	For the sprinklers, the tire wash ponds, etc.
Hualien Hoping Plant	▌8,840 m³ of rainwater runoff from the mine reused ▌54,486 m³ of water reclaimed via the MBR treatment system, achieving 100% domestic sewage recycling, with total water withdrawn decreased by 7.34% compared to 2022 ▌1,128 m³ of water reclaimed from branch lines ▌14,340 m³ of sewage treated before discharged to the Pacific Ocean	Reuse of rainwater runoff from the mine	Rainwater seeps into the shaft tunnels and converges into ponds.	For the ecological ponds, Ho-Ping Ark Ecological Program, or the reuse in irrigation
		Reuse of reclamation from branch lines	Install new rainwater/wastewater cycling systems to the car wash facilities and sedimentary ponds.	For washing limestone truck hoppers
		MBR treatment system	Filter and treat the domestic sewage on the plant, TCC DAKA, and RRRC.	For the sprinklers, the tire wash ponds, flowerbeds, etc.
RMC Plants	▌100% zero wastewater discharge ▌Reuse of rainwater, saving 15,631 m³ of municipal water	Reuse of rainwater into the mixing system	Add rainwater pipelines and harvesting tanks to Taipei RMC Plant.	For mixing water
		Reuse of rainwater runoff on the plant	Install runoff water sedimentary ponds to all plants.	For tire washing, irrigation, etc.
Sichuan Guangan Plant; Huaying Plant **Guizhou** Anshun Plant (in water-stressed regions)	▌72,496 m³ of wastewater from power generation from waste heat recovery and domestic sewage reclaimed ▌10,800 m³ of seepage from the mine reclaimed ▌76,441 m³ of seepage from cable duct reclaimed	Reclamation of wastewater from power generation from waste heat recovery and domestic sewage	Recover the wastewater for treatment and reuse.	For cooling towers and desulfurizers
		Reclamation of belt tunnels' seepage	Converge the seepage via pipelines into catch basins.	For dust suppression sprinkling and tire wash ponds
		Reclamation of cable duct's seepage	Cable duct's seepage flows into wells before pumped into the ponds for power generation.	For power generation from waste heat recovery

→ 2024 Water Resources Action Plans

Install recycling equipment for the water from conveyor belt washing
Save 3,500 m³ of water per year

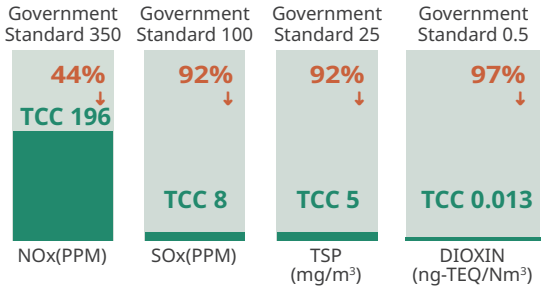
Introduce reclaimed process water into belt washing equipment
Save 4,600 m³ of water per year

Complete the rainwater harvesting system installation
Reuse for toilet flushing and sprinkling

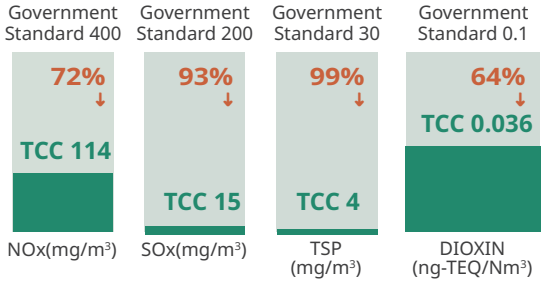
→ Air Emissions Management

TCC rigorously manages its air emissions. In 2023, the emission concentration levels of NOx, SOx, Total Suspended Particulate (TSP), and dioxin were all below government standards.

Taiwan



Mainland China



Gaseous Pollutants	Low-sulfur, sub-bituminous coals
	Low NOx burners
	Multi-stage combustion equipment
	Selective Non-Catalytic Reduction (SNCR) denitrification equipment
Particulate Pollutants	Optimization of bag dust precipitators
	Airtightness improvement of the conveyor systems
	Ongoing optimization of the electrostatic-bag dust precipitators

24-hour Continuous Emission Monitoring Systems (CEMS)

TCC has equipped all cement plants with 24-hour CEMS and established real-time connections with the Environmental Protection Bureau for comprehensive emissions monitoring. Air quality stations set up at the communities nearby the plants enable prompt response to anomalies or emergencies. Additionally, TCC engages third parties for quarterly air quality and biannual environmental impact assessments, ensuring compliance with regulations.

Hoping Plant (Hualien) The Only in Taiwan | Hilltop Platform Phased-excavation with Vertical Shaft Transport System

The hilltop platform and vertical shaft transport system are adopted. All the mining and transportation are conducted underground and automated, without noise or dust pollution, achieving carbon reduction, safety, and ecological conservation while minimizing environmental impacts and ensuring personnel safety.

Hoping Plant (Hualien)
Jurong (Jiangsu)
& Chongqing Plant

Low-carbon, Negative-pressure Enclosed Corridors Reduce Dust Emissions

TCC has constructed enclosed negative-pressure conveying systems in select plants in Taiwan and Mainland China, using electric belts instead of trucks to transport limestone from mines to plants, significantly reducing dust emissions. Take Hoping Plant (Hualien) as an example, materials undergo size reduction through crushers before being moved via enclosed conveyors. Hence, the need for truck transportation is decreased by 1,600 trips daily, thereby reducing carbon emissions by about 23,000 metric tons annually.

→ Waste Management

All waste from TCC plants is non-hazardous and treated per regulations. Following ISO 14001 certification, each site implements its waste management procedures. Cement plants have set waste goals, aiming to extend these practices to all operational sites by 2024.

On-site Treatment

Cement plants in Taiwan and Mainland China generate maintenance and domestic waste. Valuable industrial waste is reclaimed by certified third-party agencies, while other wastes are recycled via high-temperature rotary kiln treatment for reuse. Cement plants set a goal in 2024 to achieve 100% conversion of waste into renewable resources, striving for "innocuous treatment and resource utilization" practices.

Off-site Disposal

The RMC plants and distribution stations , including Tsing Yi Plant of Hong Kong Cement and E.G.C. Cement Corp., produce non-hazardous domestic and industrial waste, treated by certified vendors. Additionally, valuable metals are recovered and sold to recyclers. TCC Group Holdings' Operation Headquarters[1], Low-carbon R&D Centers, and Mainland China offices mainly generate domestic waste, with strict recycling management regulations. Qualified recyclers provide related evidence (such as handwritten logs and delivery notes) for TCC to track.

Note [1] Operation Headquarters data includes subsidiaries, affiliated companies, and foundations located within the building.

Total Climate — Low-carbon Series_Endeavor to Reduce Carbon in Construction & March Towards Low-carbon Cities

Cement is a century-old industry. As long as humans continue to have housing and construction needs, it can almost continue into the next century. Yet, when the storm of carbon fee hits, even the most enduring century-old industry will have to change.

In October 2023, TCC debuted the “Total Climate Series,” highlighting its low-carbon products such as Portland Limestone Type IL cement and concrete and UHPC to key sector leaders. TCC also partnered with Fubon Land Development Co., Ltd. for eco-friendly construction. Following expansion in Europe low-carbon cement business, Chairman Chang set a 2026 target for 100% low-carbon cement and concrete production and sales.

Whole New Launch

From R&D and Manufacturing Process to Sales Models

In 2023, TCC launched the “New Cement Business Development Center” to directly connect with end clients, focusing on supports in new product structures, technologies, carbon reduction assessments, and regulatory guidance, aiming to highlight the benefits of carbon reduction to clients and construction firms. Recognizing the challenges domestic construction companies face compared to their international counterparts in adopting net-zero practices, TCC not only markets high-value products but also provides carbon knowledge services. These services include insights into global carbon reduction trends and updates on relevant regulations, thereby boosting the carbon competitiveness within the value chain. Additionally, TCC has introduced a unique calculation system to help clients quickly evaluate the carbon footprint and reduction potential of buildings using TCC's low-carbon products.

Target Audience: structural engineers associations, architects associations, civil engineers associations, construction companies, technology companies with factories, builders, academic institutions, government agencies, financial institutions, etc.

Total Communication

From Construction to the Public/Private Sectors and Academia

The promotion events held as of April 2024: 223

TCC participates in various conferences to advance R&D and UHPC design discussions. It was further invited by the Public Construction Commission to lead a seminar on carbon reduction and showcased low-carbon materials at the Hoping Plant. By 2026, Portland Limestone Type IL Cement will 100% replace Portlancd Type I Cement and further explore UHPC applications, aiming to reduce carbon in construction and improve the industry's climate resilience, progressing towards net-zero cities.

TCC KEY FACT

As of April 2024, nearly 400 project sites have been signed.

Total Climate — Low-carbon Series_Endeavor to Reduce Carbon in Construction & March Towards Low-carbon Cities

↖ Low-carbon Construction Materials Exhibition in TCC Headquarters

→ Immersive Experience for the Total Solution of Low-carbon New Energy

TCC has established a permanent low-carbon construction materials exhibition at its headquarters. Starting with global carbon trends, it educates visitors on the carbon-cement relationship and the significance of carbon reduction in construction. The exhibit also physically displays TCC's renewable energy and energy storage solutions, highlighting achievements in carbon reduction across a building's life cycle. The goal is to work with construction partners to improve carbon competitiveness in the carbon pricing era.

TCC×NTUCE

Fuse Low-carbon Construction Materials with Design Thinking

TCC collaborated with the "Research Center for Building & Infrastructure Information Modeling and Management" of the Department of Civil Engineering, NTU to co-organize a semester-long capstone course in 2024.

TCC supported teaching assistants, scholarships, and provided DAKA Tower's engineering plans for a course requiring students to redesign a building with sustainable, low-carbon principles using Building Information Modeling. The curriculum emphasized design thinking, sustainability, and Taiwan's 2050 Net-Zero Emissions goal, urging students to consider "embodied carbon" and select low-carbon materials from the planning phase. It featured a tour of the Operation Headquarters' low-carbon exhibit and a detailed discussion with Chairman Chang on low-carbon cement's uses and benefits.

→ Low-carbon Product Quality Survey

In 2023, TCC conducted a quality survey on its new Portland limestone Type IL cement concrete through online questionnaires sent to 76 clients with orders over 100 cubic meters (excluding small maintenance/construction firms). With a 63-response rate (82.9%), the survey found no quality difference between Type IL and Type I cement, meeting the quality target.

2.3_

Resource Recycling

The core competence of the cement industry - co-processing with cement kiln can achieve innocuous treatment and resources reuse of wastes by the average temperature of over 1,300°C of cement kiln. GCCA highlighted the importance of alternative fuels and materials for the cement industry's sustainable transition.

Low-carbon Product and Circular Economy Engagement

BSMI under M.O.E.A. sets the chloride limit for Portland cement as per CNS 61.

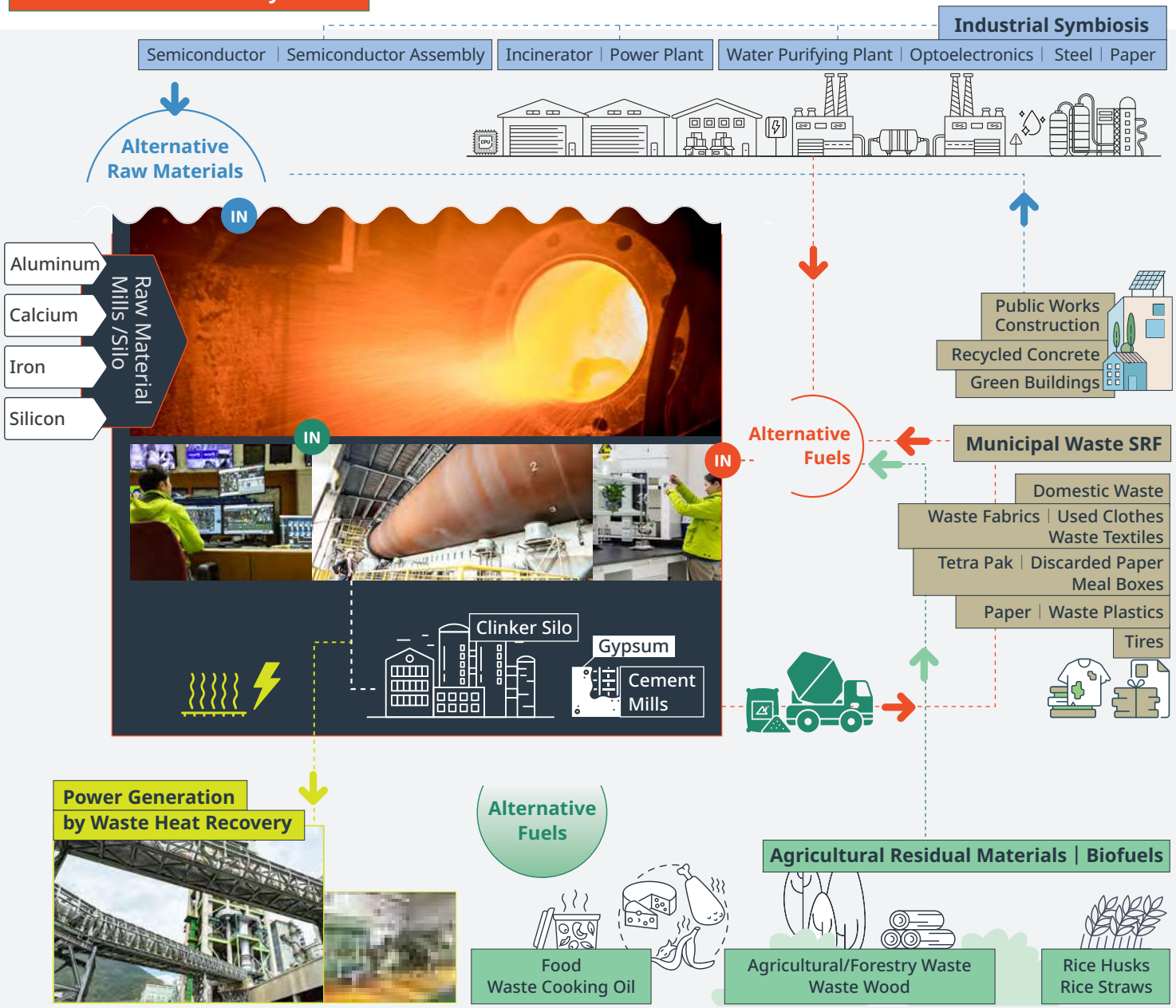
The Public Construction Commission amends the construction guidelines.

The use of alternative fuels by the MOE.

Assisting the Construction and Planning Agency of the MOI in establishing norms for low-carbon cycle construction materials construction methods.

Assisting the Industrial Development Bureau in formulating criteria for green factory evaluations.

→ TCC Circular Economy Model



→ Alternative Fuels

In 2023, TCC continued to develop sources of waste wood, plastics, textiles, and non-hazardous oily sludge. Due to the varied characteristics, extensive testing is required for stable utilization. TCC joined hands with local governments and enterprises to conduct trials. In October 2023, TCC and ITRI jointly completed the construction of the "SRF with high heating value co-firing and clean integration system for cement kiln". The system performance verification is currently underway. The outcome of the project is also expected to be applied to raise the efficiency of alternative fuels.

Taiwan's cement plants, constrained by the CNS 61 Standard limiting chloride content in cement to 240 ppm, struggle to increase the TSR of alternative fuels. To address this, efforts include dialogues with authorities and installing chlorine bypass equipment to boost alternative fuel usage in cement production.

Use of Alternative Fuels in 2023

Waste textiles	In use
Waste paper	In use
Waste plastics	In use
Waste wood	In use
Construction waste	In use
Rubber sheet	In use
Waste wood chips from White Popinac	In use
Non-hazardous oily sludge	The individual reuse application approved

The Trial of Using Sichuan Pepper Seeds for Alternative Fuel at Guangan Plant (Sichuan)

Since early 2024, Guangan Plant (Sichuan) has been utilizing the residual materials of Sichuan Pepper, a local specialty crop, as alternative fuels. The Guangan Plant has already assessed the characteristics of Sichuan Pepper and its branches. The plant aims to form a joint venture for alternative fuels, utilizing crushed branches from Sichuan Pepper harvests as biofuel and exploring benefits of Sichuan Pepper seed.

White Popinac & Street Trees Co-processed into Biofuels

To combat the invasion of White Popinac and manage street tree accumulation in Taiwan, the Hoping Plant (Hualien) and Suao Plant (Yilan) have partnered with governments and farmers' associations through MOUs to transform White Popinac into biofuels for cement production. This approach enhances removal efficiency, promotes resource recycling, and supports urban environmental and ecological preservation.

- 45.52 metric tons of White Popinac processed by Hoping Plant in 2023
- Approximately 346 metric tons of White Popinac, and 1,000 metric tons of street trees, to be processed per year based on the contract signed by Suao Plant in 2024

Fire Prevention and Control for Alternative Fuels

Alternative fuels are key to carbon reduction in the cement industry. Due to the accumulation of various alternative materials, there is a risk of combustion. TCC has established fire safety regulations for alternative fuel systems to improve fire prevention and control at cement plant fuel storage areas.

8 Fire Hoses and 9 Smoke Detectors in Suao's Alternative Fuel Storage

At the Suao Plant (Yilan), the design incorporates temperature detection and fire prevention, including buffer tanks and thermometers in the storage warehouse and a water mist system for temperature control. Upon exceeding specific temperatures, fire-fighting water is released promptly, all monitored by the central control room. Future enhancements will include IR scanning for combustion detection in material piles and smoke detectors on alternative fuel conveyors and hoppers, along with automatic sprinklers.

→ Alternative Raw Materials

TCC is reducing carbon emissions in cement production by using alternative raw materials to decrease clinker usage. Collaborating with industrial associations and businesses, TCC acquires and reuses waste materials as alternatives, including those from other industries. Additionally, TCC continues to develop alternative sources such as calcium silicate boards and construction waste, to effectively reduce carbon emissions and decrease the use of raw materials.

Alternative Raw Materials/Fuels Used in 2023

Taiwan

▲ Alternative Raw Material ● Alternative Adjunct ★ Alternative Fuel ■ Alternative Clinker

Resource Reused at TCC	Alternative Type	Amount in 2023
Coal Ash	▲	434,709
Desulfurization Gypsum	●	230,922
Construction Waste Soil	▲	201,380
Wood Chips	★	76,281
Reducing Slag from EAF	▲	67,359
Slag	▲	56,993
Calcium Fluoride Sludge	▲	18,269
Domestic Waste	★	13,762
Inorganic Sludge	▲	13,289
Solid Recovered Fuel (SRF)	★	11,670
Blast Furnace Slag	■	11,613
Waste Ceramic	▲	5,592
Sandy Loam	▲	5,184
Spent Refractories	▲	4,668
Incinerated Recycled Aggregates	▲	4,562
Air-cooled Slag	■	3,777
Mineral Fines	▲	3,631
Basic-Oxygen-Furnace (BOF) Slag	▲	2,381
Waste Foundry Sand	▲	750
Gasifier Bottom Slag	▲	649
Water Treatment Plant Sludge	▲	643
Rubber Sheet	★	509
Waste Compression Molding	▲	222
Waste Wood	★	212
Copper Slag	▲	182
Waste Plastic	★	145
Waste Man-Made Fibers	★	83
Non-Hazardous Oily Sludge	★	10
Waste Paper	★	15
Total		**1,169,462**

Mainland China

Resource Reused at TCC	Alternative Type	Amount in 2023
Metal Slag	▲	1,236,731
Desulfurized Gypsum	●	1,095,306
Fly Ash	▲	893,286
Coal Gangue	▲	676,310
Cinder	▲	563,853
Construction Waste Soil	▲	387,453
Waste Textiles	★	345,114
White Clay	▲	83,233
Biofuels	★	55,474
Industrial Gypsum	▲	41,752
Inorganic Sludge	▲	36,919
Others- Industrial Waste	▲	30,259
Pozzolana	▲	29,561
Waste Tree Roots	★	29,402
Basalt	▲	22,556
Burnt Shale	▲	21,010
Waste Industrial Label Paper	★	19,624
Regenerated Rubber Granules	★	15,553
Solid Recovered Fuel (SRF)	★	13,977
Others- Wastes	★	12,948
Rubber Scraps	★	8,019
Tire Scraps	★	6,773
Tire Crumb	★	5,154
Construction and Demolition Waste (C&DW)	▲	1,075
Plastic Fragments	★	214
Waste Foaming Slag	★	152
Total		**5,631,708**

→ Alternative Clinker (New Material)

IEA's roadmap highlights cement industry strategies for a low-carbon shift, emphasizing clinker ratio reduction and mixed cement adoption. In addition to using alternative raw materials or limestone to produce clinker, TCC is also searching for new materials as substitutes for clinker.

Limestone	Taiwan/Mainland China
Fly Ash	Taiwan/Mainland China
Calcined Clay	Mainland China, The CÔTE D'IVOIRE Plant
Pozzolana	The Cape Verde Plant
Kaolinite (requires calcination at 700-900˚C)	Ghana mining area

→ Calcined clay is GCCA's Top Recommended Option

At the Global Cement Conference in June 2023, scholars highlighted that clinker cement with added calcined clay is the most viable carbon reduction solution, potentially cutting emissions by 40%-50% by directly replacing clinker. TCC owns the world's largest calcined clay base in CÔTE D'IVOIRE (Ivory Coast). The calcined clay does not produce carbon dioxide, only releasing steam and some trace emissions.

Co-processing of Domestic Waste with Cement Kilns, First in Taiwan

TCC DAKA RRRC | Commenced Operations in 2023

The WBCSD highlights that cement kilns' high temperatures can break down dioxins, which incinerators cannot. TCC established the TCC DAKA Renewable Resource Recycling Center (RRRC) to process Hualien's domestic waste, utilizing the energy produced to replace some fuels, achieving coal, waste, and carbon reduction. As Taiwan's first to use cement kilns for local waste co-processing, the RRRC possess a daily capacity of 200 metric tons. Moreover, by addressing methane pollution—27.9 times more impactful on global warming than CO_2—the RRRC helps local governments reduce methane emissions and the carbon footprint of waste transport.

To enhance management of alternative materials and costs, TCC has established an environmental technology company and created renewable resource recycling centers in Mainland China, boosting TCC's procurement competitiveness and control over material supply sources.

TCC KEY FACT

13,762 metric tons of waste processed in 2023
Equivalent to 40.09% of Hualien's total waste[2]

NOTE2 Data Source: Statistics from the Environmental Protection Bureau, Hualien County

Double Diamond Certifications|Green Building Labeling Diamond Certified & Low-carbon Building BCFd Diamond Certified for the RRRC

Extensive application of the self-developed low-carbon construction materials
Compared to other buildings of similar scale
-23.5% carbon emission

The RRRC obtained the Candidate Green Building Certificate in 2023 and obtained the Low Carbon Building Certification during the architectural drawing stage in February 2024. The RRRC's 60-year carbon footprint is 23.5% lower than similar-scale projects. During building operation and use, the RRRC cut carbon emissions by 12,963.6 metric tons via air conditioning optimization and efficient lighting design.

TCC Low-carbon New Products and New Energy Sites

The main building and surrounding pavements of the RRRC extensively employ construction material products manufactured by TCC. The curtain wall features UHPC panels while the permeable concrete used for roads. Permeable concrete is one of the indicative constructive materials for building a sponge city. It can be used on roads and sidewalks to store and drain water, mitigating the urban heat island effect. Chargers and EnergyArk will be installed around RRRC. Energy storage system is planned to go with ocean thermal energy conversion (OTEC) in the future. Future plans include utilizing OTEC, properly treating seawater, and then introducing it into the RRRC chiller for heat exchange.

↖ Permeable concrete

Can withstand 210 kg/cm² pressure, meeting strength, carbon reduction, and environmental protection standards.

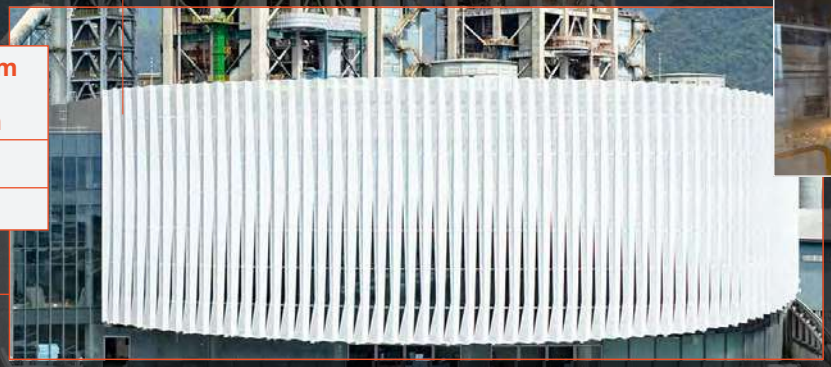
The Carbon Reduction Designs at RRRC

-1.30% Rainwater harvesting and water-saving appliances

- Eaves rainwater harvesting system
- Water retention design with confluence channels for green spaces
- Rainwater reuse for the automatic moisture-sensing irrigation system
- Water-saving appliances

-4% Rooftop PV system for power for self-consumption

- Installed capacity: 346.8 kW
- Solar panel coverage: 75%



-8.51% Reduced air conditioning load

- CO_2 Concentration-based Demand Controlled Ventilation system
- Energy recovery ventilator
- Cooling towers designed with wet-bulb temperature controlled VFD fans
- VAV and VWV designs

-7.16% High-efficiency lighting with energy-saving design

- Adoption of LED energy-efficient lighting
- Skylight design to increase natural lighting

-1.68% Main architecture durability

- 25% higher than the designed seismic resistance
- 0.5cm thicker than the statutory standard of that of the concrete cover of reinforcement bars in RC columns, beams, and slabs

The Only Fly Ash Co-Processing Cement Kiln in Jiangsu

In 2021, the Jurong Plant (Jiangsu) built a co-processing facility using its cement kiln, incorporating "FWD Technology" for zero wastewater discharge and salt separation, to process fly ash from regional domestic waste incineration. The Jurong plant employs a washing system to remove chlorine from fly ash for reuse as raw material, recycling the washing liquid after purification and distillation without causing secondary pollution.

Yingde Plant's Food Waste Treatment Center Reduces Methane Emissions

Food Waste Landfill is a Major Methane Source

The center processes food waste into liquid and solid forms. The solids become organic fertilizer, while the liquids yield oil for soap and candles, and water for liquid fertilizer. The center also helps local residents and eateries recycle food waste. Hoping Plant established the Food Waste Reuse Center in 2021 to transform food waste into soil amendments. Both plants invested over 27.99 million from 2020 to 2023.

TCC KEY FACT

The Yingde Plant Monthly Food Waste Processing Capacity: approx. 5.1 metric tons

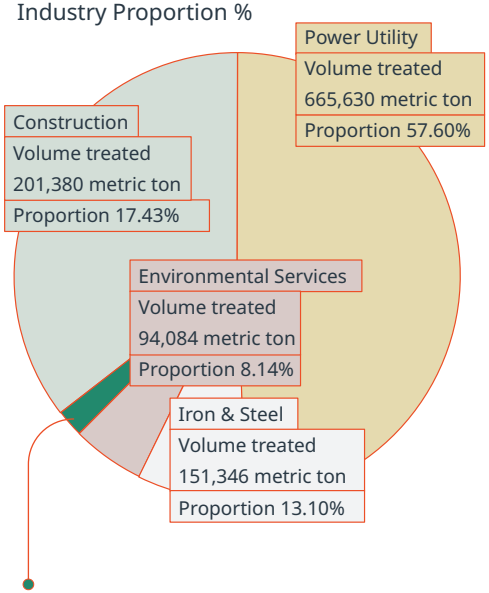
Fertilizer productivity: approx. 1.5 tons

The Jurong Plant Processed fly ash for 5,818 metric tons

→ Cross-Industrial Circular Symbiotic Ecosphere

Committed to circular production, TCC leverages the characteristics and core competencies of cement industry, maintains communication with various stakeholders, and collaboratively builds a circular economy sphere with industries, governments, cities, and the general public. TCC helps diverse industries to treat industrial wastes that are difficult to process and reuse them as alternative raw materials and fuels for cement manufacturing.

Taiwan | Source of Waste Industry Proportion %

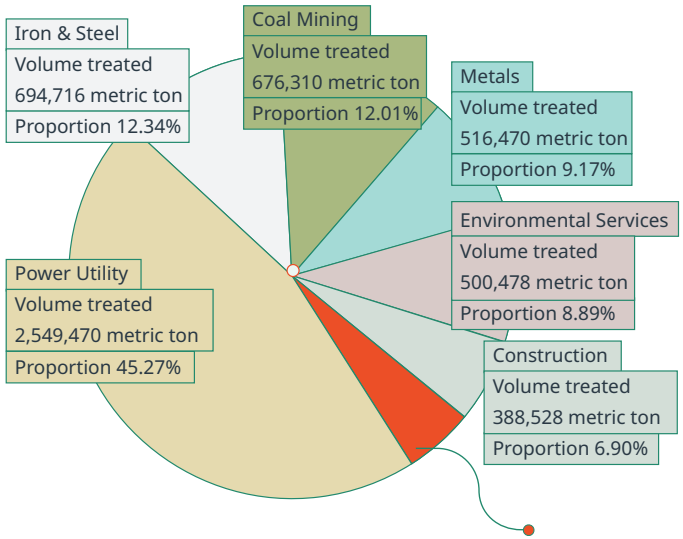


Source Industry of Wastes	Volume treated (metric ton)	Proportion
Semiconductor	18,269	1.58%
Paper	8,020	0.69%
Petrochemical	5,280	0.46%
Waste Incineration	5,211	0.45%
Metals	933	0.08%
Water Treatment Plant	643	0.06%
Semiconductor Assembly	222	0.02%
Self-treated	4,668	0.40%

TCC KEY FACT

Total Volume treated 1,155,684 metric tons

Mainland China | Source of Waste Industry Proportion %



Source Industry of Wastes	Volume treated (metric ton)	Proportion
Chemical	116,644	2.07%
Paper	83,520	1.48%
Mining	73,128	1.30%
Semiconductor	20,518	0.36%
Tire	11,927	0.21%

TCC KEY FACT

Total Volume treated 5,631,708 metric tons

Whole Lifecycle Services for Buildings - Construction Waste Solutions

"We are currently dealing with astronomical figures in handling construction waste after demolition, and the handling is not adequate. In the future, what we hope to do is to recycle and reuse all the ready-mixed concrete after building demolition, which will not only reduce carbon emissions but also will not affect the strength quality."

~Chairman Nelson An-ping Chang

In recent years, with the rise of urban renewal and public and residential construction projects, Taiwan generated over 2.1 million metric tons of construction waste in 2022, as per MOE statistics. By 2023, 25% of Taiwan's construction waste recycling facilities were still unlicensed[3]. The legal disposal and subsequent treatment of this waste are crucial for the government, highlighting the importance of resource recovery and reuse.

In 2023, TCC invested in the recycling and treatment of construction waste, designing the Hualien Plant designated as a construction waste treatment site. With the authorities' approval, a construction industry recycling chain has been established, enabling a circular economy with a monthly treatment capacity of 12,000 metric tons.

TCC processes waste and leverages R&D to repurpose construction waste through element analysis, sampling, testing, and trial production, ensuring product quality and strength. Meanwhile, the Company also ensures its compliance with air emissions standards during the manufacturing process. TCC is prioritizing high-quality material sourcing and ensuring enclosed transportation to minimize dust pollution.

- After experiments, construction waste can be used as filler for graded aggregate, fine aggregate or admixture for concrete, and alternative clay for cement.
- The remainders are sorted as alternative fuels for the cement plant.

Construction Waste Processing Zone in the Yingde Plant (Guangdong)

In 2023, TCC successfully transformed waste concrete into recycled concrete aggregates, with tests confirming RCA's mechanical strength matches that of natural sand and gravel. The initial products developed have been applied to the roads around the RRRC, such as permeable concrete pavements, for which construction waste are used as the lower coarse material of the pavement. Hence, by reducing carbon without reducing strength, TCC boosts resilience against extreme precipitation and earthquakes.

Guangdong's Qingyuan region faces construction waste issues, traditionally managed through landfilling, with a low resource utilization rate of about 1.5%. The Yingde Plant (Guangdong) cooperated with the local authorities to recycle urban construction waste, using it as alternative raw materials and fuels. It is projected to obtain a government franchise permit by the end of 2024.

→ Construction Waste Treatment Process

1. Recover construction waste, with strict requirements for materials and transportation.
2. Sort and crush.
3. The Low-carbon R&D Center conducts experiment and research.
4. Cement plant or RMC plant engages trial production, while the Low-carbon R&D Center verifies product quality and strength.
5. Officially reuse.

NOTE3 Source: PTS News Network (2023): https://news.pts.org.tw/article/668911

TCC KEY FACT | Construction waste Recycling Performance

70%	20%	2-3%
Alternative raw materials	Alternative fuel	Scrap metal

The construction industry heavily demands raw materials and energy. TCC adopts goal-oriented strategy, exploring construction waste solutions to pioneer a circular economy model for the construction ecosystem.

OYAK&Cimpor Overseas Cement Businesses

Chairman Nelson An-ping Chang, CIMPOR CEO SUAT CALBIYIK, and OYAK Group CFO BAREN CELIK completed the expanded investment in the Netherlands.

→ Global Development with the Lowest-carbon Cement

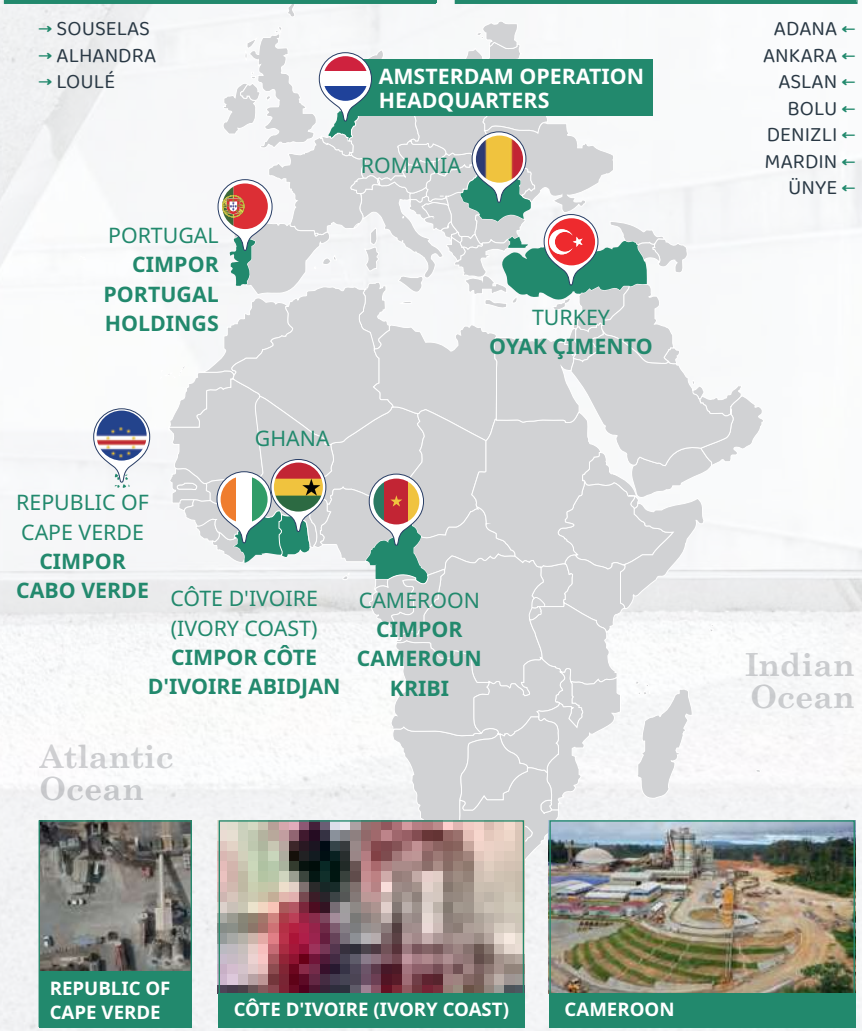
TCC has been expanding its overseas presence. Starting from 2018, it partnered with OYAK, the largest cement company in Turkey, to establish a subsidiary. In 2019, TCC acquired CIMPOR, accumulating 2.37 million metric tons of carbon credits in Europe to date. In 2024 Q1, TCC further expanded its investment in the cement market in Europe, Asia, and Africa, becoming one of the significant low-carbon cement suppliers in Europe.

CIMPOR and OYAK are both members of the SBT Business Ambition for 1.5°C campaign member, with OYAK being the first cement company in Turkey to announce a net-zero commitment and complete the setting of a 1.5°C target. OYAK, through CIMPOR, has obtained ultra-low-carbon materials in Africa, positioning itself at the forefront of the global cement sector. After securing the management right of CIMPOR, TCC will expand its low-carbon R&D and continue to develop ultra-low carbon cement. Aiming to become one of the brands capable of producing the lowest carbon cement in the world by 2025, TCC is ambitiously pursuing the goal of Net Zero by 2050.

Located at the junction of Europe, Asia, and Africa, Turkey benefits from its position for exporting low-carbon products to the EU. The World Bank predicts Turkey will need a US$600 billion investment for earthquake-proofing and reconstruction, boosting cement demand. Research Nester forecasts the European low-carbon cement market to expand at an 8.5% CAGR from 2022 to 2030. TCC believes that with the EU's implementation of the CBAM, low-carbon emissions will be crucial for competing in the European market, affecting both local and imported cement.

PORTUGAL | CIMPOR PORTUGAL HOLDINGS

TURKEY | OYAK ÇIMENTO



REPUBLIC OF CAPE VERDE

CÔTE D'IVOIRE (IVORY COAST)

CAMEROON

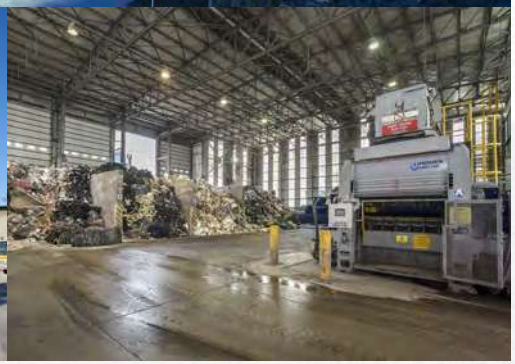
→ OYAK Group in the Turkish Market_ AI Manufacturing Processes

OYAK owns 7 cement plants, 11 clinker production lines, including 1 white cement production lines, 67 concrete plants, 50 distribution stations, and 1 port in Turkey. Its Aslan plant emits 628 kg CO_2 per ton of cement, and the Ankara Plant 652 kg, both well below the global average of 900 kg for traditional cement, showcasing superior carbon reduction.

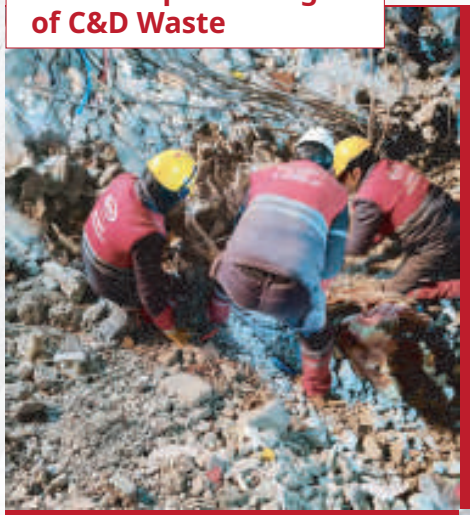
OYAK is advancing the "OYAK Cement 4.0 Project" for digital transformation, leveraging AI to analyze cement plants' operational data for better energy efficiency management in production. This AI integration reduces the thermal energy per clinker unit, cutting fossil fuel use and carbon emissions. Additionally, AI optimizes the co-processing of biomass and RDF, further decreasing fossil fuel dependency and achieving the goal of reduced fossil fuel consumption.

OYAK BOLU PLANT

OYAK MARDIN PLANT



OYAK Co-processing of C&D Waste



On February 6, 2023, a 7.8-magnitude strong earthquake struck Turkey, inflicting severe damage and resulting in collapses of 300,000 buildings. According to the estimates of the UN, the strong earthquake might generate up to 210 million metric tons of debris in Turkey, equivalent to 14,000 football fields piled with 3 feet tall of debris.

OYAK planned to leverage the core competence of the cement industry for waste co-processing, assisting in post-disaster cleanup and reconstruction efforts. Meanwhile, it aims to properly utilize waste resources, achieving the synergy of a circular economy. Research shows that besides recycling concrete waste into aggregates, sand, and gravel for concrete, the dust from recycled concrete can also be used as an alternative raw material for cement.

OYAK aims to extend its recycling process to cities like Istanbul and pilot it in Portugal, aiming to cut natural resource use and achieve carbon reduction.

→ CIMPOR in the Portuguese Market_ Accumulated Carbon Credits from Low-carbon Cement

CIMPOR operates 3 EMAS-certified cement plants in Portugal, with a annual clinker capacity nearly 5 million metric tons. The Alhandra Plant is the plant with the largest production capacity of CIMPOR, using alternative fuels of tires, animal feed, wood, and bioenergy to reduce dependence on fossil fuels. The plant aims to complete the clinker production line optimization project by 2025. In 2023, the Souselas Plant achieved an average 613 kg of GHG emissions per metric ton of cement, setting a TCC Group Holdings record, thus acquiring a huge amount of carbon credits.


CIMPOR ALHANDRA PLANT


ALQUEVA DAM


CIMPOR CAMEROUN KRIBI

→ CIMPOR in the African Market_New Materials and Technologies

CIMPOR has established the world's first large-scale calcined clay cement facility in Côte d'Ivoire (Ivory Coast). The calcined clay, when mixed with clinker, reduces carbon emissions by at least 40% compared to the traditional cement. By optimizing the biofuel heat treatment, the Ivory Coast Plant aims to halve its calcined clay's carbon footprint from 200 kgCO_2e to 100 kgCO_2e per metric ton by the end of 2024, achieving a 50% reduction in emissions.

'Cape Verde,' which means 'Green Cape' in Portuguese, possesses abundant natural volcanic ash resources. When used as an alternative to clinker, for example, in CEM II 42.5 type cement, it can replace traditional clinker, which emits 750-800 kg of CO_2 per ton, with zero carbon emissions per ton of volcanic ash.

Meanwhile, CIMPOR found Kaolinite in Ghana, beneficial for the calcination process due to its lower temperature chemical reactions, enhancing energy efficiency. The Ghana Plant is set to start operations by end of 2025.

The Kribi Plant in Cameroon, one of just two worldwide commercial cement plants, uses 90% biofuel and premier flash calcination technology, significantly reducing carbon with its energy-efficient process and clinker substitution.

CHAPTER 3

ENERGY TRANSITION

Green Power Leads to A New Era

NHOA. TCC Charging Stations at the Crayon Factory ,Yilan

Targets

Energy Creation
235 MW managed by 2025

Energy Storage
Installed Capacity by 2025:
840.44 MWh | Taiwan
2.5 GWh | Global

NHOA.TCC Charging Services
40 charging stations by 2025

Energy Transmission
3.5 GWh by 2024

2023/ Performance Highlights

Installed Capacity of Renewable Energy
Taiwan & Mainland China

110 MW

Renewable Energy Power Generation
2021-2023 cumulatively

315 million kWh

Energy Storage
Global (including installing)

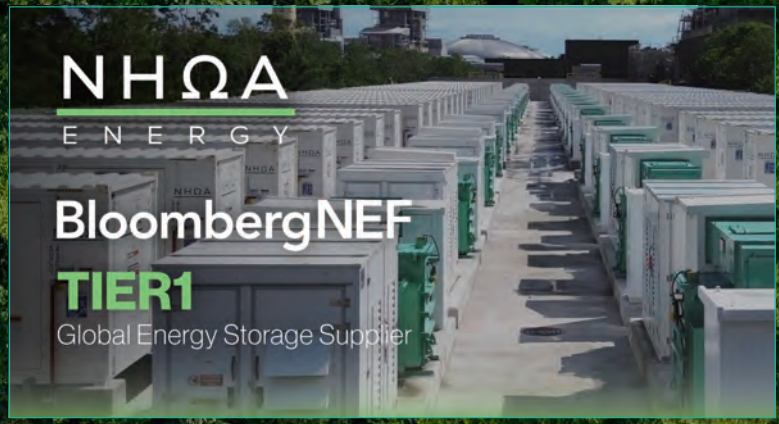
2,263 MWh

Charging Points

Taiwan & Mainland China	Italy, France, Spain, Portugal	Taiwan
NHOA.TCC **226**	ATLANTE **4,111**	NHOA.TCC Charging Service **20** Charging Stations

Production Capacity of Power Cells/year
1.6 GWh

MOLICEL The STSP Plant



The 21st Century marks the century of energy. Only by taking the ark of green energy storage and properly storing the energy lent from the earth can humanity restore the planet to its pristine outlook as it should be.

~ Nelson An-ping Chang, Chairman

TCC has built a comprehensive new energy industry chain, with diverse renewable energy projects. TCC has developed efficient green energy storage, key battery cells for mobile devices, and the patented EnergyArk Energy Storage Cabinet. EnergyArk powers charging stations integrated with solar, storage applications, green energy wheeling services, and power trading. TCC optimizes green power use throughout the value chain, aligning with UN SDG7 for affordable, reliable, sustainable energy access for all.

Energy Creation | Energy Storage | Energy Transmission
Energy Supply | Energy Solution

A Group with New Energy across All Industry Chains

Energy Creation | TCC Green Energy Corporation

The most diverse development and management of renewable energy in Taiwan, focusing on the advancing geothermal and OTEC research.

Energy Storage | NHOA.TCC & NHOA

Energy storage is key to a stable energy transition. With comprehensive hardware and software vertical integration solutions and product services, NHOA.TCC delivers one-stop management.

Energy Supply | NHOA.TCC& Free2Move eSolutions & Atlante Co.Charing Services

The pioneering DC-DC integrated charging stations combine solar, charging, and storage, reducing grid burden and providing stable, fast charging. Reverse power transmission in regional grids is also planned.

Energy Solution | Energy Helper TCC Corporation

AI-optimized aggregated electricity trading and management, pioneering Online Consultant, and big data-driven green energy use solutions.

Energy Transmission | MOLICEL

Focusing on high-performance ternary lithium power cells, aiming for the high-end EV industry chain, with product applications ranging from aerospace and supercars to advancing low-altitude economy.

3.1_

Energy Creation
Diversified Green Power of Wind, Solar, Geothermal, and Marine Energy

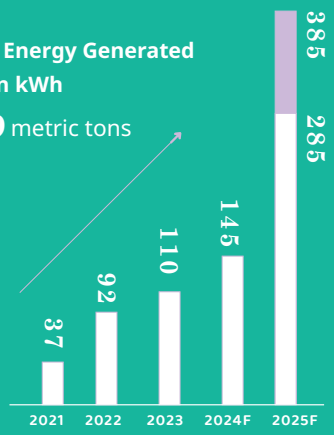
The IEA states global renewable energy capacity must triple by 2030 to reach the 1.5°C goal. TCC not only generates renewable energy for self-use but also installs PV panels at its Taiwan and Mainland China sites to reduce grey energy use. Moreover, by investing in diverse renewable sources like wind, solar, geothermal, and marine energy, TCC supports Taiwan's energy transition.

TCC KEY FACT

2021~2023

Renewable Energy Generated
>315 million kWh

-155,659 metric tons
CO_2e

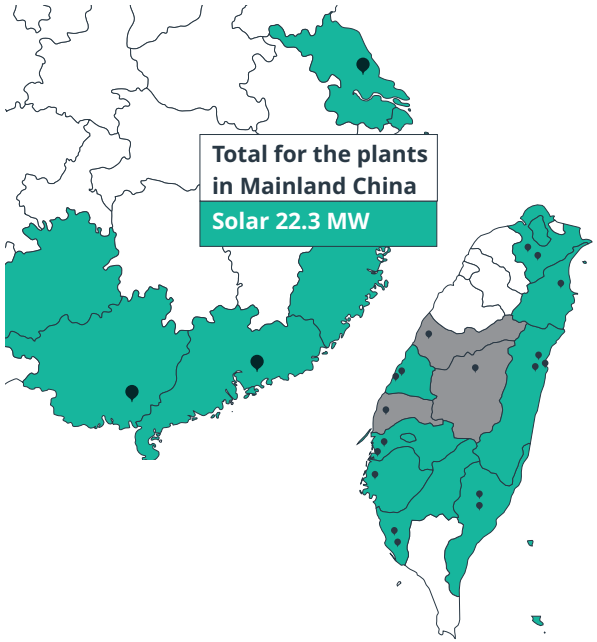


→ **TCC Renewable Energy Installed Capacity**

■ In Production/Under Construction
■ Under Development
Unit: MW

Creating Value of Compound Land Utilization Wind-Solar Hybrid Power Plant & Aquavoltaics

In 2019, TCC Green Energy Corporation built the first hybrid energy power plant, merging solar and onshore wind power. This plant employs AI for real-time monitoring and uses weather data and big data analysis for maintenance recommendations. TCC also established Taiwan's first large-scale aquaholic project in Chiayi, collaborating with aquaculture companies to enhance aquaculture by optimizing probiotic timing. To address solar and wind power intermittency, TCC invests in advanced energy research, such as geothermal and OTEC, for baseload power.



Northern Taiwan	Solar 0.6MW Wind 15MW Wind 6MW
Taichung &Nantou	Solar 0.8MW
Changhua	Solar 12.5MW Wind 30.6MW Under Development 25.2MW
Yunlin	Under Development 33.6MW
Chiayi	Solar 84.9kW Aquavoltaics 125.5MW Aquavoltaics 31.9MW
Tainan	Solar 0.5MW
Kaohsiung	Solar 3.3MW Aquavoltaics 60MW
Yilan	Solar 1.9MW
Hualien	Solar 8.9MW Solar 3.7MW Small hydropower 0.6MW OTEC 1MW
Taitung	Solar 17.6kW Geothermal 1MW

■ In Production/Under Construction
■ Under Development

→ Vakangan Green Energy Hot Spring Park

← Vakangan Geothermal Drilling

→ Vakangan Geothermal Power Generation, Taitung
Drilling Technology with CPC & Local Revitalization with FDC

The Vakangan Hot Spring sits about 800m southeast to the Hongye Village. The ITRI was commissioned by TCC Green Energy Corporation to commence a survey in September 2020, in which we found that the maximum temperature at the bottom of the well could reach over 140°C, exhibiting the potential for geothermal development. In 2022, the company collaborated with CPC Corporation, to employ the most efficient "directional drilling" technique to drill a well to a depth of 1,700 meters underground, shortening the development process. In 2023, the company partnered with the ITRI to conduct capacity testing to maximize power generation efficiency. A circulation power generation system in conjunction with tailwater reinjection technology will be adopted to achieve resource circulation without water withdrawal. The plant will have an installed capacity of 1 MW and a maximum annual power generation capacity of 8.76 million kWh, equivalent to an annual power consumption of 2,400 households. It is expected to be grid-connected in the H2 2024.

Building upon the success of TCC DAKA Open Eco-Factory (TCC DAKA), TCC Green Energy Corporation was well-received by the Yanping Township. Collaborated with FDC International Hotels Corporation, it launched the "Vakangan Green Energy Hot Spring Park." **(See CH4.4 Nature-based Solutions (NbS))**

Green Energy Pavilion

TCC Green Energy Corporation has established the Green Energy Pavilion at its Changbin base maintenance center. The Pavilion offers multimedia exhibits and interactive simulations with guided tours. It aims to become a prominent venue for energy education, providing visitors with insight into Taiwan's power systems. The Pavilion features a rooftop garden with an observation deck. This not only cools the building but also offers visitors a clear view of the 19.9-hectare wind-solar hybrid power plant, enhancing their understanding of energy transition and encouraging participation.

Solar Grazing | For Green Energy and Ecology

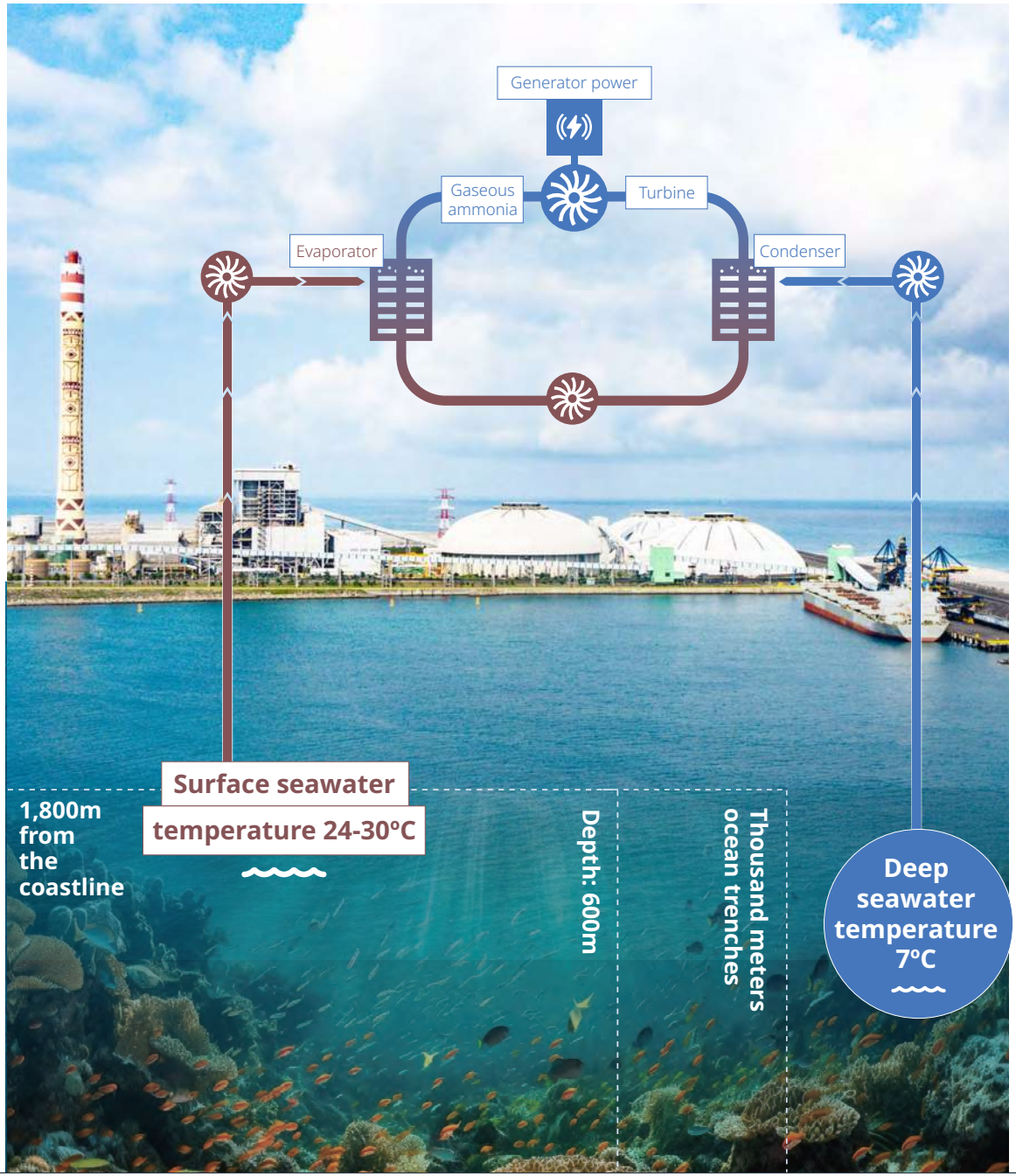
To maintain optimal power generation efficiency at solar power sites, controlling plant height is crucial to prevent panel obstruction. The Changbin base prioritizes environmental friendliness by avoiding chemical pesticides and exploring solar grazing feasibility since 2023. Trials have begun at Changbin and Yingde photovoltaic bases, introducing appropriately sized goats in collaboration with local breeders. Initial trials focus on animal and equipment safety, with plans for scaling up and fostering solar grazing environments in the future.

→ The Deep Trench Advantage in Eastern Taiwan
The World's First MW-Class OTEC Power Plant

Marine energy differs from solar and wind energy in that it's not intermittent and can be accessed 24/7, providing a reliable baseload power source.

Eastern Taiwan's unique ocean trench terrain makes it an ideal location for marine energy generation. TCC and the Hoping Power Plant, a subsidiary of TCC Group Holdings, utilize the temperature difference between power plant cooling water and deep seawater to generate electricity through turbines. The Heping site, with a 600-meter-deep trench just 1.8 km offshore, is particularly advantageous. Permit applications are underway for Taiwan's first large-scale OTEC system, potentially the world's only MW-class OTEC power plant, estimated to generate 24,000 kWh of electricity per day, equivalent to powering 2,000 households. Surveys on underwater cultural heritage are complete, and ecological surveys for environmental impact assessment (EIA) are ongoing. Phase-1 aims for a capacity of 1-2 MW, with plans for grid connection by 2028.

Deep seawater, shielded from sunlight, holds abundant minerals, making it Earth's most nutritious and pure water source. Extracting it for OTEC and then discharging it can effectively circulate precious minerals and trace elements like magnesium, zinc, manganese, selenium, and germanium, invigorating the food chain. Its purity also supports high-quality fish and lobster farming. With a quality akin to human body fluids, deep seawater's osmotic pressure enables easy absorption, suitable for drinking water and skincare products. Once operational stability is achieved, further development can explore additional uses of deep seawater.



3.2_

Energy Storage
The Key Technology for Energy Transition

Energy storage is vital for stabilizing intermittent renewable energy sources. In September 2020, TCC established TCC Energy Storage Technology Corporation. In 2021, TCC acquired Engie EPS, renamed NHΩA, and merged it with TCC Energy Storage Technology Corporation to form NHΩA.TCC. This integration made TCC the world's fourth-largest energy storage provider in 2020, according to BNEF. TCC continues to install energy storage systems globally, participating in energy trading platforms. Through off-peak storage and peak discharge, TCC stabilizes the power grid, providing peak shaving and valley filling services.

NHΩA.TCC provides comprehensive integrated new energy services, focusing on its patented EnergyArk Energy Storage Cabinet. Leveraging its core construction materials business with new energy, NHΩA.TCC actively develops energy storage project sites. With turnkey hardware/software solutions, system integration, and services, it offers city-level microgrid integrated solutions and addresses enterprise challenges such as energy-heavy industries, distributed energy resources, low-carbon EV solutions, and pure green virtual power plants, aiding in their net-zero transitions.

TCC KEY FACT

NHΩA.TCC has been managing 9 energy storage project sites in Taiwan. As of 2023

With these projects scheduled to go online in 2024, **the installed capacity will reach**

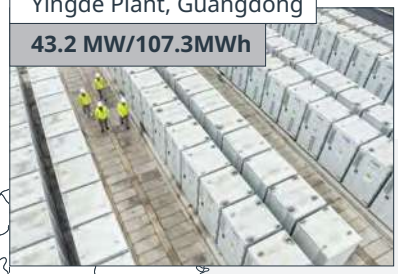
217.3 MW / 655 MWh

Guigang Plant, Guangxi

5.6 MW/33.546MWh

Yingde Plant, Guangdong

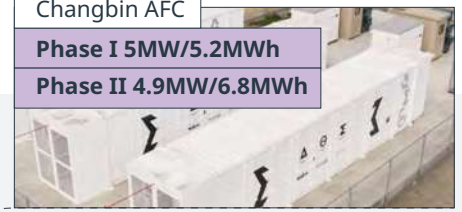
43.2 MW/107.3MWh



Changbin AFC

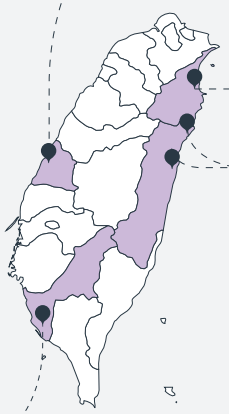
Phase I 5MW/5.2MWh

Phase II 4.9MW/6.8MWh



Suao Plant, Yilan

35 MW/123.6MWh
online in 2024/04



First in Battery Plants
Install the EnergyArk Energy Storage System

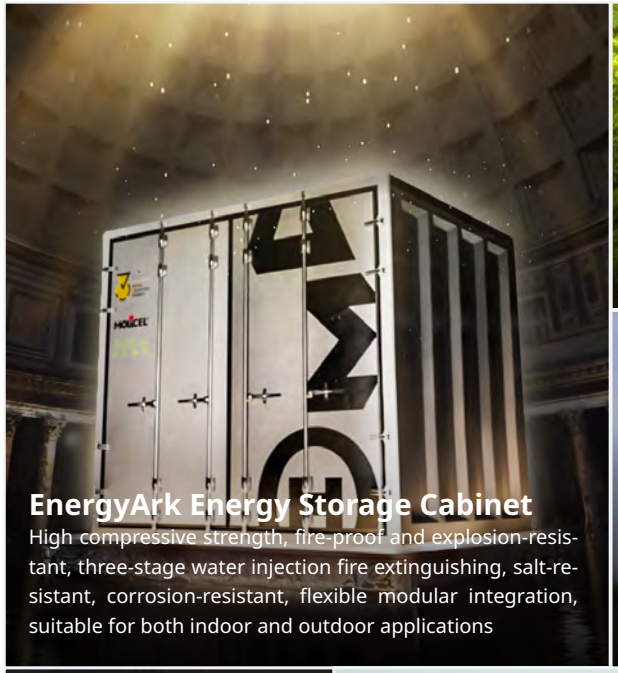
MOLICEL Xiaogang Plant Phase I	**5MW/6.2MWh**
MOLICEL Xiaogang Plant Phase II	**4MW/5.3MWh** (projected to come online in 2024)
MOLICEL STSP Plant	**1.2MW/1.7MWh**

Hoping Plant, Hualien	**2.2MW/2.3MWh** **10MW/32.8MWh** **100MW/311.4MWh**
Hualien Plant	**50MW/160.042MWh** (projected to come online in 2024)

NHΩA.TCC

→ NHΩA.TCC All-round Integrated New Energy Solutions

Products & Services |



EnergyArk Energy Storage Cabinet

High compressive strength, fire-proof and explosion-resistant, three-stage water injection fire extinguishing, salt-resistant, corrosion-resistant, flexible modular integration, suitable for both indoor and outdoor applications

Integrated Charging Stations with Solar, Charging and Storage Applications

Stable supply of fast charging services with chargers powered by energy storage, along with green-power-wheeling charging stations, to deliver green charging services

Energy Management System (EMS)

Integrated one-stop management and integrated microgrid applications in compliance with international cybersecurity standards

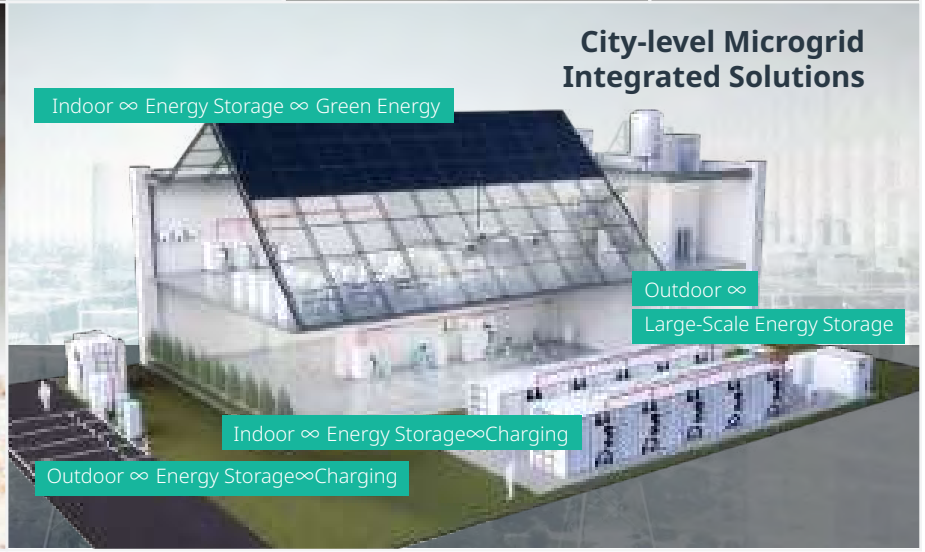
Power Trading

Diverse renewable energy sources, multiple power trading resources, and Online Green Energy Consultant with big data algorithm for optimal strategy

Business Portfolios

Energy-heavy industries
Distributed energy resources
Low-carbon EV solutions
Pure green virtual power plant

City-level Microgrid Integrated Solutions



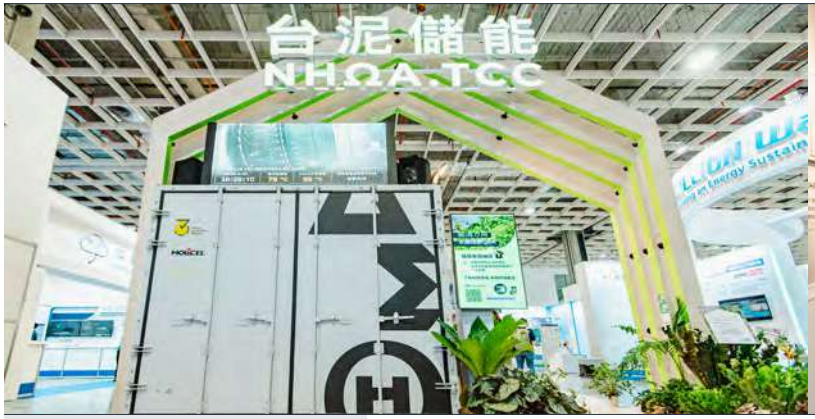
Taiwan's Largest Energy Storage Project: 100MW E-dReg Energy Storage System at Heping, Hualien Goes Online

In 2024, TCC's E-dReg market share reached_ **72%**

The 100MW Hoping Plant, Hualien and 35MW Suao Plant, Yilan, designed by NHOA and constructed by NHΩA.TCC, are connected to TaiPower's electricity trading platform in December 2023 and April 2024, respectively. These projects can adjust 290MWh of off-peak electricity consumption daily for TaiPower's northern and eastern power grids. NHΩA.TCC collaborated with NHOA's Italian team to exchange expertise on site construction and regulations, while NHOA gained insights into Taiwan's power regulations, system requirements, and circuit design, achieving synergistic benefits.

NHΩA.TCC's E-dReg system provides long-term grid frequency adjustment, delivering power according to Taipower's dispatch needs. It requires batteries over 2.5 times more than traditional dReg systems, with higher technical thresholds and costs. By April 2024, NHΩA.TCC's E-dReg systems will make up 72% of the total capacity on the Taipower electricity trading platform.

A Safe Place for Clean Energy - EnergyArk ／ Energy Storage Cabinets／



PATENTS

Patents for movable cabinet and energy storage device: I813064, I800157, TW111145031, TW111142615, TW111130061, TW110142301, and TW111138119

CERTIFICATIONS FOR ENERGYARK-1000

Cabinet：CNS12514-1 & -8 (2HR 1000°C Fire proof)

System Certification:
IEC62933-5-2、UL1642
UL1973、UL9540A、
IEC62619
IEC62477-1、UN38.3、UL9540

FIREPROOF & EXTINGUISHING GUARANTEE

- Up to 2 hours of protection under 1,050°C heating with excellent fire resistance and flame retardant properties
- Multi-Stage Anomaly Detection in the system design, capable of injecting 9,000 liters of water to prevent battery thermal runaway upon any thermal runaway detected.

TEMPERATURE & WEATHER RESISTANT

- Corrosion-resistant, leak-proof, salt-resistant, and highly weather-resistant cabinet
- Up to 10 times of a lifespan, reducing carbon emissions by 50%, compared to traditional metal cabinet
- A 25-35% lower power consumption compared to traditional metal cabinets

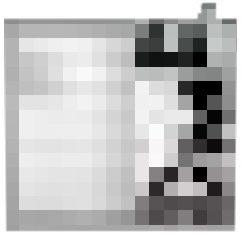
FLEXIBILITY & TENACITY

- Single/Flexible modular design with flexibility to accommodate multiple application scenarios
- Various PCS configurations, along with modular design of cabinet combination, for optimal battery capacity allocation

COMPREHENSIVE PROTECTION

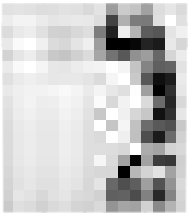
- 24/7 EMS system monitoring & optimal depth of discharge (DOD), extending the lifespan of batteries
- The 1st energy storage cabinet with product liability insurance in Taiwan
- Comprehensive after-sales service & remote anomaly monitoring with Automatic Monitoring Center

EnergyArk-1000



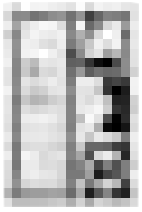
Size	**W315×D260×H290cm**
Installed Energy	**About 1000kWh**
Characteristic	**Parking space size** **Flexible modular cabinet combination**
Application	**Energy storage system, Electricity trading** **Pairing with chargers**

EnergyArk-60



Size	**W225×D65×H256cm**
Installed Energy	**About 60kWh**
Characteristic	**Can be placed behind parking spaces** **Optimal space utilization**
Application	**Pairing with chargers**

EnergyArk-40



Size	**W125×D125×H190cm**
Installed Energy	**About 40kWh**
Characteristic	**Can be placed around pillars** **Utilizing space between parking spots**
Application	**Pairing with chargers**

→ **Safety Tested**

Fire extinguishing System of EnergyArk-1000 Tested by the National Fire Agency

Recently, the safety of energy storage systems has become crucial for domestic projects. In September 2023, NHΩA.TCC collaborated with the National Fire Agency, MOI, conducting a fire emergency response study on EnergyArk-1000. The study observed the cabinet's fire-fighting water injection system performance under battery thermal runaway conditions. Results showed NHΩA.TCC's proprietary fire extinguishing system can inject over 9,000 liters of water at high pressure within 5 minutes. This submerges battery modules, maintains cabinet integrity, and reduces battery temperature to below 50°C within 5 seconds, effectively preventing thermal runaway and extinguishing fires. Even under extreme circumstances with a total system failure, EnergyArk's high structural strength and low thermal conductivity can contain disasters within one cabinet, preventing thermal runaway spread.

In 2023, EnergyArk BTM Energy Storage System Leasing Solutions were introduced, providing a circular procurement model of Rent to Own, reducing barriers for owning an energy storage system. NHΩA.TCC plans to expand promotion of energy storage cabinets from Taiwan and Mainland China to European and American markets. NHΩA.TCC aims to partner with Atlante, a TCC subsidiary, to build the first charging station integrated with EnergyArk in Europe, specifically in Italy, by Q3 2024.

EnergyArk Enters Commercial Buildings to Help Clients Achieve RE100

In 2023, NHΩA.TCC partnered with Cathay United Bank to establish Taipei's first low-carbon fast-charging station, integrating EnergyArk and T-RECs at Cathay United Bank's Ruihu Branch building. This station uses only one-third of the electricity of a typical slow-charging station in commercial buildings, ensuring fast-charging services without compromising power supply safety. It helps reduce Scope 3 emissions from the bank's corporate cars and enables employees and tenants to lower costs in transitioning to low-carbon transportation.

3.3_

Energy Supply
The Key Technology for Energy Transition

NHΩA.TCC has constructed EV charging stations that integrate solar, charging, and storage applications, using energy storage devices to buffer the power grid. By storing electricity during off-peak hours and discharging it during peak hours, they alleviate grid burden and ensure stable fast charging. NHΩA.TCC offers low-carbon, energy-saving charging solutions, fostering a zero-carbon green logistics ecosystem in Taiwan. Additionally, through TCC Group Holdings' consumer brand "NHΩA.TCC Charging Services," they prioritize both people and vehicle charging experiences, providing innovative services. Coupled with "EARTH HELPER, the Carbon Reduction Sustainability Action," NHΩA.TCC encourages EV owners to adopt new energy for a new lifestyle.

NHOA.TCC CHARGING SERVICES

→ NHOA.TCC Charging Station with Energy Storage System

NHΩA.TCC Charging Stations use self-developed EMS to provide charging electricity via the energy storage system during peak grid hours, reducing grid burden by nearly 90% and stabilizing fast charging quality. PV panels installed on station roofs offer direct green energy supply for charging or pure green energy charging services through green energy wheeling. 4 stations in Yilan, Northern Hualien, Southern Hualien, and Taitung resolve range anxiety for EV owners traveling in Eastern Taiwan, serving as the "best charging support in Eastern Taiwan" for EVs.

TCC KEY FACT **Tainan Yawan Station**

In the late 2023

Upgraded from "Solar-Storage-Charging" into

Green-Storage-Charging Services

February 2024

During peak hours, 100% pure green electricity is used.

→ Virtual Power Grid Reverse Power Transmission Service

First Pilot Site - Yilan Crayon Factory Station

Starting in 2024, all new NHΩA.TCC Charging Stations will incorporate TCC's patented EnergyArk Energy Storage Cabinets. It's expected that by the end of 2024, 10 new EnergyArk-integrated stations will be established across Taiwan. NHΩA.TCC obtains permission from Taipower, exploring low-voltage site reverse power transmission technologies, envisioning charging stations functioning as distributed energy systems. These stations can feed electricity back to the grid during power shortages, enhancing grid resilience and laying the groundwork for a virtual power grid mechanism and future electricity trading platforms in Taiwan. The Crayon Factory Station in Yilan will serve as the first pilot site, with Eastern Taiwan prioritized for introduction.

→ EVPASS: New Charging Life Experience

NHΩA.TCC has streamlined its charging interface by integrating it into the LINE platform, eliminating the need for separate charging apps and reducing cybersecurity concerns. Innovative features like LINE-based charging activation, parking lot reservation with license plate recognition, and voice reminders were introduced. In 2023, EVPASS Charging Plans were exclusively launched for members, offering tailored plans based on charging habits. NHΩA.TCC plans to integrate new station resources for carbon pricing and continue promoting its brand ethos through EVPASS Charging Plans, emphasizing energy efficiency and inclusive charging practices to enhance its sustainable brand value.

EVPASS Yilan-Hualien-Taitung Low-Carbon Travel Plan

This plan links charging stations in Eastern Taiwan with nearby tourism attractions to incentivize EV owners to use stations integrated with solar, charging, and storage. EV owners are encouraged to slow down and make more stops, supporting the local economy. **As a result, potential revenues for partner tourism resources quadrupled in 2023.**

TCC KEY FACT

LINE OFFICIAL ACCOUNT

"Green Lifestyle Sharing Platform" regularly sharing the latest ustainability news and EV trends

Accumulated in 2023

A total of **17,980** friends

EVPASS Off-Peak Charging Plan

NHΩA.TCC advocates off-peak charging subscriptions to prompt EV owners to avoid peak grid demand, lessening the need for TaiPower to activate high-cost, high-carbon-emitting generators. **In 2023, off-peak charging at Taipei Zhishan Station reached 86%.**

Green Logistics Services as Part of the Tech Sector's Supply Chains

TTS, a subsidiary of TCC Group Holdings, introduced Taiwan's first 26-ton electric truck and, with NHΩA.TCC's resources, initiated green logistics services for IKEA Taiwan in 2023. Besides offering replenishment services, TTS installed dedicated charging stations for the trucks at IKEA sites and helped plan optimal charging solutions to alleviate range anxiety during the enterprise's transition to EVs. In 2023, three stations supplied a total of 72,435 kWh of electricity, reducing carbon emissions by approximately 42.8 metric tons. In 2024, TTS expanded into the technology sector's logistics, with its electric trucks becoming the designated vehicles for green supply chains.

TTS electric trucks vs. traditional 10.5-ton diesel trucks
Carbon emissions per trip in average **-18% CO_2e**

3.4_

Energy Solution Serve SMEs

Renewable energy shouldn't be confined to site construction but maximized for its potential. In late 2022, TCC formed Energy Helper TCC Corporation, creating a team to introduce the "Green Energy Trading Platform." This platform offers green energy wheeling and procurement services, catering to small and medium-sized enterprises (SMEs) lacking market bargaining power. It pledges to provide a percentage of green energy annually, assisting Taiwan's export-oriented SMEs in transitioning towards RE100.

ENERGY HELPER TCC CORPORATION

Energy Helper TCC Corporation offers a flexible renewable energy mix for trading, including Unbundled RECs and innovative services like Online Green Energy Consultant. Energy storage project sites, both owned by TCC and its clients, can be aggregated for electricity trading with Taipower. Beginning in 2024, TCC will conduct workshops to educate its supply chain on green energy trends and applications.

TCC KEY FACT

The Green Energy Trading Platform (ETP) provides power producers with a convenient, convenience store-like selling experience for green energy.

Over 40 million kWh of green electricity sold and 87.5% of non-affiliated clients.

Provides AI-optimized green energy wheeling, efficiently planning the deployment of surplus electricity and offering clients low-cost green energy solutions.

378 members on the green ETP
(Continuously increasing)

The innovative **"Online Green Energy Consultant"** allows clients to input their power consumption and carbon reduction goals, receiving optimal green energy solutions through big data analysis.

Over a thousand accesses.

Traded on Taipower's ETP, both its own project sites and those managed for clients included.

Total capacity of 205.2MW

Cumulative to April 2024

Takes up nearly 20% of market share, ranked No.1 in Taiwan.

→ Aggregating Energy

Full Participation on Taipower's ETP

The Largest Ancillary Services Provider in Taiwan

Energy Helper TCC Corporation is the only company in Taiwan participating in all operational items on the TaiPower's ETP.

By utilizing AI for optimal bidding strategies, Energy Helper TCC Corporation aggregates small energy storage systems, facilitating real-time power dispatch through a cloud-based EMS. In 2024, Energy Helper TCC Corporation aims to increase its participation capacity to 260.2 MW, including 195 MW for E-dReg and 22 MW for Regulation Reserve. In the future, the B2B model will be promoted to help SMEs procure green energy and assist brands in reducing Scope 3 emissions.

The First Aggregated Power Purchase Agreement in Taiwan

In 2023, Energy Helper TCC Corporation assisted five Taiwanese Decathlon suppliers in procuring nearly one million kWh of green electricity. This enabled Decathlon's supply chain to achieve its annual carbon reduction targets, marking the first successful case in Taiwan of enterprises procuring green electricity through an Aggregated Power Purchase Agreement (APPA).

3.5_

Energy Transmission **Leader in Superbatteries**

MOLICEL, a TCC Group Holdings subsidiary, focuses on developing "next-generation high-performance ternary lithium-ion batteries" with exceptional energy density and discharge power. Targeting high-end clients in electric vertical take-off and landing (eVTOL) aircraft, electric supercars, and electric motorcycles, MOLICEL has emerged as a global leader in ultra-high power cells.
With the Xiaogang Plant in Kaohsiung put into operation in 2023, MOLICEL targets at an annual production capacity of 3.4 GWh.

MOLICEL ESG SUMMARY REPORT

→ Battery Life Cycle Management | Establishing the Recycling Mechanism with the Supply Chain

MOLICEL actively enhances manufacturing processes, identifies carbon emission hotspots, and advances battery lifecycle management. It has established links with suppliers and clients in the recycling chain to create a complete closed-loop system. The aim is to conduct a pilot closed-loop recycling test in 2024 to comply with EU Batteries Regulations recycling standards.

→ World's First 100% Green-powered Low-carbon Battery Cell Plant—Canada Plant

In November 2023, MOLICEL and the Prime Minister of Canada jointly announced plans to build the world's largest high-performance ternary lithium-ion battery cell plant in Vancouver. Groundbreaking is expected in 2024, with operations commencing in 2028. It will be the world's first low-carbon, high-power battery plant utilizing "100% green electricity" from hydropower. The Canadian government is providing nearly NT$4.8 billion in funding through the Strategic Innovation Fund as part of the Net Zero Accelerator initiative. Expected to begin mass production in 2028, the "next-generation high-performance ternary lithium-ion battery" offers high energy density and discharge power while significantly reducing carbon emissions compared to most batteries produced in Asia. Moreover, this project aims to attract MOLICEL's raw material suppliers to set up factories in Canada, fostering an ecosystem and cluster in the lithium battery industry. The clustering of upstream and downstream players along the supply chain can minimize transportation-related carbon footprints, promoting a low-carbon logistics circle.

Schematic Diagram of MOLICEL Canada Plant ↗

TCC KEY FACT

Projected production capacity up to 2.8 GWh

Capable of manufacturing 135 million cylindrical ternary lithium batteries annually

Battery carbon footprint expected to -30%

→ AI-optimized Production Process

The First Battery Megafactory —Xiaogang Plant

MOLICEL's Xiaogang Plant (Kaohsiung) is Taiwan's first battery megafactory, specializing in high-nickel power batteries for elite products like electric supercars and aerospace technology. It features smart manufacturing and fully automated production lines, boasting an annual capacity of up to 1.8 GWh. In 2023, it launched Taiwan's inaugural "high-end lithium battery lab" to pioneer advanced manufacturing processes, integrating AI and big data technologies. Additionally, analysis results inform the R&D team's design concepts for the next generation of batteries.

→ Accelerated Low-carbon Transformtion —STSP Plant

In 2023, MOLICEL introduced ISO 14064-1:2018. The base year for GHG inventory was set as 2022. Furthermore, in compliance with EU Battery Regulations, the carbon footprint inventory of its main product, P42A, at the STSP Plant was completed by the end of 2023 with third-party verification. This initiative will extend to the next-generation product, P45B, in 2024, with plans to expand to all products.

To expedite operational transformation and embrace smart manufacturing, MOLICEL intends to demolish and redesign the STSP Plant 1 with fully automated equipment. This initiative aims to enhance precision in high-nickel power batteries, distinguishing the company in international competition.

ISO 14001 ISO 14064 ISO 45001 ISO 9001

MOLICEL XIAOGANG PLANT CERTIFIED TO THE GOLD LEVEL OF TAIWAN'S GREEN BUILDING LABELING AND LEED GOLD

MOLICEL Xiaogang Plant integrates ecological design principles from the outset, resulting in the creation of an automated smart factory. An efficient air conditioning system achieves 42% energy efficiency. Rainwater is fully reclaimed for restroom facilities or plant irrigation, reducing water consumption by 30%. The plant generates power for self-consumption using a rooftop PV system, complemented by an EV charging station. All facilities were operational by Q1 2024.

→ Strategic Partner—Group14, a New Silicon Material Supplier

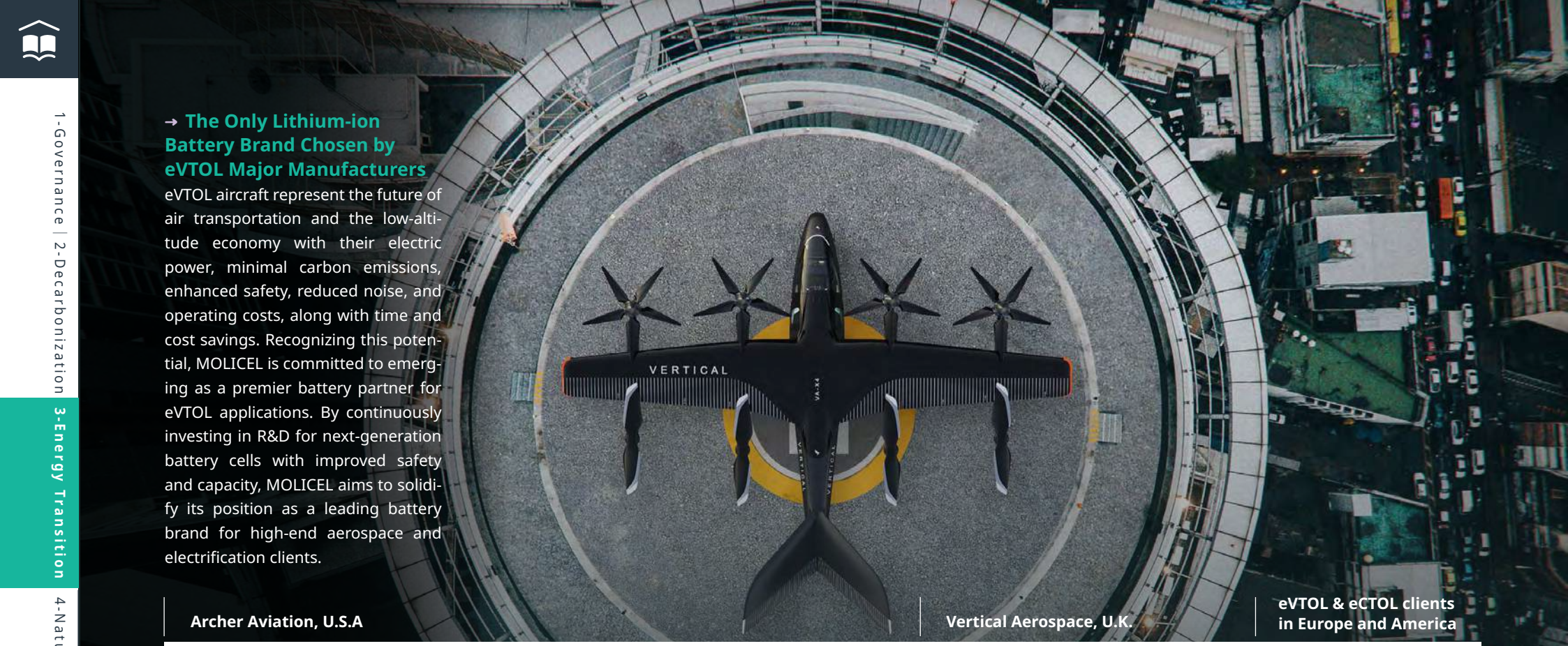
MOLICEL focuses on advanced material development, strategically partnering with Group 14, experts in silicon-based lithium battery materials. Together, they craft composite materials to enhance battery capacity without sacrificing power charge and discharge capabilities. This collaboration enables the launch of proprietary battery materials for MOLICEL, driving competitiveness and innovation across the industry supply chain.

↑ Leading British electric racing car manufacturer McMurtry has launched the Spéirling Pure, equipped with MOLICEL batteries. The charging time is reduced to 20 minutes, and the top speed is increased to 190 mph.

↑ The Star Future electric off-road motorcycle, equipped with MOLICEL batteries, won the 2024 British Arenacross Championship rider and manufacturer titles.

→ The Only Lithium-ion Battery Brand Chosen by eVTOL Major Manufacturers

eVTOL aircraft represent the future of air transportation and the low-altitude economy with their electric power, minimal carbon emissions, enhanced safety, reduced noise, and operating costs, along with time and cost savings. Recognizing this potential, MOLICEL is committed to emerging as a premier battery partner for eVTOL applications. By continuously investing in R&D for next-generation battery cells with improved safety and capacity, MOLICEL aims to solidify its position as a leading battery brand for high-end aerospace and electrification clients.



Archer Aviation, U.S.A

- Collaborating with NASA, MOLICEL utilizes state-of-the-art testing technology, including the European Synchrotron Radiation Facility, to enhance battery safety. This cutting-edge approach involves studying high-performance batteries and conducting rigorous safety, energy, and power performance tests.
- An MOU with Atlantic Aviation to establish electric aircraft hubs in major US cities, aiming for service launch in 2025 with future expansion plans.
- A contract signed with Air Chateau International, to sell 100 Midnight eVTOL aircrafts, valued at up to US$500 million
- A contract signed with the Indian travel company, InterGlobe, to sell 200 Midnight eVTOL aircrafts, paving the way for air taxi services in India's urban centers to address congestion caused by growing populations
- A contract signed with the US Air Force and special airworthiness certification obtained from the US Federal Aviation Administration

Vertical Aerospace, U.K.

- P45B battery cells testing completed and mass production line for aviation battery modules officially launched at the newly established battery research center
- Two additional new aircrafts to be built for flight testing and certification by the European Union Aviation Safety Agency
- Scheduled to participate in the World Expo 2025 Osaka for demonstration

eVTOL & eCTOL clients in Europe and America

ONGOING TESTING AND VERIFICATION

Official demonstration transportation to be conducted for European clients during the 2024 Paris Olympics

3.6_

NHΩA's Overseas Energy Deployment

In 2021, TCC acquired ENGIE EPS, a European energy storage company, rebranding it as NHOA (New Horizons Ahead) to enter the European energy market. By 2024, NHOA earned recognition from BNEF as a Tier 1 global energy storage supplier, underscoring its reliability and innovation in the market.

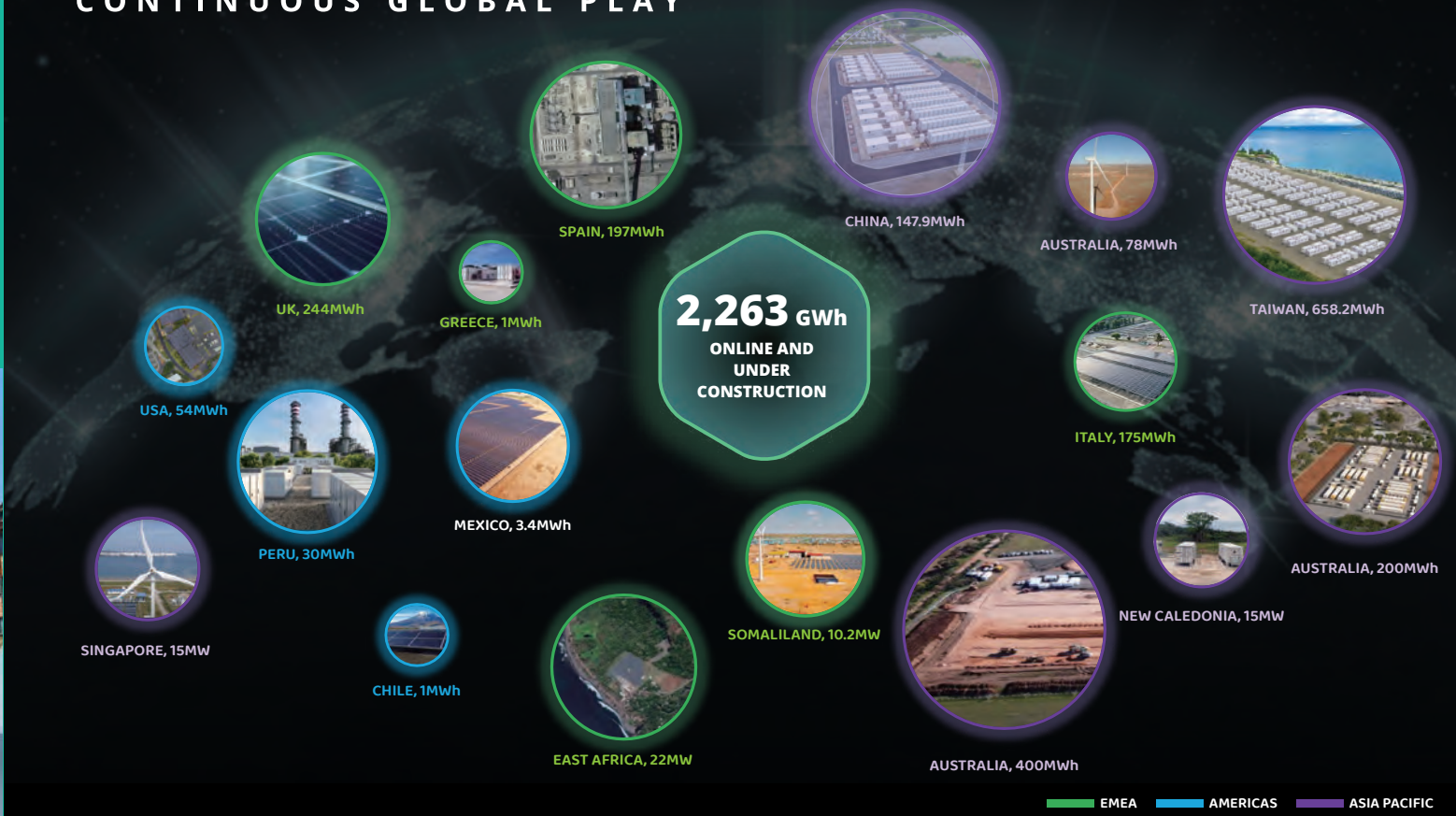
The NHOA Group, comprising NHOA Energy, Free2Move eSolutions, and Atlante Co., is a global leader in energy storage, e-mobility, and EV charging networks. Dedicated to clean energy and transportation solutions, NHOA fosters the next generation of sustainable practices that harmonize with the planet.

NHΩA

NHΩA derives its name of "Noah" from the biblical story Noah's Ark. The figure of Noah epitomizes mankind's epoch-making moment after the Great Flood. The line below the NHΩA brand identifier symbolizes a new vision. Ω, one of the Greek alphabets resembling the rising sun to take the place of O, is also the unit of electrical resistance in Ohm's law. Facing the new horizon of green energy, NHΩA confers on the brand a new beginning and mission.

PROJECT SITES AROUND THE GLOBE

CONTINUOUS GLOBAL PLAY



→ NHOA Energy

NHOA Energy offers one-stop energy storage systems, converting intermittent renewables like solar and wind into reliable 24/7 power sources, advancing the global adoption of clean energy. In 2023, 97% of the annual Capex was allocated to technological R&D.

As of Q1 2024 **the online capacity is 975 MWh, with an annual growth rate of the capacity under construction is 1,058 MWh** **674%**

Aiming for 2,500 MWh of installed capacity by 2025

→ Free2Move eSolutions

Transportation, responsible for a quarter of global carbon emissions, with 70% attributed to road transportation, necessitates a shift. Free2Move eSolutions, part of NHOA Group, provides diverse charging solutions for residential, commercial, and public EV users, advancing electric transportation to mitigate carbon emissions.

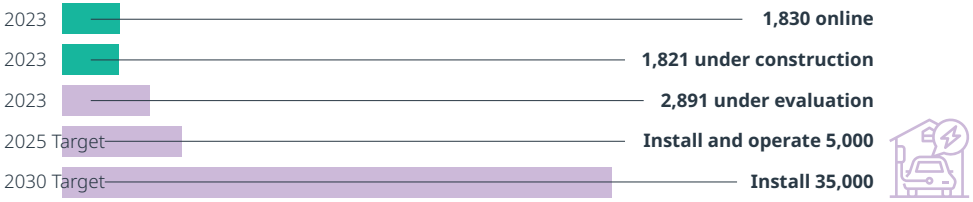
Weekly capacity **2,750 charging equipment**

→ Atlante Co.

Atlante Co. has built the largest fast and ultra-fast charging network in Southern Europe, 100% powered by renewable energy. These stations utilize modular design and energy storage systems to optimize peak/off-peak charging and incorporate solar power generation. By seamlessly integrating with national grids, Atlante Co. has established one of the world's largest virtual power plants.Atlante Co.

Atlante Co.'s fast-charging points are strategically positioned along the Trans-European Transport Network, in parking areas, and urban centers. Benefiting from these prime locations, the company secured 23 million euros from the Connecting Europe Facility (CEF Fund) in 2022 and an additional 49.9 million euros from EU in September 2023, totaling 73 million euros (approximately NT$2.5 billion) over two years. With this support, Atlante Co. plans to establish 407 charging stations, deploying over 1,000 fast-chargers and providing 1,800 charging points.

Fast and Ultra-fast Charging Spots



European Uban Regeneration Project – CityLife

Atlante Co. has partnered with the European urban regeneration project, CityLife, to enhance the sustainability of cities. CityLife, initiated in 2004, is a pioneering urban development endeavor renowned globally for its exceptional livability, architectural excellence, and environmental quality. Situated in Milan, CityLife encompasses parks, residential, and commercial areas, emerging as a symbol of modern urban living.

In December 2023, Atlante Co. launched CityLife's inaugural 24/7 fast-charging station, catering to over 10 million visitors annually. Initially equipped with 4 fast charging points, it aims to expand to 12 points to accommodate increasing demand. Atlante plans to integrate a photovoltaic system into CityLife, providing zero-emission energy and advancing the district's transformation into an "energy community."

Cross-domain Integration for New Energy to Enter Global Markets

The energy business of TCC Group Holdings made a showcase at major energy exhibitions in Taiwan and the USA in 2023. TCC showcased its integrated prowess across energy creation, energy transmission, and energy storage, together with its energy subsidiaries, i.e., NHΩA.TCC, TCC Green Energy Corporation, MOLICEL, and Energy Helper TCC Corporation. Through exhibitions, TCC interacted with potential clients and suppliers, discussing energy and storage system development while jointly addressing low-carbon and sustainability challenges in the energy industry.

→ Consumer Electronics Show (CES), USA

In January 2024, TCC unveiled its new energy products at CES, marking its entry into the global energy storage market. EnergyArk, a safe and stable energy storage solution, was showcased alongside MOLICEL's ultra-high-power ternary lithium batteries powering the McMurtry Spéirling electric racing car. European and American clients expressed interest in EnergyArk-integrated charging stations to address future energy demands and grid stability concerns. Discussions at the exhibition also led to collaborations with global partners, including Williams Advanced Engineering (WAE) in the UK and KULR in the US, to develop scalable battery modules and safety solutions for energy storage applications. Chairman Nelson An-ping Chang emphasized the importance of international competitiveness, highlighting Europe and USA as leaders in energy storage development and expressing the company's commitment to growing its global presence through partnerships.

→ Energy Taiwan

At Energy Taiwan, TCC introduced its innovative EnergyArk Energy Storage Cabinet, endorsed as fireproof by the National Fire Agency, MOI. The booth, resembling an ark, featured species supported by TCC's long-standing partnership with the Dr. Cecilia Koo Botanic Conservation Center, promoting biodiversity awareness in line with COP27 principles. Complying with sustainable exhibition guidelines, 80% of booth materials were reusable, minimizing disposable waste. Constructed with minimal steel frames and woodwork, the booth's leftover materials were repurposed as biofuel at TCC's Hoping Plant in Hualien, reducing carbon emissions by approximately 943 kg and earning the Gold Prize for its design.

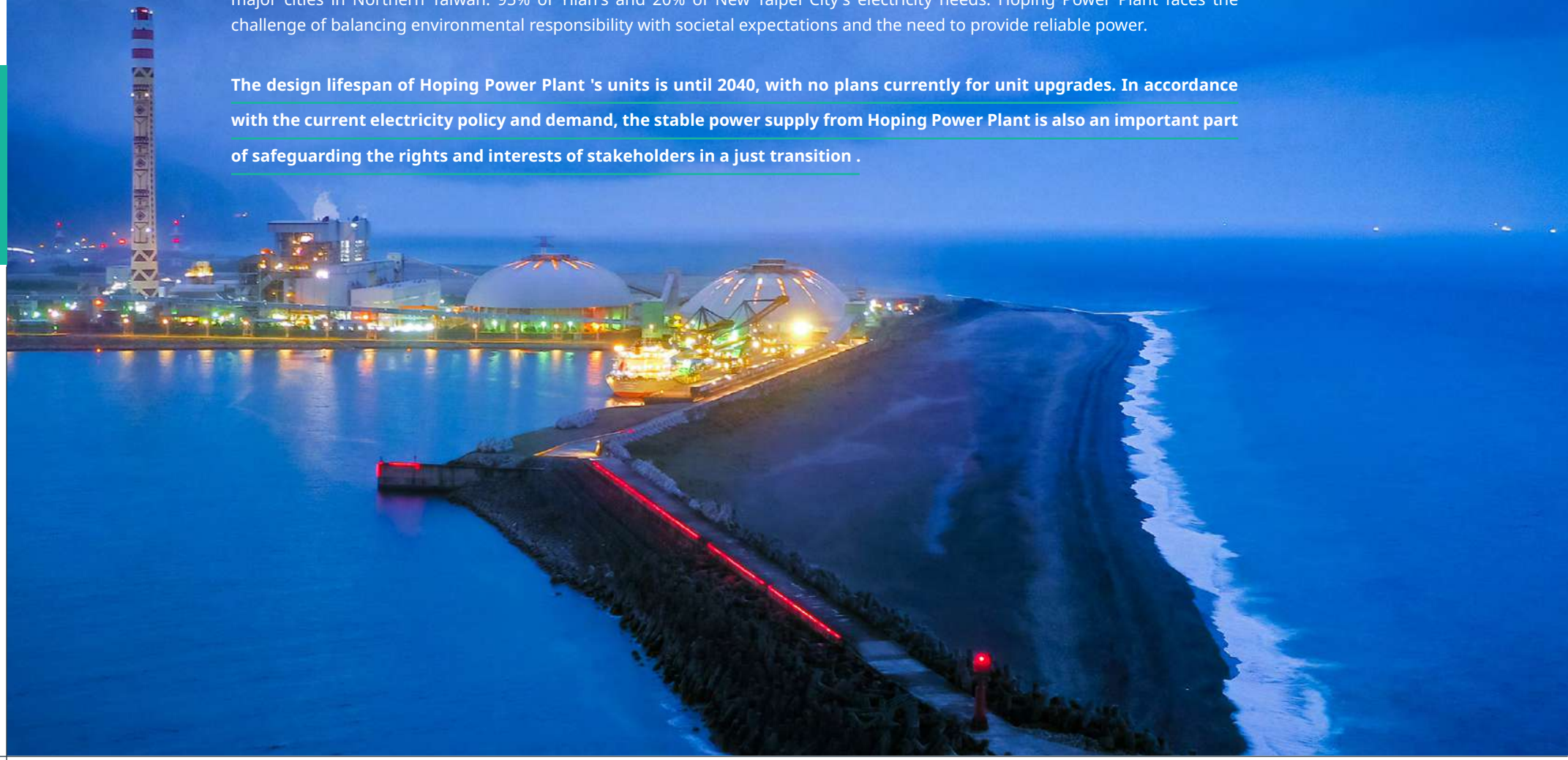
Hoping Power Plant Fulfills Social Responsibility and Just Transition

The Only Large Power Plant in Eastern Taiwan to Support 4% Electricity Supply around Taiwan

TCC supports the resolution of COP28, transitioning away from fossil fuels in energy systems. However, Taiwan faces challenges due to limited natural resources and delayed efforts in promoting renewable energy. Originally set at 20% by 2025, the green energy target has been revised down to 15.5%, with achieving the 20% goal now expected by at least 2026. This delay also impacts plans to reduce coal-fired power generation.

Hoping Power Plant complies with government energy policies and contract regulations, ensuring stable electricity supply to two major cities in Northern Taiwan: 95% of Yilan's and 20% of New Taipei City's electricity needs. Hoping Power Plant faces the challenge of balancing environmental responsibility with societal expectations and the need to provide reliable power.

The design lifespan of Hoping Power Plant 's units is until 2040, with no plans currently for unit upgrades. In accordance with the current electricity policy and demand, the stable power supply from Hoping Power Plant is also an important part of safeguarding the rights and interests of stakeholders in a just transition .



Hoping Power Plant Fulfills Social Responsibility and Just Transition

→ Severe Power Supply Challenges Seen in Taiwan's Northeastern Grid After Earthquake

The April 3rd Hualien earthquake led to 8 power generators across Taiwan, including the most severely damaged Hoping Power Plant, going offline, cutting power supply by 8%. This affected the northern region, home to millions and reliant on the northeastern and northwestern power grids. With population growth, over 2.63 million households face increased power supply pressure. The aging Second Nuclear Power Plant and the upcoming decommissioning of Hsieh-Ho Power Plant's Units 3 and 4 mean the northeastern grid will depend heavily on the Hoping Power Plant. Any issues with Hoping could result in power shortages in the area.

The Hoping Power Plant, which sells all of its electricity to Taipower, plays a crucial role in improving northeastern Taiwan's power supply, easing the load on the 345 kV UHV north-south trunk line, and enhancing power system stability. Despite coal price soared by 3-4 times during the COVID-19 pandemic, the plant continued supplying power, bearing the pressure of losses, and showed commitment to corporate social responsibility. This situation underscores Taiwan's challenge in ensuring stable power while balancing environmental and energy concerns.

→ Fufill Just Transition, Safeguarding Rights and Interests of Environment, Social, and Employees

Since its inception in 2002, Hoping Power Plant, set to operate until 2040 without equipment updates. TCC is shifting towards green energy, enhancing investments in renewables and energy storage. In 2022, Hoping Power Plant launched the 'Hoping Carbon Reduction Parent-Child Bankbook Project' to communicate with the local community, including many indigenous people and employees dependent on the plant for livelihoods, about energy transition and carbon reduction. TCC is also pioneering the world's first MW class OTEC project locally and offering Carbon Academy courses to equip power professionals with new skills. This move towards green energy aims to protect stakeholders' interests, especially during the plant's potential decommissioning. **(See CH5.1 Carbon Academy and 6.4 Carbon Reduction Parent-Child Bankbook)**

Energy Transition Projects

Biomass Energy Feasibility Study

In 2024, the Hoping Power Plant conducted a feasibility study on utilizing wood pellets and SRF. The study covered aspects such as unloading, transportation, storage, and the impact on boiler operations. The project still requires government environmental assessment review.

Renewable Energy Generation for Self-Consumption—Rooftop PV, Small Hydropower and Wind Turbine

Photovoltaic | The Hoping Power Plant is installing renewable energy generation equipment for self-use, primarily solar panels on the roof. These panels boast higher-than-average power generation efficiency in Hualien.

Small hydropower | The Hoping Power Plant plans to improve efficiency by using the cooling water's flow and energy difference in existing channels for small hydropower, integrated with the high-voltage system. Studies in 2023 project a 572 kW capacity and an estimated annual generation of 3.9 million kWh.

Wind turbine | Installing a 10.8-kW wind turbine that will be connected to the low-voltage system of the plant, which is expected to be completed in the H1 2024 with an annual power generation of 1,183 kWh.

Ocean Thermal Energy Conversion (OTEC):

The Hoping Power Plant is expected to apply to the government for OTEC-related review procedures in 2024. It plans to utilize the power talents and teams of the Hoping Power Plant to build the world's first MW-class OTEC power plant. **(See CH3.1)**

The Only Zero-waste, Ash-pond-free Power Plant in the World

The Hoping Power Plant, situated in Eastern Taiwan's cement industrial zone, prioritizes zero waste and environmental sustainability from its design phase. Integrated within the 'Circular Economy Park of 3-in-1 of Port, Power, Cement Plant,' it fosters resource utilization among the port, power plant, and cement plant. Notably, fly ash from the power plant serves as raw material for cement production, while limestone powder from the cement plant helps reduce sulfur emissions by over 95% at the power plant. As a result, the Hoping Power Plant stands out as the world's only eco-friendly facility in its category without an ash pond. Moreover, the industrial ecoport waters within the park have held EU EcoPort certification since 2019, doubling as a coral habitat and ecological restoration site.

ISO 14001 ISO 50001 Systems Introduced Strengthen Environmental and Energy Managements

Low-pressure Steam Turbine Retrofit Project

In 2021 and 2023, units 1 and 2 underwent retrofitting of their low-pressure steam turbines to optimize thermal energy utilization. This enhancement resulted in a 1.66% reduction in heat consumption, equivalent to a 12 MW increase in power generation capacity. This improvement is estimated to save 29,000 metric tons of coal consumption and reduce carbon emissions by 66,000 metric tons.

Air Pollution Control Equipment Renovation Project

The air emission levels at the Hoping Power Plant consistently surpass regulatory standards and EIA commitments. Following the completion of the Air Quality Control System renovation project in 2022, total air emissions decreased by 34% compared to 2016 levels in 2023. Additional optimizations, including enhancements to the gas-gas heater (GGH) and replacement of denitrification catalysts and ammonia injection grids (AIG), have further reduced emissions of sulfur oxide, particulate matter, and nitrogen oxide.

Water Resources Management

100% Recycling of Industrial Wastewater by 2025

Patented Nanofiltration and Reverse Osmosis Membrane System | Through collaboration with National Ilan University since 2022, the Hoping Power Plant has developed a nanofiltration and reverse osmosis membrane system, a unique innovation among Taiwan coal-fired power plants. This system fully recovers wastewater for use in desulfurization or seawater electrolysis. With Patent No. I832462 obtained, it is set to commence operation in Q2 2024.

Nanofiltration System |
Integrated into the demineralization plant early in the process, the system acts as a modular reclamation mechanism, boosting reclamation efficiency by 50%. This allows for wastewater reuse in the desulfurization system. In 2023, wastewater discharge was slashed by 29,620m^3.

Rainwater Harvesting System |
With full installation in April 2024, the system filters and stores rainwater for reuse in the desulfurization system, harvesting an estimated 18,000 m^3 of rainwater annually.

Occupational Safety Management

Facial Recognition | A single entry and exit system with separate facial recognition for employees and contractors utilizes biometric technology to control personnel access. Integrated with the Occupational Safety Office's digital engineering surveillance, it enhances contractor management.

Navigation Identification | Pipeline safety is enhanced with color-coded identification, alongside the installation of safety ladders and railings to ensure personnel safety.

Digital periodical | Monthly digital periodicals promote OHS management to all employees, including knowledge quizzes.

Safety Assessment | Safety training and testing adopted for contractor management, combined with assessments for specific personnel, to strengthen OHS awareness among partners.

Internship Program of Industry Practices for Sustainable Development of Materials

The Hoping Power Plant partners with National Ilan University in an industry-academia collaboration to cultivate electromechanical talents. Through hands-on practice supervised by experienced professionals, students gain practical skills. The internship program offers access to power plant operations and advanced analytical instruments, along with competitive salaries and retention bonuses. As of March 2024, 33 interns were recruited, with a 9.1% retention rate.

Student Feedbacks

The power plant system is far more complex than I anticipated before my internship. Here, instruments operate at thousands of volts and hundreds of amps, so any negligence could result in an accident!

In school, I learned many mechanical engineering theories, but it was only during my internship that I grasped how to apply that knowledge in real-world situations.

During my internship, I gained valuable insights into the fundamental architecture of systems, including both the distributed control system and the programmable control system. These are concepts that I would have only encountered in the industry.

CHAPTER 4

NATURE
Carbon is the Basis of Life

Chongqing Mining and Water Conservation Area

Targets

Net positive impact NPI

Quarry Rehabilitation Plan (QRP) 90% for The Percentage of Indigenous Species by 2030 | Hoping & Suao

Ho-Ping Ark Ecological Program

Soil Carbon Sequestration

Increase by 60% by 2035 | Rehabilitation Area in 2023

Dr. Cecilia Koo Botanic Conservation Center by 2030
Plant Conservation (Including Endangered Species): 40,000 species

Environmental Education

Hoping EcoPort Courses **12 Sessions Annually | 90% Satisfaction Rate Maintained for The 2022-2024 Courses.**

TCC DAKA **EPA Environmental Education Facility Certified**

The First Major Construction Material Company

Nature Strategy Endorsed by

Business for Nature
The Only Construction Material Company Joins
It's Now for Nature

Promoting OECMs in The Hoping Mining and Hoping Eco-Port Areas

2023/ Performance Highlights

Mining Areas

Coverage rate of the Biodiversity Management Plan (BMP) for High-Risk Mining Areas.
100%

Quarry Rehabilitation Plan (QRP) Coverage **100%**

Native Species Preservation Ratio Hoping Mining Area
88%

Taibai Mountains Mining Area
90%

Proportion of Soil Organic Matter of Mining Area Rehabilitation Zones

2021-Three-Year Rehabilitation Area Increased by **1.3** Times

2023-Organic Carbon Levels
31.2 tons per hectare

Note 1 High Risk: Evaluated based on international IUCN, WDPA, and various regional databases.

Conservation of Plants (Including Endangered Species)

34,646 Varieties

A Total of **6,500** Pharmaceutical Samples Derived From **62** Different Plant Families Have Been Provided.

Accumulated until March 31, 2024

Coral Rehabilitation Project at Hoping EcoPort

A Total of 1,001 plants Have Been Rehabilitated.

Accumulated until February 29, 2024

The Survival Rate of Rehabilitated Coral is 80%
The Area Designated for Rehabilitation Has Been Expanded to Four Times Its Original Size.

4.1_

TCC Nature Action

No Deforestation Commitment

In line with the zero-deforestation commitment of the COP26 resolution under the United Nations Framework Convention on Climate Change (UNFCCC) and in response to the SDG 13: Climate Action and SDG 15: Life on Land, TCC Group Holdings has made its No Deforestation Commitment, approved by executive management.

The commitment covers TCC Group Holdings operations, suppliers and business partners. Through cooperation agreements, TCC Group Holdings requires partners to adhere to commitments and management policies, jointly contributing to the environment. TCC Group Holdings commits and implements management approaches as follows:

→ 100% operation sites not in the nationally protected areas

→ 100% zero deforestation beyond the mining areas and commitment to the recovery and restoration in mining areas, contributing to the target of no net deforestation by 2040

→ Sharing knowledge about the importance of forest conservation with stakeholders, including employees, customers, suppliers, and partners.

Biodiversity Policy

"Without nature, the 1.5-degree goal of the Paris Agreement cannot be achieved."

Both COP27 Climate Summit and COP15 Biodiversity Summit called for:

Climate action and nature positive are equally important on the net-zero scale, and both are indispensable.

The World Economic Forum's Nature Positive Growth reports in September 2023 clearly stated that nature-based solutions (NbS) could contribute to 37% of the required emissions reduction by 2030. Emphasizing sustainable industry development and mutual benefits with nature, TCC has integrated NbS into its corporate philosophy.

Cement and concrete, essential for modern societies and the second most used resources after water, are crucial for human progress. Since the 1980s, TCC has prioritized environmental and biodiversity conservation, establishing the world's largest tropical plant conservation center in 2007, starting mine ecosystem restoration in 2016, and marine coral restoration in 2021, alongside soil research in 2022. TCC follows international standards for nature assessments, including adopting the Task Force on Nature-related Financial Disclosures (TNFD) framework in 2023 and joining Early Adopters . TCC also aligns with the Science Based Targets Network (SBTN) for sustainable management and adopts the World Business Council for Sustainable Development's (WBCSD) Net Impact Assessment for the cement sector. By joining Business for Nature's "It's Now for Nature" initiative, TCC commits to reversing nature loss by 2030, aiming to systematize its conservation efforts, meet international standards, and support the global 30X30 land and sea conservation goal by 2030, fostering a Nature Positive future.

TCC Nature Action is based on the frameworks and methodologies of TNFD, SBTN, and WBCSD, and conducts assessments in accordance with the SBTN Company Guidance for Nature Positive.

WBCSD World Business Council for Sustainable Development

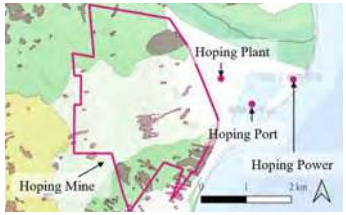
SCIENCE BASED TARGETS NETWORK
GLOBAL COMMONS ALLIANCE

Taiwan Cement SBTN Company Guidance for Nature Positive Overview

→ TNFD Reporting and Disclosure | No Protected Areas in TCC Mines and Plants

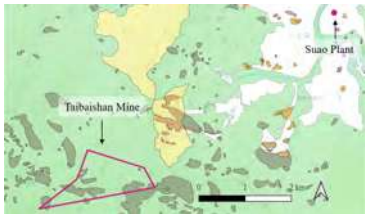
TCC applies the TNFD LEAP approach and Sector Guidance across its key sites in Taiwan, including mines, cement plants, and Hoping EcoPort and Power Plant. TCC uses ENCORE tool for biodiversity sensitivity analysis, and evaluates risks from **natural disasters**.

Criterion 1 | Ecosystem Sensitivity - IUCN Protected Areas, Ministry of the Interior Function Zones
Criterion 2 | Species Sensitivity - Biodiversity Datasets from the Ministry of Agriculture



Hoping Mine, Cement Plant, Hoping Power, and Hoping EcoPort

Criterion 1 None are in IUCN I~IV protected areas. The cement plant, Hoping EcoPort, and Power Plant are in low ecological sensitivity areas. The Hoping Mining Area, on state-owned forest land, is geologically sensitive. Taiwan Cement follows strict EIA, employs vertical shaft transportation to protect the surface, and enacts soil and water conservation practices.
Criterion 2 The mining area potentially hosts 26 species of animals and 14 species of plants of concern, with no species of concern in other location. TCC conducts regular ecological monitoring and restoration projects. Notable species observed include the Styan's bulbul, Mountain hawk-eagle.



The Taibaishan Mine, Suao Plant

Criterion 1 None are in IUCN I~IV protected areas; the Suao plant is in ecologically low-sensitivity area; the Taibaishan Mine is located in state-owned forests and on hillside lands designated for enhanced conservation. TCC strictly adheres to EIA and uses cableways to transport limestone, with innovations such as rainwater harvesting and solar-powered drip irrigation systems for restoration work.
Criterion 2 In the mining area, 12 species of animals and 14 species of plants of concern were identified. TCC conducts regular ecological monitoring, identifying species of concern including the Civet and Calocedrus formosana. Since 2017, conservation work has led to sightings of species like the Crested Serpent Eagle and Black Eagle.

Shoushan Mine

Criterion 1 Not within IUCN I~IV protected areas. The Shoushan Mining Area is a geologically sensitive area, but mining has ceased. It is now used as a detention basin park and a hiking trail.
Criterion 2 There are 11 species of animals and 6 of plants of concern. Recently, restoration efforts in the mining area have prioritized native species to improve the ecology.

LEGEND

- Type 1 environmental conservation zone
- Type 2 environmental conservation zone
- National park or national nature park
- Geologically sensitive area(landslide)
- Impact area of potential debris flow torrent
- urban planning conservation area

For more details, please refer to **the 2023 TNFD report**
(scheduled for release in August 2024)

SBTN Company Guidance for Nature Positive. →

Reporting & Dislosure
Implementation & Action
Target Setting
Impact Assessment
Science Foundations
Societal Goals

Reporting & Dislosure

Implementation & Action

Target Setting

Impact Assessment

Science Foundations

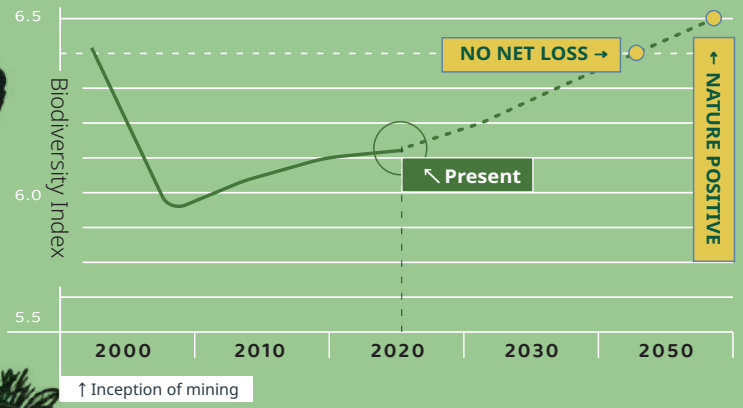
Societal Goals

→ SBTN AR3T

AVOID	REDUCE	REGENERATE/RESTORE	TRANSFORM
100% TCC-owned quarries have passed EIA and avoid mining in protected areas.	Implement MBR to reduce wastewater pollution. Set up slope protection mesh to mitigate soil erosion.	Prioritize native plants and select species fit for the area.	Transform the ceased mine into a hiking trail and flood detention park.
Cement plants boost reclaimed water use, enhance water efficiency and avoid freshwater withdrawal.	Remove White Popinac to reduce the ecological threat .	Install nesting boxes to provide habitats for bird reproduction.	Shift to a circular economy, reusing waste as resources to replace the raw materials/fuels for cement.
	Plant streetlights automatically adjust to sunrise times to minimize light pollution, and silencers are installed on equipment to lower noise.	Using natural organic compost to enhance soil's physical and chemical qualities.	Engage with tribes and communities, offering economic opportunities, scholarships, emergency funds, and educational support.
	Adopt vertical shaft system to convey limestone to reduce GHG emissions, noise and dust.		

→ Set the Goal of Water, Carbon and Electricity (TCC Sustainability Targets and Performance Tracking)

→ Net Impact Assessment (NIA) | TCC No Net Loss (NNL) Curve



TCC applies the NIA methodology for the cement sector to evaluate biodiversity restoration at Hoping Mine. The assessment is undertaken every five years. The scores are plotted into an index curve, and modeling showcases the NNL scenario achieved through TCC's conservation strategies.

NIA Methodology Application Process

❶ Map and define the areas of different habitat types;

❷ Assess importance: protected areas or habitats of endangered species;

❸ Assess condition: naturalness, species diversity, alien species, and human disturbance;

❹ Evaluate the biodiversity index of the mine.

Note 2 The biodiversity index calculation formula is: Σ(habitat area × habitat importance × habitat condition) ÷ mining area.

→ Science Foundations | Forest and Soil Research

TCC draws on reports of IPCC and IPBES, conduct foundational scientific research, including Forest Carbon Sink Survey Project, Soil Carbon Sequestration and Biodiversity Project Soil Carbon Sequestration and Biodiversity Project, and Ho-Ping Ark Ecological Program.

←Japanese soil expert Satoshi Shimano shares research with TCC restoration team

→ Societal Goals | Sustainable Development Goals (SDGs)

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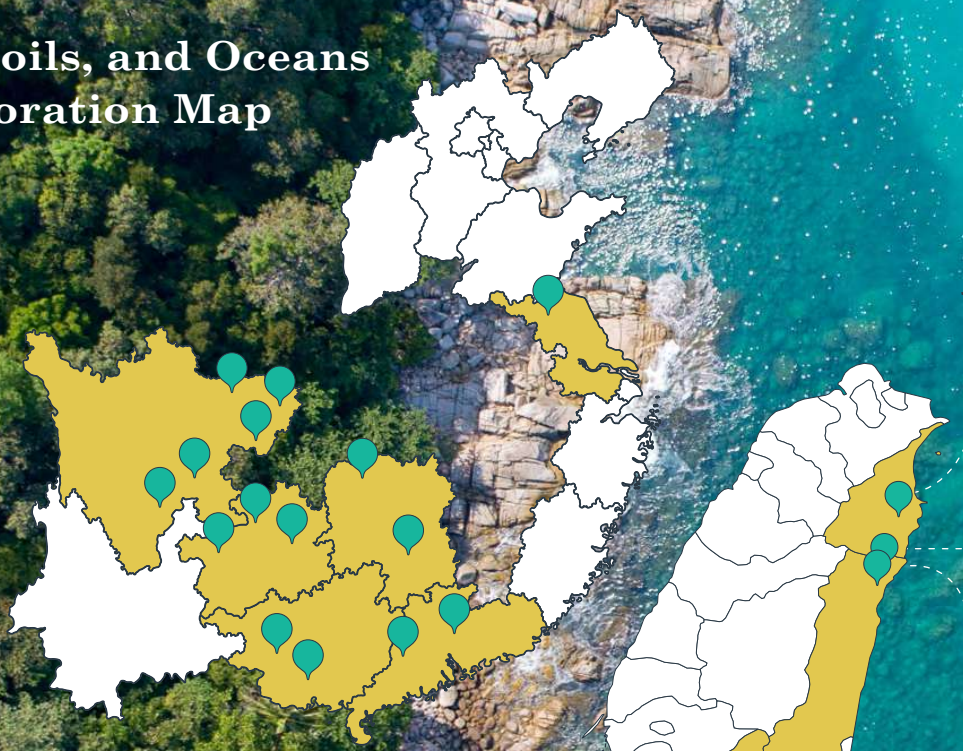
Forests, Soils, and Oceans
TCC Restoration Map



THE MINES IN MAINLAND CHINA
A restoration and reforestation rate at **19.7%**

THE TAIBAISHAN MINE, SUAO

Micro-Irrigation system with PV and energy storage combined

Enhanced windbreak net for fog-catching

90% for the percentage of indigenous species

Restoration and reforestation rate at **61.5%**
with a restored and reforested area of 13.2 hectares

THE HOPING MINE, HUALIEN

Taiwan's first low-carbon vertical shaft transport system

24,955 plants of indigenous species planted

88% for the percentage of indigenous species

Restoration and reforestation rate a **49.1%**
with a restored and reforested area of 51.7 hectares
Install water recycling system for vertical shafts, with 8,840 metric tons reclaimed annually

Proportion of Soil Organic Matter
Increased by **1.3** times in 2021-2023

THE HOPING ECOPORT, HUALIEN

OCA Class-A Water
3-time PERS-certified
GPAS-certified

EPA
Environmental Education Facility certified

1,001 corals cultivated cumulatively

Water Environment Watch established voluntarily by employees and certified by the Environmental Protection Bureau

THE SHOUSHAN MINE, KAOHSIUNG

Integrated Urban Blue & Green Spaces

Detention basin for flood prevention

Hiking trails for recreation and ecological protection

Note 3 The calculation method for the rehabilitation and reforestation rate is the rehabilitated area / (area under mining + area mined)

→ Forest Restoration

TCC's mining sites have customized biodiversity and management plans, reflecting local conditions. These plans cover land areas, focusing on native flora and fauna in the mines' forested and soil regions. TCC plants pioneer plants that thrive in sunlight, resist drought, and fix nitrogen to accelerate vegetation recovery in affected zones, aiming to restore the mines' ecosystems and services, committed to No Net Loss.

Approach

Restoration is conducted alongside mining, prioritizing native species for restoration. TCC employs two approaches: first, creating nurseries and hardening facilities with KBCC and academics to grow local species. Second, using natural succession to increase vegetation diversity and richness.

→ The Hoping Mine, Hualien |

since 2003 Environmental & Ecological Survey

since 2016 Long-term Restoration Project

Expert Team | **Dr. Cecilia Koo Botanic Conservation Center (KBCC)**

Indigenous Plant Seeds Collection and Cultivation & Quarterly Biodiversity Monitoring

Hoping Mine extensively adopts self-collected and cultivated native plants and partners with KBCC to revive the endemic Yunnan Bletilla orchid. In 2023, the restoration focused on large native trees. These native species are pioneers in forest succession and adapt to alpine climates and high-pH soils, which are ideal for the mining environment.

Apart from plant restoration, ecological monitoring and surveys are conducted quarterly at the mine. Various protected species have been observed. To enhance biodiversity, bird nesting boxes, ecological ponds, and IR cameras are installed to support bird and amphibian habitats.

Aquaponics System at the Mine

Since 2022, water collected from Hoping Mine's shaft-3A has supported an aquaponics system. Fish inhabit an ecological pond, with nearby trellis-grown vegetables. The Hoping Plant shares the produce with employees and the employee canteen. Besides aquaponics, this recycled water irrigates the vegetation while being used for vehicle washing and road sweeping.

Environmental Education Boardwalks

The Hoping Mine nurseries focus on native plants like Yunnan Bletilla and oriental chain ferns, utilizing the humid climate to grow ferns since 2022. Boardwalks link ecological ponds for environmental education, offering views of spring butterflies and early summer fireflies.

→ The Taibaishan Mine, Suao |

in 2017 Dedicated Ecological Restoration Project Launched

Expert Team | **Professor Ji-Wei Huang, Sustainable Landscape Laboratory, National Ilan University**

TAIWAN SEROW ↓

Pioneering Solar-powered Microirrigation System

The Taibaishan Mine, challenged by strong winds and a lack of surface water due to its unique climate and location, faces difficulties in restoration. TCC's Suao Plant tackled this by creating a solar-powered micro-irrigation system and building 65 rainwater ponds, improving water retention in the karst terrain. Windbreak nets were set up to protect against the winds. Plans are underway to upgrade these barriers with fog-catching technology to harvest dew for restoration purposes.

Wind-resistant, Drought-resistant, and Locally Adapted Species with Medium & Large Mammals Spotted

TCC Suao Plant transformed an old tennis court into an acclimatization facility, further cultivating native plants from the nursery, and reintroduce them to Taibaishan. In 2023, the facility focused on growing Subcostate Crape Myrtle and Autumn Maple Tree, among others, totaling 1,121 plants across a cumulative 13.2 hectares of restoration area. Subcostate Crape Myrtle, known for its drought resilience suits Taibaishan's dry conditions. Autumn Maple Tree is valued for its wind-resistant qualities.

Biannual ecological monitoring at TCC's Suao Plant in 2023 identified 5 medium to large mammals, 24 birds, and 9 amphibians. Notably, the Formosan Serow was the most observed protected mammal. Protected birds like the Crested Serpent Eagle and Crested Goshawk were also spotted.

Adhering to the "Respect and Conform to Nature" philosophy, TCC implemented restoration using eco-friendly techniques without chemicals, pesticides, or additives. By planting select fruit trees and tubers, TCC aimed to feed mammals such as boars, thereby preventing them from damaging the restored vegetation through uprooting and foraging.

→ The Beihushan Mine of Shaoguan Plant, Guangdong | Pigeon Pea Planted to Increase Soil Fertility

In 2023, the Beihushan Mine at Shaoguan Plant in Guangdong planted 6,578 native species like osmanthus and Black Locust on the restoration areas, achieving over 90% survival rate. The plant preserved the overburden to create habitats and used grow bags to increase soil depth for plant growth. It introduced legumes like pigeon peas early on to boost soil nitrogen. Shaoguan's restoration and conservation methods surpassed local norms, leading Guangdong's Environmental Protection Department to include Shaoguan Plant's practices in the reference techniques for environmental protection and land reclamation programs.

→ The Niubeiji-Shuijingpo Mine, Chongqing | Restore Farmland as Farmland & Forestland as Forestland

Chongqing Plant preserves overburden and soil fertility during mining. It plants legumes and rape as green manure to minimize exposed land. Chongqing plant prioritizes water recycling, featuring water-saving facilities like detention ponds and catch drains. Treated reclaimed water is used for irrigation, ensuring zero wastewater discharge and promoting water resource circularity.

Chongqing Plant performed analysis for restoration on the principle of “restoring farmland as farmland and forestland as forestland”. In 2023, a total of 15,989 indigenous plants of Japanese Cinnamon Tree, Chinese Banyan, plums, and loquats were planted. 57.6 hectares has been restored at the mine, with a restoration rate of 61.28%. The mine has even become the first Green Mine in the southwest region of Mainland China.

Transform Closed Mine to Ecological Corridor with Ecological & Recreational Functions

→ The Shoushan Mine, Kaohsiung |

in 1992 Mining Terminated **in 2017** Flood Detention Park Established

After mining rights ended in 1992, the Kaohsiung Plant started restoring the Shoushan Mine, focusing on cultivating native plants for in-situ conservation. This has led to the gradual recovery of the ecosystem, attracting indigenous species like Formosan rock macaques, and various plants and birds back to the area.

Next to Shoushan National Nature Park, Shoushan Mine, though not a protected area, features unique coral reefs, limestone landscapes, and diverse indigenous species, contributing to a rich ecosystem. Environmental restoration efforts have led to the creation of Shoushan Detention Park and Shoushan Hiking Boardwalk, making them favored recreational spots in Kaohsiung. Additionally, they act as an ecological corridor linking the city's blue and green spaces,the Love River and Chaishan (Monkey Mountain).

Besides its recreational and conservation roles, Shoushan Mine includes Shoushan Flood Detention Park for flood mitigation. Initially, the urban area's poor drainage led to severe flooding in low-lying regions. To enhance drainage, TCC donated land in 2013 for constructing flood control structures like detention basins, channels, and pumping stations. Opened in 2017, Chaishan Park can manage 65,000 metric tons of floodwater and serves as an outdoor water park for leisure activities.

Source: Shu-Qi Yang and Keng-Yu Ku from the Landscape Architecture Department of TungHai University

Cultural Values & Carbon Sink Potential

The Shoushan Mine, home to a century-old limestone kiln and red-brick building, draws many visitors. In 2023, Shoushan Mine hosted landscape architecture students' graduation projects. They transformed the Shoushan Plant into an efficient carbon sink base, blending culture and recreation.

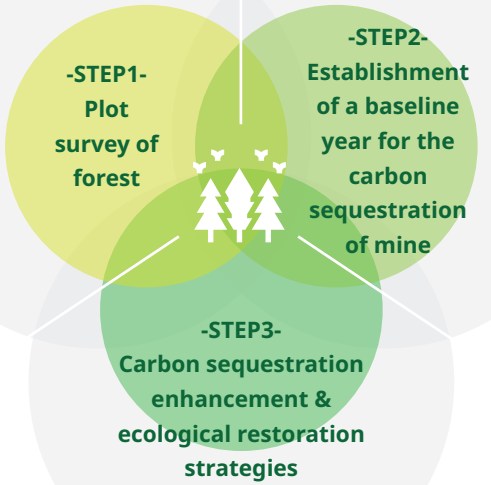
→ Forest Carbon Sink

Expert Team | **Associate Professor Chyi-Rong Chiou, Department of Forestry and Resource Conservation, National Taiwan University**

TCC has initiated ecological restoration of indigenous species at its mines since 2016, aiming for immediate restoration post-extraction to return mines to their original state. The restoration focuses on enhancing biodiversity, supporting Nature Positive, and combating climate change by fostering forest growth and adapting to local climates.

By the end of 2023, TCC introduced the Forest Carbon Sink Survey at the Hoping Mine in Hualien, aligning with global conservation efforts like Nature Positive and NbS. The project integrates ecological restoration monitoring and carbon sink analysis to set a forest carbon baseline and track carbon sequestration progress.

A total of 40 forest survey plots and 10 growth monitoring plots were established in the mine. The tree species, tree height, and diameter at breast height (DBH) of the vegetation in the plots were measured.

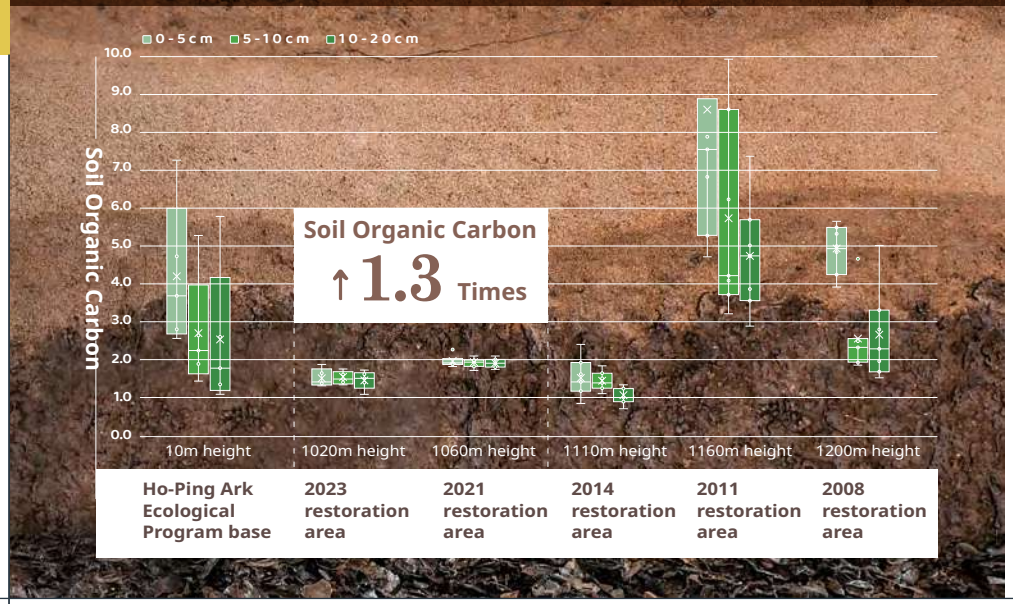


Through vegetation analysis, forest stand stages, succession, and plant community statuses are identified, offering a detailed insight into the mine's ecological restoration and carbon sink potential.

Through an assessment, developing plans to boost carbon sequestration and enhance conservation for indigenous species at the mine, aiming for faster carbon capture for Nature Positive.

→ Soil Research

Soil is the largest land carbon sink, absorbing 25% of annual human CO2 emissions. Additionally, 60% of Earth's species are found underground. Soil is vital for mining and restoration. TCC's soil research project focuses on organic matter, soil fauna, and talent development. Also, a world's first semi-closed ecological ark has been initiated to study long-term soil changes.



Carbon Sequestration & Fauna Survey Establish Soil Carbon Sequestration and Biodiversity Baseline Year

For decades, Hoping Mine has continuously explored various restoration techniques. In 2023, TCC collaborated with experts to study carbon sequestration and biodiversity in soil at Hoping Plant and restoration areas, aiming to create baseline data for soil carbon and biodiversity. Initially, experts trained plant staff in sampling techniques. The team collected soil samples using the soil column method at Ho-Ping Ark Ecological Program base at 10 meters and restoration sites between 1000 to 1200 meters altitude, analyzing soil for organic content, carbon, pH, conductivity, and biodiversity.

The Proportion of Total Organic Carbon in The Soil Has Increased by 130%

In early 2024, surveys and analyses showed that at the Hoping Mine over 15 years rehabilitated area, soils had more organic carbon than non-mined areas. Specifically, areas rehabilitated for three years had 130% higher proportion of total organic carbon than recently rehabilitated areas, due to topsoil addition and vegetation restoration. This suggests that these areas have begun to recover ecosystem services through effective management.

The mining area's soil is mildly alkaline, with earthworms and original caudate species found in areas rehabilitated for 12 years, showing soil quality improvement as these creatures only live in healthy soils. The year 2023 is set as the baseline for new rehabilitations. Future plans include working with experts to create soil improvement strategies and conducting more sampling to compare soil properties and biodiversity between original forests and rehabilitated areas.

The mining team collects soil samples using the soil column method

→ Soil Research Awards

TCC launched the soil research awards in 2024 to allocate resources to encourage research on soil ecology and biodiversity and cultivate talents in the field of soil science.

Gold Prize | Hsin-Ju CHENG, Institute of Ecology and Evolutionary Biology, National Taiwan University

Springtails, once considered insects, have been reclassified into the Collembola class. Previously seen as pests, they are crucial for soil ecosystems, serving as predators and decomposers. Hsin-Ju CHENG, this year's Golden Prize laureate, expanded Taiwan's springtail species list from 26 to 58, adding 13 new species and boosting species richness by 123%. This work sets the stage for future research on springtails.

Gold Prize | Hsiang-Yun LIN, Department of Life Science, National Taiwan Normal University

Since junior high, Hsiang-Yun LIN has been fascinated by pseudoscorpions, the carnivorous soil dwellers. For over 80 years, no new species were identified in Taiwan until Lin's work uncovered two new pseudoscorpion species and explored their symbiotic relationships with other insects, broadening the research field. Besides their research, both laureates lead facebook clubs focused on springtails and pseudoscorpions, aiming to enhance and promote soil animal studies, aligning with TCC's goal to foster soil research.

Soil Ecology Winter Camp

2024/2/2~2024/2/4

World-Class Botanic Conservation Base
—Dr. Cecilia Koo Botanic Conservation Center (KBCC)

"In the past, we call people 'earthy (old-fashioned)', or joke about 'eating soil (financially broken)' at the end of the month. I never imagined that earth and soil could be so full of depth!" TCC held the TCC 2024 Soil Ecology Winter Camp, selecting 20 applicants for issues on nature and biodiversity. Participants valued the camp, gaining insights through observation, activities, discussions, and presentations. They noted the overlooked richness of soil and its crucial role in climate regulation and food supply, highlighting the diversity of organisms like earthworms, springtails, and mites. Instructors commended the participants' insightful reflections and their commitment to future learning and soil ecology conservation.

TCC KEY FACT

Students from 25 departments across 14 different schools signed up for the camp, with an acceptance rate of only 33%

In addition to students from forestry, ecology, and environmental engineering departments, the students admitted also included fields of anthropology, business administration, and medicine.

→ Ho-Ping Ark Ecological Program |

Net Positive Impact, NPI by 2040

↑ Professor Chia-Wei LI from the Ho Chin Tui Lecture Series,NTHU

Since 2022, TCC has supported the "Ho-Ping Ark Ecological Program," led by Professor Chia-Wei LI and soil expert Dr. Chiao-Ping WANG, along with Professor Chih-Han CHANG's team from National Taiwan University. They established a semi-closed experimental site in Hoping to achieve a net positive impact by 2040. The project focuses on understanding soil's role in substance cycles like carbon and nitrogen through new ecosystem creation and long-term research. In 2023, efforts included removing invasive species, installing a skynet, setting up a water system, and planning diverse microenvironments. Additionally, the project aims to cultivate over 100 taro taxa, highlighting taro's historical significance to Austronesians and its medicinal value.

- **The program site:**approximately 1.45 hectares set in the secondary forest in the Hoping region, with the experimental base survey completed, and introduction of indigenous plants continuously

- **Semi-enclosed experimental base:** Columns and skynets have been installed, and over one hundred Taiwan Power electric poles have been recovered for reuse

- **Introduce native species:** 970 plants of 108 taxa transplanted, aiming to expand to at least 1,000 taxa

- **Habitat heterogeneity increased:** observation of decomposition rates of different dead wood, measurement of microbial composition in different decay stages, and estimation of the overall carbon sequestration

← What is NPI?

It refers to ensuring that a project's impact when combined with mitigation efforts through biodiversity management, results in a positive outcome for biodiversity.

→ Marine Conservation

The water quality of Hoping EcoPort has been certified as Class-A waters by the Ocean Conservation Administration and Ocean Affairs Council, equivalent to the waters of Penghu Islands. The EcoPort Action Plan has been promoted since 2018. Hoping EcoPort renewed the PERS certification in 2023. It was certified to APSN Green Port Award System (GPAS) in 2021 as well. In addition to being an EcoPort, it has also been certified to standards of ISO 14001, ISO 45001, ISO 14067, and ISO 14064. As such, Hoping EcoPort provides a decent living environment for corals, attracting more marine life to enrich the underwater world.

The Ecological Restoration Trajectory of Hoping EcoPort

- **2015** Life below water survey
- **2020** Identification and distribution survey of the coral species
- **2021** Bio Cube Coral Creation Project
- **2023** Fish and shellfish survey project
  2023 Coral planting project
- **Future** Constructed wetland creation project & bird survey project

→ Coral Rehabilitation Project

Expert Team: Eco-Angel Environment Conservation Association

Origin | Discovery of Coral Fragments

Over the last decade, sporadic coral sightings were reported at Hoping EcoPort. A 2020 survey revealed numerous Staghorn and Acropora corals growing on unstable rocks in shallow waters, making them vulnerable to damage from wind or waves. To combat this, the Bio Cube Coral Creation Project was launched in 2021 in collaboration with Eco-Angel Environment Conservation Association. The project aims to increase coral coverage and restore coral populations in the port without affecting navigation safety.

TCC KEY FACT

In 2023

713 corals have been newly transplanted with a total of 1,001 corals restored at Hoping EcoPort to date, as the overall rehabilitation rate approximates 90%.

Compliant with Nature-Based Solutions Included in the Ministry of Education's "Taiwan Demonstration Sites Introduction Manual" Case Study

Phase 1 | Bio Cube Coral Creation Project

In 2021, the project team installed bio cubes in sheltered port areas, utilizing TCC's core industrial technology and low-carbon cement. These cubes served as bases for transplanting coral fragments, broken by natural events or waves, to facilitate their regrowth.

Phase 2 | Planting Project with Grating Plates

In 2023, the project team enhanced coral rehabilitation by installing elevated grating plates at Piers S1, S3, S4, and N1, providing a stable base and preventing silt-related coral death. By January 2024, all coral habitats were established, facilitating observation and monitoring of rehabilitation efforts. Moving forward, the team plans to explore public involvement in coral planting to boost engagement in marine conservation.

After rehabilitation efforts, the bio cubes' inhabitants have tripled, with 25 Acropora species dominating 38% of the area. Coral identification on grating plates is anticipated by 2024. The Hoping EcoPort project team's efforts in asexual rehabilitation have enabled corals to reproduce sexually, creating an underwater spectacle during their May spawning. Hoping EcoPort will keep tracking the corals' growth to understand their development better.

→ Fish and Shellfish Survey Project

Expert Team: Taipei University of Marine Technology (TUMT) & Tunghai University (THU)

Tridacna (giant clam), the world's largest bivalve mollusk known from The Little Mermaid, is an important environmental marker found in coral reefs. In 2023, these giant clams were unexpectedly seen at Hoping EcoPort's bio cube area. To understand the coral reef ecology there, Hoping EcoPort tasked a team from TUMT to survey the fish and shellfish around coral areas in March 2023.

Maxima clam (Tridacna maxima)

TCC KEY FACT

In the fish survey
a total of 207 species of 39 families
of fish were **recorded across the four seasons.**
In the shellfish survey
a total of 660 shellfish of 10 species from 8 families
were recorded across the four seasons.

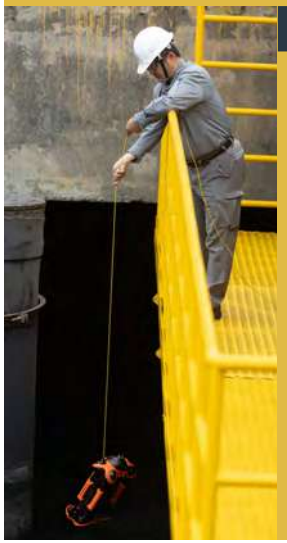
Conducted quarterly, the survey used scuba diving and underwater visual census (UVC), with underwater cameras for species identification. After a year, results showed the bio cube area had the highest biodiversity, species count, and organism number in the port, proving the coral restoration efforts had enhanced the habitat and attracted new marine life to Hoping EcoPort.Hoping EcoPort is advancing its ecological initiatives by developing a constructed wetland to transform idle areas. The project will feature native Taiwanese aquatic plants like Winkled Marshweed, Water Chestnut, and Oriental Cat-tail, and introduce three fish species: Medaka, Crucian Carp, and Paradise Fish. This enhancement aims to create habitats for migratory and waterbirds, while also attracting frogs and aquatic insects, enriching the port's biodiversity.

Water Environment Watch, Hoping EcoPort

In 2023, the Water Environment Watch of Hoping EcoPort was established by employees voluntarily at Hoping EcoPort. The Watch regularly patrols the waters of Hoping EcoPort to elevate the quality of the ecosystem and to prevent water pollution collectively.
17 employees of Hoping EcoPort on the Water Environment Watch have completed volunteer training. After receiving their certificates as qualified volunteers in November 2023, they conduct patrols once a month. It is projected that 50% of the employees of Hoping EcoPort will become members on the Watch by 2024. Also, the recruitment will be extended to contractors within Hoping EcoPort.

Responsibilities:

- **Regularly patrol and maintain the environment of the adopted areas and report pollution incidents in the port;**
- **Assist in environmental education, promotion, or training.**



TCC KEY FACT

In 2023

Wastes Removed by the 2 Beach Cleanups

36.2kg
of Recyclable Waste

18.8kg
of Non-recyclable Waste

4.3_ Other Effective Area-based Conservation Measures (OECMs)

The OECMs Group from the Forestry and Nature Conservation Agency, MOA & the Ocean Conservation Administration OAC Visited the Hoping Mine and EcoPort

2024/1/30

OECM Expert Group:

Experts and scholars at home and abroad, including the Forestry and Nature Conservation Agency (FANCA), National Park Service, National Tsing Hua University, Providence University, National Taiwan University, and Kyushu University in Japan

Assessment Criteria

1. Not a Protected Area recognized officially or for the purpose of ecological conservation traditionally
2. Governed and managed
3. In-situ conservation of biodiversity
4. Sustained long-term outcomes

The "30x30 goal" established at COP15 UN Convention on Biological Diversity: protect 30% of Earth's lands and oceans by 2030.

What is OECMs? ←

An Other effective area-based conservation measures (OECMs) is a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic, and other locally relevant values.The UN Convention on Biological Diversity states that OECMs contribute to global biodiversity conservation and are part of the 30×30 goal. Thus, creating an inventory and certification for OECMs is a priority for many countries.

30 × 30

Hoping Mine | Sustained Long-term Outcomes

The Hoping Mine focuses on soil and water conservation and restoring the mine's original landscape, aligning with Secondary Conservation principles. Some restoration areas have been in progress for over 20 years, achieving a relatively complete forest structure. Expert group confirm these efforts align with OECMs' long-term sustainability principles, noting the mine's location outside protected areas and its effective restoration team. Facilities for nurturing and acclimatizing native species have been set up for gradual in-situ restoration. The restoration is reported to be successful. Following expert advice, TCC plans to conduct biodiversity surveys comparing rehabilitated and undeveloped areas to quantitatively assess restoration success.

Hoping EcoPort | In-situ Conservation

After finding coral fragments in Hoping EcoPort, efforts were made to rebuild their habitat using methods like bio cubes for coral growth in situ. Hoping EcoPort, prioritizing coral conservation, is recognized as Primary Conservation principles. Corals support fish ecosystems and offer educational, tourism, and cultural benefits. With a global shift towards using OECMs for biodiversity conservation, Hoping EcoPort seeks to deepen collaborations with experts and agencies to better understand and apply this method, while maintaining good local stakeholder relationships. Through rehabilitation and management, it aims to be an OECM example globally.

4.4_ Nature-based Solutions (NbS)

The International Union for Conservation of Nature (IUCN) has defined Nature-based Solutions (NbS) as "actions to protect, sustainably use, manage and restore natural or modified ecosystems, which address societal challenges, effectively and adaptively, providing human well-being and biodiversity benefits." With NbS at the core, TCC manages the environmental impacts of operation sites, restores local ecosystems, and protects unique and endangered species in order to mitigate climate change and create net positive impacts.

TCC's NbS and Three Projects Alignment

NbS 1

Protection, restoration, and sustainable use of forest landscapes

Secure water supply, erosion control, and risk reduction

White Popinac as Zero-Carbon Biomass Energy

Issue Addressed

Environmental Degradation and Biodiversity Loss

NbS Criteria

a net gain to biodiversity and ecosystem integrity; economically viable

NbS 2

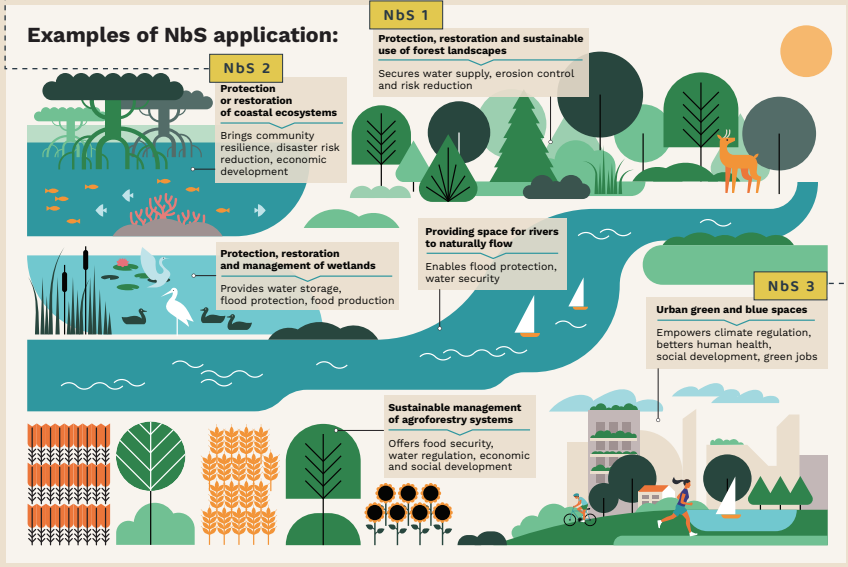
Protection or restoration of coastal ecosystems

Brings community resilience, disaster risk reduction, and economic development

Hoping EcoPort Coral Rehabilitation Project

Issue Addressed Environmental Degradation and Loss of Biodiversity

NbS Criteria Define clear and measurable outcomes for biodiversity conservation, establish benchmarks, and perform regular assessments.



NbS 3

Urban Green and Blue Spaces

Enpowers climate regulation, betters human health, social development, green job

Vakangan Green Energy Hot Spring Park, Taitung

Issue Addressed

Climate Change Mitigation and Adaptation

NbS Criteria

inclusive, transparent and empowering governance processes; sustainable and mainstreamed within an appropriate jurisdictional context

NbS Indicators

the design of the NbS recognises and responds to interactions between the economy, society and ecosystems


White Popinac Alternative Fuel Warehouse

NbS 1 **White Popinac as Zero-Carbon Biomass Energy**

→ Eradicate the dominant invasive species, White Popinac

Just like a virus, a single germinating seed of White Popinac can release toxins that suppress surrounding plant growth and spread quickly, significantly harming local ecosystems and biodiversity. To combat this invasive species, TCC's Suao and Hoping Plants collaborated with the Industrial Development Bureau and local governments, utilizing advanced cement kiln co-processing technology. This approach converts invasive White Popinac from riverbanks or industrial areas, and trimmed roadside tree branches, into zero-carbon biomass energy, effectively managing the threat.

Previously, White Popinac's poor growth in Taiwan made it unsuitable for economic uses like pulp or lumber, leading to its mismanagement. TCC addresses this by using crushed and dried White Popinac logs as an alternative fuel in cement kilns, reducing coal usage. TCC plans to collaborate with more government agencies to manage White Popinac, replacing it with native species on cleared land to protect biodiversity and combat climate change.

NbS 3 **Vakangan Green Energy Hot Spring Park, Taitung**

→ Geothermal & Tourism Combined

A Bunun proverb: "We humanity are merely borrowing the land we live on, as one day we must return it."」

In a lush valley, the Vakangan Green Energy Hot Spring Park, akin to Shangri-La, was developed over two years. TCC's subsidiary, TCC Green Energy Corporation, worked with FDC International Hotels Corporation to convert the typhoon-ravaged Vakangan hot spring into Taiwan's first geothermal power base that blends tourism and local symbiosis.

Named after Hongye Village's old Bunun name, the Park symbolizes the memory of Vakangan hot spring, respect for the land, and cultural preservation.

The Park's design is eco-friendly and low-impact, with a third of the land as water storage and retention spaces. It features grasslands for flood resilience and safety. Efficient drilling technology is used for geothermal development, along with long-term environmental monitoring. With FDC's support, five-star hotel experiences are introduced, promoting local employment and culture. This fusion of geothermal, food, and culture creates new values at Vakangan hot spring. **(See Section 3.1 Energy Creation for more details)**

→ Creating a Habitat for Coral

NbS 2 **Hoping EcoPort Coral Rehabilitation Project**

Hoping EcoPort's coral project has rehabilitated 1,001 corals since 2021. By 2023, the rehabilitation area tripled, with new corals indicating a thriving population. The 2023 survey showed diverse fish species and rare giant clams inhabiting the corals. Future efforts will align with the UN's 30 by 30 conservation target. **(See Section 4.2 Marine Conservation for more details)**

4.5_

Nature's Benefit Sharing

The Kunming-Montreal Global Biodiversity Framework (GBF) promotes sustainable use and benefit-sharing to meet and enhance human health and well-being. The Dr. Cecilia Koo Botanic Conservation Center (hereinafter "KBCC") in Gaoshu Township, Pingtung, has become a gene bank of plants for medicinal development in Taiwan.

TCC KEY FACT

A collection of plants cultivated in greenhouses with 17 net greenhouses, totaled 35,398 m2 (approx. 3.5 hectares).

35,398m² (approx. 3.5 hectares)

As of March 2024

34,646 taxa of plants from around the world have been collected.

Goal by 2030

Preserve over 40,000 plant taxa of plants

In 2013

Expansion and execution of the bird and turtle conservation programs with 39 taxa of birds and 24 taxa of turtles collected, respectively.

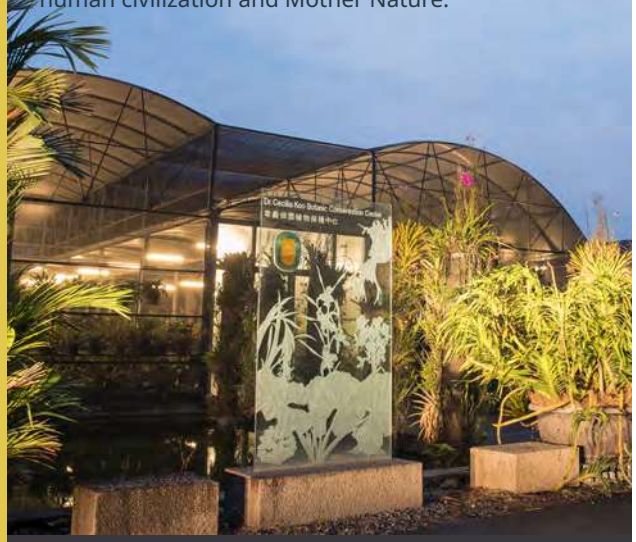
Liquid nitrogen-frozen plants currently include:

8,709 taxa of plants

62,037 liquid nitrogen-frozen specimens

Dr. Cecilia Koo Botanic Conservation Center

Since its investment and establishment of KBCC in 2007, TCC is devoted to a long-term support to KBCC's daily operation to shoulder the responsibilities of handling the complex relationship between human civilization and Mother Nature.



With Chia-Wei LI from the Ho Chin Tui Lecture Series, National Tsing Hua University (hereinafter "NTHU") as the CEO, KBCC is tasked with the mission to conserve tropical and subtropical plants in the world. With focuses on ex-situ conservation and academic research, KBCC actively partakes in international academic exchanges and tropical plant conservation projects as a world-class botanical conservation base.

KBCC rescuing endangered plants in the Solomon Islands

KBCC's collection of species and tissue specimens serve as research materials for future scientists. This vast resource aids in studying biology, developing medicine, and cultivating horticulture. Recognizing that various key elements of human medicinal advancements originate from natural plants, KBCC upholds the spirit of benefit sharing and shares plant samples with universities for extraction, aiding drug development.

→ International Genome Conservation Team for Liquid Nitrogen Plant Cryopreservation Initiative and International Rescue Program

Since 2014, KBCC has acquired 40 large liquid nitrogen tanks, each holding 6,000 specimens. Currently, KBCC houses 8,709 taxa and 62,037 frozen specimens. In partnership with the Smithsonian Institution, KBCC preserves selected species tissues. It plans to continue storing frozen specimens, seed samples, and living moss specimens.

→

NTHU Molecular Medicine Cross-team Collaboration

—

Successfully Developed a Patented New Drug for Brain Nerve Regeneration

Around 70 million people globally suffer from brain injuries annually. Currently, no effective drugs promote neural regeneration. KBCC and Institute of Molecular Medicine (IMM), NTHU are developing such drugs. The team screened over 2,000 plant extracts and found Monstera epipremnoides. This was sent to Germany for natural product separation. With NTHU's Chemistry Department's support, a new compound was synthesized and patented (Invention Patent No. I823110). The drug screening platform and process development are ongoing.

A Biomedical Unicorn/
A New Opportunity for Brain Injury Patients
NTHU Team Develops Drug
to Promote Brain Nerve Regeneration

Through the efforts of KBCC CEO and NTHU Professor Chia-Wei LI, thousands of plant extracts have been collected for pharmaceutical use, making it the only large-scale repository of natural plant extracts for medicine in Taiwan.

Source: United Daily News

→

In Partnership with The Graduate Institute of Natural Products, KMU

—

Vaccine Research Program

In 2014, KBCC and Kaohsiung Medical University (KMU) established natural product libraries. At present, the plants in the natural product libraries came from 920 taxa across 83 families of plants. A high-throughput screening platform was created to aid new drug R&D. The libraries, with over 2,500 extracts, have aided multiple projects, finding Nepenthaceae and Musaceae effective against various cancers, HBV, influenza, and potentially COVID-19. Some results are published, with ongoing patents and studies.

International Moss Conservation Workshop

Mosses, unassuming yet potent, absorb six times more CO2 than other plants. They indicate environmental quality and are pioneer species, aiding other plants and forest ecology. They also enhance soil carbon sinks. However, climate change affects mosses. In February 2024, KBCC hosted a global orchid and moss conservation workshop. Conservationists from eight countries shared experiences. KBCC plans future collaborations on research and conservation.

For more information please refer to KBCC Sustainable Life Sustainable Earth

CHAPTER 5

INCLUSION

All Nature Things Are in Harmony with Man

TCC DAKA Open Eco-Factory

Targets

Diverse and Friendly Workplace
2025 Female Employees 22%

0 Human Rights Violations

TCC Community Engagement Management (CEM)
Cumulative Investment of NT$ 0.8 Billion by 2025 | Cumulative from 2022

Occupational Safety and Health
0 Work-related Injury & Fatality for Employees and Contractors
TRIR and LTIR Lowered by 35%
| Mean for the Base Years of 2016-2018

Employee Education and Training
Cumulative Investment of NT$125 Million by 2025
| Cumulative from 2020

Education Investment
Cumulative Investment of NT$ 33.5 Million by 2025
| Cumulative from 2022

2023/ Performance Highlights

TCC Workforce
47 Nationalities
Employees of Non-ROC Nationalities **7.51%**

Employee Stock Option Program
100% Employee Eligibility
Participation rate
95.43%

Share of Women in Total Workforce
23.7%

Share of Women in
All Management Positions 18.9%
Junior Management Positions 18.3%
Top Management Positions 16.2%
STEM-related Positions 20.6%

Cement and Battery Business (Southern Taiwan Science Park & Siaogang Plant)
NHOA

Share of Women in
Management Positions in Revenue-generating Functions
21.6%

Cement and Battery Business (Southern Taiwan Science Park & Siaogang Plant)

Employee Care
Taiwan & Mainland China

Childbirth Subsidies/ Bonuses & Maternity Allowance
Over NT$ 2.1 million

Insurance Schemes of Retired Employees Participation Rate
32%

425 TCC Babies were Born

Cumulative from 2017 | Taiwan-based Operations

Talent Development
Total Training Hours
228,841.6
Hours

Sustainability Learning Passport Coverage Rate
100%

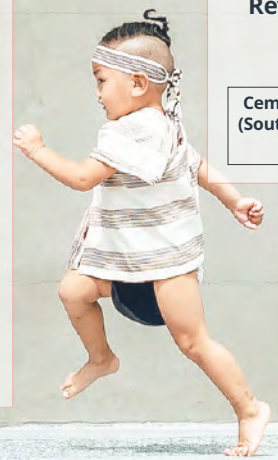
Social Inclusion
TCC DAKA
| 8.44 million Visitors
33,706 Tour Participants
As of 2024/04/30

Ecological Tour Satisfaction
96.20%
Hanben Ocean Station
| 77,241 Visitors
As of 2023/12/31

Public Welfare Funding
Hoping Sustainability Charity Foundation Contributed Amount
NT$ 2,396,748

Students Benefited from Cement Academy 12,150
As of 2023/12/31

C.F. Koo Foundation Koo Cloud Theater +23%
Compared to 2022



5.1_

Climate Action Talents

"Sustainability Concentration" is not merely a prerequisite for employees of TCC, but a key to talent selection." As talent is the bedrock for a sustainable corporate operation, TCC aims to develop our employees' potentials through diverse training programs and evaluate the effectiveness through performance assessments. During the transition, the company also addresses the career growth needs of each employee, ensuring a fair transition.

TCC KEY FACT

One-click Test "What Type of Climate Action Talent Are You?"

Total Uses 2,666 Times

Average Usage Rate 39.20%

2024/02/22-2024/04

The Earth can't wait; climate talent is rising. TCC's 2024 recruitment targets youth with campus events, matchmaking, expos, and lectures, etc. TCC is hiring in carbon management, low-carbon materials, and AI, expanding its Generative AI team. The "TCC Sustainable Learning Passport" offers weekly LINE updates, access to competitions, DEI lectures, and wellness challenges. Staff can also enroll in the "TCC Carbon Academy" for carbon management courses, enhancing TCC's competitive edge.

Chairman Nelson Chang discusses carbon competitiveness of the younger generation with AI-generated TCC employee NOAH (AI 001).

→ AI-generated Avatars

To connect with Gen Z job seekers, TCC created the "Climate Action Talent Online QUIZ." This quiz aligns traits and studies with roles. TCC guides job seekers on workplace climate action and help students pinpoint study areas. This idea is adopted by National Taiwan University's Career Development Center. TCC has created six AI avatars with ChatGPT and Midjourney from employees' faces, traits, skills, and work environments to depict TCC life. Chairman Nelson Chang emphasized that carbon management is vital in any field. Without it, one risks falling behind in the next decade. "Reducing carbon and adapting to carbon changes are key issues for humanity and industries."

"Carbon knowledge will be crucial for the younger generation.
In the future, not understanding carbon will be like not knowing how to use a computer today!"

→ On-Campus Communication | To Recruit Outstanding Students

Mentorship Program, National Taiwan University

At the "Alumni Talk," the HR leader highlighted trends in corporate transformation and talent needs. NTU TCC alumni shared career insights and strategies for honing sustainability-related soft skills.

Corporate Visit Programs

Hsing Academy with National Chung Hsing University

Our staff mentored students on industrial practices and applications of TCC through lectures and corporate visits, facilitating talent and industry matchmaking.

"Innovative Practices of Smart Grid" Corporate Visit Program with Chung Yuan Christian University

Organized a seminar on "Application and Development of Grid-scale Energy Storage System" and a visit to NHOA.TCC Zhishan Charging Station, providing students insights into energy technologies and grid-scale energy storage applications.

Summer Internship Program

Courses such as "Pre-Employment Preparation" and tours to TCC plants introduce students to our core sectors, aiding in top talent acquisition.

Scholarships

Dean's Award for Graduates, NTU College of Engineering
Scholarship for Master's and Ph.D. Graduation Thesis Exhibition, Chemical Engineering, NTU
TCC Summer Internship Grant
TCC Soil Research Awards

Industry-Academia Collaboration Progra

TCC's alliance with National Dong Hwa University (NDHU) introduces the "Electrical Engineering Talents Program" at Szu-Wei High School in Hualien, providing local students with exam-free admission, support for professional certification, and a focus on new energy careers, prioritizing TCC job applications.

Talent Recruitment with Big Data

Self-developed AI System for CV & Talent Analysis

TCC developed an AI system to improve recruitment efficiency and process optimization.
It automatically imports CVs from HR platforms, calculates talent fit using big data, tracks recruitments, and analyzes results to expand TCC's talent pool. By the end of 2023, the system processed 54,837 e-CVs and saved 4,570 nours for HR.

TCC Lyceum & MIT Industrial Liaison Program (MIT ILP)

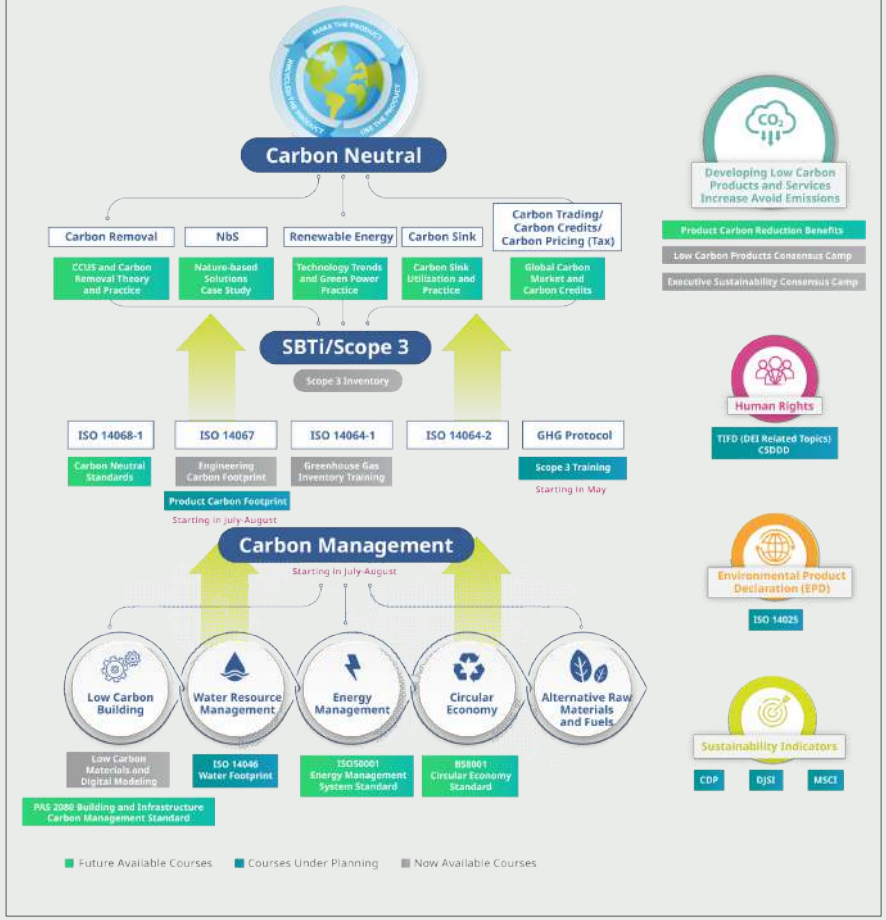
Since 2020, TCC's Management Associates have been trained with MIT ILP content to foster innovation. In 2023, this was added to TCC Lyceum, offering 23 MIT lectures on energy trends and AI applications, keeping staff updated with global R&D dynamics.

→ TCC Carbon Academy

To meet net-zero targets and industry transformation needs, TCC's "Carbon Academy" offers a full learning path for vital carbon skills. Launched in 2023, it motivates staff to upskill via courses from GHG basics to advanced engineering carbon footprints and international carbon-related regulatory trends. Employees can sign up and learn during work hours, fostering cross-unit collaboration. The high demand has filled all spots, attracting interest across the company.

TCC Carbon Academy | Learning Course Map

Connecting Globally, Enhancing Talent and Carbon Competitiveness



TCC Carbon Academy now includes the value chain, welcoming customers and suppliers to raise carbon literacy. This also transforms TCC from a traditional raw materials provider into an innovative company offering high-quality low-carbon products and carbon consulting services.

Shin-Cheng Yeh
Professor at the Graduate Institute of Environmental Education and Sustainability Management, NTNU
Corporate Sustainability and Greenwashing: A Fine Line or Clearly Distinct?

Chyi-Rong Chiou
Associate Professor, Department of Forestry, NTU
Is There Carbon with Soil? Challenges and Opportunities for Corporate Carbon Sink Assets

Tung-Li Mo
Secretary-General of BCSD
Green Supply Chain Revolution: Scope 3 Carbon Reduction International Trends

TCC KEY FACT

Carbon Academy Curriculum Average Satisfaction
96.2%

Sustainability Courses Average Satisfaction
95.1%

2023 TCC Carbon Academy Curriculum

GHG Inventory Talent Development Program

Staff overseeing GHG inventory across various business units & employees who voluntarily enroll

81 participants in total

100% internal assessment pass rate

Low-carbon transition strategies at TCC
ISO 14064 Standard Inventory techniques
Internal audits and external verifications
Practices sharing from colleagues
Case studies and discussions
Post-course tests

Management Consensus Camp

Assistant Vice Presidents, Plant CEOs, and higher level managers at TCC, along with Presidents, Plant CEOs, and higher level managers at TCC-affiliated enterprises

83 participants in total

International sustainable management trends and corporate carbon talent development
Sustainability challenges and competitiveness of TCC
Basics of corporate sustainability certification management

Low-carbon Product Consensus Camp

Managers and staff overseeing R&D, production, and sales of low-carbon products

177 participants in total

Carbon management and circular sustainability from the perspective of construction supply chain
Narratives and strategies for the low-carbon products of TCC
2024 TCC low-carbon product sales strategies

→ Employee Development Programs

	Training Content	Business Benefits			Quantitative Impact of Business Benefits[1]	
Sustainable Learning Action Program	**Target** | All employees in Taiwan-based operations **Content** | ▌Diversity & Inclusion: Cross-cultural communication and management, Strong generation/psychology book club ▌Sustainability trends: Lectures by external experts, sharing low-carbon architecture trends & applications, challenges and opportunities of corporate carbon sink, etc. ▌Development: Positive communication skills ▌Sustainable Action Proposal Competition: Proposals for energy-saving measures in the workplace	Encourage self-learning among colleagues through diverse and engaging methods, enhance sustainability awareness, support innovative thinking, promote internal talent mobility, and help TCC address increasingly severe sustainability challenges to maintain its market leadership.	L1	Reaction	**Indicator & Performance** Average satisfaction with the sustainability courses: 95.1%	**% of FTEs participating in the program** **100%**
			L2	Learning	**Indicator & Performance** Course completion rate: 100%	
			L3	Behavior	**Indicator & Performance** Number of participants in the Sustainable Action Proposal Competition:148 Number of participants for the Sustainable Learning Action Passport:1,308	
			L4	Result	**Indicator & Performance** Open positions filled by internal candidates: 78.6% in Taiwan	
TCC Carbon Academy	**Target** | All employees **Content** | ▌Trends and regulations in GHG inventory, practical training, case studies, and written examination ▌Engineering carbon footprint: introduction on ISO 14067 and LEBR, case study exercise in groups ▌Low-carbon product consensus camp, calculation on construction, low-carbon construction materials applications	Develop internal climate action talent, reduce the potential impact of corporate transformation on employees and the supply chain, promote low-carbon products, and build a sustainable supply chain with carbon competitiveness. Courses are capped and include post-training assessments to guarantee educational excellence.	L1	Reaction	**Indicator & Performance** Average satisfaction: 96.2%	**% of FTEs participating in the program[2]** **25%**
			L2	Learning	**Indicator & Performance** Course completion rate:100% Internal certification pass rate:100%	
			L3	Behavior	**Indicator & Performance** Growth of the enrolment: 111%	
			L4	Result	**Indicator & Performance** Nearly 400 project sites have been signed | Cumulative 2023/10-2024/04	

Note 1 It was developed with reference to the Kirkpatrick Model.

Note 2 Scope: Cement business in Taiwan and Mainland China

Workplace Energy Conservation and Carbon Reduction: Sustainable Action Proposal Competition

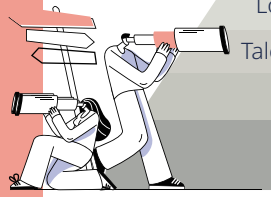
TCC's first Competition urged staff to adopt energy-saving and carbon-cutting measures. Proposals were applied in-house. Post-preliminary, TCC held workshops to fine-tune proposals and boost presentation abilities. 17 teams of 46 supervisors and employees proposed initiatives like "less paper use," "energy-saving water coolers," "streamlined processes," and "sustainable travel." These solutions, showcasing a dedication to sustainability and ingenuity, are now active in TCC's workflow.

5.2_

Employee Development of DEI

Following Diversity, Equity, and Inclusion (DEI) principles, TCC focuses on employee needs and tackles talent diversity by promoting gender equality, intergenerational cooperation, and ethnic inclusion, aiming for a fair and vibrant workplace culture.

TCC Talent Development and Training System



	Sustainability	Management	Cross-Disciplinary	Developments
Executives	New Recruit Orientation	Management Courses for Executives	Creativity Courses	**Humanity**
Mid-level Managers	Carbon Academy	Mid-level Management Courses	Thinking Courses	Internal Trainer Training
Low-level Managers	ISO and Important Policies	Low-level Management Courses	Self-management Courses	**Education**
Talents with Potential	Sustainable Learning Action Program	Industry-Academia Seminar	Interpersonal Intelligence Courses	TCC Lyceum
Employees		Cross-Industry Forum	Agility Management Courses	**Lifestyle**
New Recruits				Healthcare | Financial Management | Slasher Series
				Language Proficiency
				English Study Subsidy

→ DEI for Cultural Diversity

With a global presence, TCC has employees from diverse racial, ethnic, and cultural backgrounds. TCC organizes events like Christmas parties, cultural exchanges, and birthday celebrations to foster unity. Indigenous employees receive Cultural and Ceremonial Leave to promote core cultures.

To support foreign employees in Taiwan, TCC provides housing, medical support, and transportation to/from project sites. In 2024, Mandarin and Taiwanese culture courses will launch, alongside a living assistance scheme.

TCC KEY FACT

Share of Women in Total Workforce

23.7%

Scope: Cement and Battery Business (Southern Taiwan Science Park & Siaogang Plant) & NHOA

Employees of Non-ROC Nationalities: 5.42%

TCC Workforce

47 Nationalities

→ DEI for Bridge Generation |

TCC prioritizes diversity, respects individual differences, and actively fosters intergenerational communication and collaboration, aiming for a harmonious and healthy workplace.

→ Stages for Youth

Management Associate Program:
Initiated in 2007, TCC's program offers comprehensive training, salary security, and a promotion guarantee. It includes cross-plant learning, department rotation, and project-based practice to cultivate versatile talents.

Internship Program:
TCC offers a flexible internship program tailored to students' schedules. It includes various courses, field visits, and career mentors who guide, appraise, and brainstorm with interns.

Studying forestry, I was involved in biodiversity projects, questioning corporate positive environmental impact. I was impressed when following mine workers and experts in the restoration process. The mining impact is undeniable, demanding corporate responsibility. "Restoring while mining" reflects the balance between social development and environmental protection. I saw "In Service of Life" in action among the mine workers.

—Angela HUANG, Master's Program, School of Forestry and Resource Conservation, National Taiwan University

→ Succession Ladder for the Strong Generation

Key Talent Development Program:
The two-year program is designed for low-to-mid-level managers to enhance their management capabilities. It utilizes Business Weekly resources to develop technical, managerial, and various soft skills. The program offers personalized training, including one-on-one English conversation practice, and cultural knowledge for global roles, aiming to nurture international, generalist, and technical specialists.

Financial Management Seminars:
TCC caters to its 'strong generation' staff, the family's financial mainstay, with targeted retirement and risk seminars for enhanced financial literacy and employment stability.

→ Veteran Experience Sharing

Recruitment of Seasoned Professionals:
TCC recruits experienced personnel as consultants to pass on skills and assist younger teams in project site construction.

Reemployment after Retirement:
TCC reemploys retirees for project needs, offering professional insights and guidance. In 2023, 2 retirees were reemployed. TCC plans to expand the talent pool and create a veteran group to extend careers and expertise.

Retiree Visit and Luncheon:
TCC organizes one-day activities for retirees, with in-service staff also engaging to share experiences and updates on TCC's progress. In 2023, 3 visits were held with 95 retirees attending.

→ DEI for Gender Friendly

Targets Set for Females in Management to Break the Myth of Glass Ceiling

TCC's construction materials business attracts more male applicants for physical labor positions. TCC aims for 25% female senior management in the Cement and Battery Business (STSP & Siaogang Plant) and NHOA by 2025. Recruitment ads use gender-neutral language, and the "Anti-Discrimination and Anti-Harassment Policy" is promoted via internal meetings and announcements. An online Care Platform offers anonymous feedback to ensure a supportive and safe environment for employees.

STEM Female Scholarship with NHOA

NHOA, a TCC subsidiary, aims to increase female employees in high-tech and energy sectors, achieving 50% female management in 2023. To eliminate gender disparities and cultivate future female STEM talents, NHOA has participated in the "Girls@Polimi Grants" at the Polytechnic University of Milan since 2021. Recipients receive an annual €8,000 grant for three years, plus training and mentoring. The goal is to increase the proportion of female engineers tenfold by 2025.

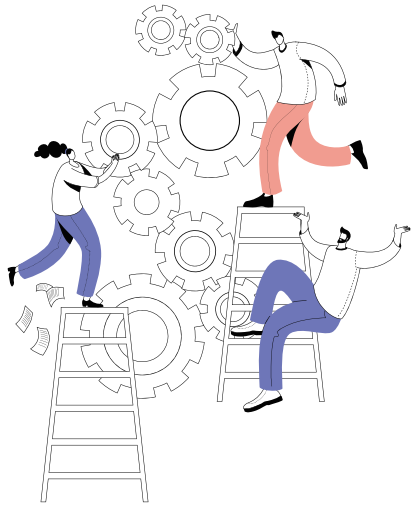
New Apprenticeship Scheme at the Yingde and Guigang Plants

TCC's "New Apprenticeship System" at Yingde Plant (Guangdong) and Guigang Plant (Guangxi) combines practical training with theoretical courses in partnership with local institutions. The Yingde plant began electrician training in 2022. The Guigang plant has a comprehensive training base with 12 facilities. This initiative enhances the skills of workers and offers local residents training opportunities leading to employment.

By 2023, 649 employees had completed the training.

→ DEI for Cross-Disciplinary Talent

TCC is committed to fostering diverse employee growth, urging them to leverage their strengths, introduce fresh perspectives, and drive innovation. TCC regularly provides internal transfer opportunities, handling applications and reviews confidentially to promote talent mobility and integration. TCC also endorses external learning by subsidizing courses, seminars, and workshops. In 2023, the internal promotion rate reached 78.6% in Taiwan and 9% in Mainland China, with 1,009 applications for external training by the end of 2023.



5.3_

Employee Remuneration & Benefits

Employees are vital to the Company's sustainable development and innovation. TCC offers competitive salaries and generous bonuses to attract, retain, and motivate talent.

TCC KEY FACT

100%

of TCC Employees are Eligible for the Employee Stock Option Program (ESOP).

Total Usage: 3,026 Employees
Participation Rate: 95.43%

In Taiwan, 69% of Outstanding Employees are Eligible for the Treasury Shares Program.

→ Remuneration Policy and Share Profits

Fair Evaluation System with 100% Performance Appraisal

To align employee objectives with TCC's development strategies, a fair performance appraisal system was established. It quantitatively measures job objectives and qualitatively assesses behaviors, linking company profitability with individual performance. In 2023, 100% of employees (excluding new staff in their first three months) were assessed.

TCC's remuneration policy is based on sharing operation results. Employee remuneration is determined by performance and job responsibilities, regardless of gender, race, age, marital status, language, religion, political affiliation, place of origin, appearance, or disabilities. TCC offers monthly salaries, year-end bonuses, quarterly bonuses, performance bonuses, and other variable remuneration to 100% of employees.

→ Variable Compensations

Quarterly Bonus |
TCC's quarterly bonus system rewards employees, and factors in progress on carbon emission intensity targets towards the 2050 Carbon Neutrality commitment, integrating sustainability performance into corporate operations.

Performance Bonus |
Employee appraisals include risk and sustainable management indicators, linking results to the Company's governance, operations, and sustainable development.

→ Treasury Shares Program

TCC introduced the Treasury Shares Program as a long-term incentive, linking performance indicators, like carbon emissions reduction strategies, to sustainable development goals. Employees in Taiwan or overseas subsidiaries with outstanding performance are eligible.

→ Employee Savings Mutual Fund

TCC encourages employee savings, adjusting deposit amounts by age. Deposits are made in January and July each year. The sum, plus a 50% contribution from the Employee Welfare Committee, goes into the employee benefit trust account. In 2023, there were 1,290 participants, with subsidies totaling NT$1,894,290.

→ Employee Stock Option Program (ESOP)

TCC and employees contribute to a trust account at a 1:1 ratio monthly. Employees can apply for additional contributions in June and December, with TCC adding 10% to individual accounts. Employees eligible for retirement at 60 can contribute further. This program retains talent and helps employees accumulate wealth and plan for retirement.

Type of Performance Appraisal	Execution Frequency
Management by Objectives	Conducted annually
Agile Conservations	Conducted annually

→ Annual Performance Appraisal Linked to Sustainable Development Indicators

Linkage with Executive Renumeration

Please see **CH 1.2 Management Remuneration Policy**.

Incentives Linked to SBTs

Quarterly bonuses are awarded to cement plant personnel based on their SBT performance, linking emissions reduction to compensation and incentives, strengthening the activity and validity of climate-related indicators.

Sustainable Actions by All

The annual performance appraisal for all employees (including the President, Vice President, and management personnel) is based on "Sustainable Action by All" and the "Sustainable Learning Action Program," accounting for 10% and linked to the company's sustainable development goals. Indicators include environmental protection, emission reduction, water reclamation, waste treatment, supply chain enhancement, risk reduction, talent development, and anti-corruption.

Internal Carbon Trading Performance

Starting in 2024, quarterly internal settlement reports based on carbon emission budgets for cement plants in Taiwan and Mainland China will drive positive competition. Internal carbon allowances will be settled uniformly at year-end, with results included in year-end performance evaluations.

Mean Salary and Median Salary of Full-Time, Non-Managerial Employees and Their Historical Differences

Item	2022	2023	Difference
Total Salary of Full-Time, Non-Managerial Employees (NT$1,000)	1,174	1,163	-11
"Mean Salary" of Full-Time, Non-Managerial Employees (NT$1,000)	1,030	992	-38
"Median Salary" of Full-Time, Non-Managerial Employees (NT$1,000)	922	870	-52

Note 3 This table discloses salary information for Taiwan based on the "Instructions for Reporting Salary Information of Full-Time Employees Not Holding Supervisory Positions" issued by the Taiwan Stock Exchange.

→ Retirement Benefits

TCC's retired members enjoy ongoing benefits, including annual banquets and tours. They also have access to a unique retirement insurance plan that automatically renews, covering life and accident insurance, with only medical insurance costs for the retirees. Regular health checkups are provided in Taipei, Taichung, and other locations.

TCC KEY FACT

As of the end of 2023 **TCC 3 insurance schemes participation rate:**

32% with the total insured amount of NT$ 4 million

72 participants for retiree health checkups

Paid Volunteer Time Off

In September 2018, TCC implemented "Paid Volunteer Time Off (VTO)" to encourage community service. Employees receive half a day off for three hours of service and a full day for six hours or more, up to two days per year. By 2023, 113 employees contributed 592 service hours. TCC collaborates with charitable organizations to organize volunteer activities in its operating areas and offers basic training per MOHW guidelines. Activities include caring for the elderly, making Lunar New Year Gift Boxes, and assisting with home repairs, fostering broader social engagement.

For details of VTO, check out
TCC e-Newsletter : My Second Uniform— Life as a Volunteer for The Ocean Conservation Administration and Ocean Affairs Council After Work

→ Creating A Vibrant Workplace

TCC participates in three major annual sports events: "Dragon Boat Race," "Taroko Gorge Marathon," and "Sun Moon Lake Swimming Carnival." To encourage exercise, TCC reserves registration slots and offers free F&B and 5-star hotel accommodations. In 2023, 310 employees participated.

2023 First TCC Dragon Boat Race

Sustainable Fitness Challenge

The "Sustainable Fitness Challenge" began in May 2023 to promote personal health. Goals included running 50 kilometers, cycling 90 kilometers, or completing 3,000 fitness exercises.

- 687 employees participated, valuing healthy lifestyles.
- 92.7% achieved their goals, showing peer encouragement's effect.
- Employees ran 39,030 km, cycled 60,573 km, and completed 199,984 exercises, driving healthy living at TCC.

Round-the-island Cycling Challenge

In November 2023, TCC launched its first nine-day, eight-night cycling tour around Taiwan. 90 employees took turns to complete the 950-kilometer journey, starting from Operations Headquarters and passing through the Hsinchu RMC Plant, Taichung RMC Plant, Chiayi RMC Plant, Siaogang Plant of MOLICEL, Vakangan Green Energy Hot Spring Park in Taitung, Hoping Plant in Hualien, and Suao Plant in Yilan. Averaging over 100 kilometers daily, participants pushed their physical limits, fostering teamwork and willpower.

→ Employee Cafeteria at TCC Building

In 2023, the TCC Employee Cafeteria reopened with a focus on low-carbon operations. It ceased providing disposable utensils for dine-in and mandated self-provided containers for take-out. The adoption of online pre-ordering and electronic payments cut down paper use, while meal portions are managed to reduce waste.

Annually, catering suppliers are vetted through taste tests and employee votes. The cafeteria serves diverse dishes, complies with ISO 14001 EHS standards, and undergoes regular food safety checks. Emphasis is placed on local and seasonal produce to lower carbon emissions, supporting TCC's carbon reduction goals, promoting sustainable lifestyles.

Employee Support Programs

Easy at Work

Flexible Working Hours & Agile Working

[Hybrid Agility to Work] Cross-time-zone Shift | Employees working across time zones can take the following morning compensatory leave

Flexible Working Hours | For employees to adjust work hours catering to their needs, with flex schedule available; 434 applicants in 2023

Subsidies for External & English Studies | External and English studies for employees promoted; 784 applicants with a total of NT$2,887,600 subsidized in 2023

Positive & Stress-relieving Work Environment

On-site Services | A free 20-minute consultation with doctor or nurse available per month to discuss mental stress or disease prevention

Relaxation Spaces | Total Care Commitment Center at Operation Headquarters with open-plan offices, a small library, and a gaming lounge

Travel Subsidy | An annual travel subsidy of up to NT$15,000 to encourage employees to travel and unwind; 2,617 applicants with a total of NT$20,980,254 subsidized in 2023

Club Subsidy | TCC encourages employees to join club activities with professional coach instructions, and annually subsides up to NT$80,000 per club; 258 employees benefited in 2023

Diverse Leaves Available

Paid Personal/Sick Leave | 3 days of paid leave available to employees in case of unforeseen circumstances

Healthy in Living

Employee Assistance Programs

Overtime Home Late Plan | Free late-night company taxi for urgent projects or ad-hoc tasks; NT$121,968 subsidized in 2023

Green Transport Subsidies | An one-time NT$15,000 electric motorcycle subsidy and NT$200 yearly for shared motorcycles; 199 applied, totaling NT$2,870,000 in 2023

Medical subsidies | Outpatient, dental, and checkup subsidies up to NT$40,000, including dependents; 1,369 applied, with a total of NT$22,897,052 subsidized in 2023

Smart Vending Machines | Discounted healthy beverages and convenience store available at TCC HQ vending machines for employees

Workplace Health Promotion

Employee Cafeteria | Employee cafeterias with meal allowance to cover certain percentage of meal cost for employees to enjoy nutritious meals at prices far below market prices

Workplace Stress Management | Periodic stress management and health promotion lectures by physical therapists/counselors; 6 held with 5,679 attendees in 2023

Gymnasium | The TCC headquarters has a 24/7 gym with an aerobics room, pool table, free basketball machine, and premium massage chairs

Employee Health Promotion Activities

Free influenza vaccination at all operation sites each year

Health checkup costs are covered by medical subsidies, with confidential advice for those at mid-to-high health risk

Special checkups for noise, dust, and ionizing radiation exposures are also covered, with on-site health tracking and job adjustments based on health

Employee Support Programs

Happy with Family

Parent-Child Bonding

Family Da | Annual event for employees and families, with 1,700 participants in 2023.

Family Volunteer | Employees and their children volunteer at a 3-day SDGs Sustainable Innovation Camp with provided meals, accommodation, and travel allowance.

Family Care Support

Maternity & Childbirth Bonus | NT$10,000 for the first child, NT$20,000 for the second, and NT$50,000 for the third. In 2023, 118 employees received NT$1,123,000 in bonuses.
From 2017 to 2023, 425 TCC Babies were born in Taiwan.

Paid Maternity Leave | Female employees get 8 weeks of paid maternity leave and 6 months of childcare leave at 80% of the insured salary.

Paid Paternity Leave | Spouses receive 7 days of paid paternity leave and 6 months of childcare leave at 80% of the insured salary.

[Hybrid Agility to Work] Paid Family Care Leave | 3 days of paid family care leave, exceeding the statutory requirement; 364 applicants in 2023 totaled 5,016 hours.

[Hybrid Agility to Work] Work from Home (WFH) | 3 days WFH per month for employees with children aged 12 or below; 31 applicants in 2023.

Contracted Nurseries | Free school supplies upon enrollment and tuition discounts for families with multiple children enrolled in certain kindergartens.

Emergency Loan | Interest-free loan up to NT$300,000 for employees facing short-term financial difficulties or educational interruptions for their children.

All-round Care | Includes gift vouchers for holidays, birthdays, marriage gifts, scholarships for employees' children, funeral condolence money, and extended group insurance for dependents (covering life and accident insurance).

Maternity Protection Friendly

Nurse Care Services: One face-to-face consultation during pregnancy and postpartum, plus occasional health counseling via phone.

Breast-feeding Facility: Available at all operation sites for use during milk expression periods, considered as normal working hours.

5.4_

Occupational Health & Safety

"Whether it's our employees or outsourced contractors, we have the responsibility, and should make every effort, to prevent workplace accidents from happening as long as they enter our company's premises for work. The year 2024 will be the Year of Occupational Health and Safety Enhancement. Let's work together to create a safe and sustainable TCC."

~ Chairman Nelson Chang

Occupational Safety and Health Policy Statement

TCC KEY FACT

No Work-related Ill Health

Contractors 100% have Signed Safety and Health Responsibility Commitment

→ Occupational Health and Safety Management

TCC is committed to providing a top-tier health and quality workplace. The "Internal Control Policies for Occupational Safety and Health Management" has been formulated, 100% applied to all TCC employees, on-site outsourced workers, and contractors. All cement and RMC plants in Taiwan, Mainland China, and the Operation Headquarters are 100% certified to ISO 45001 certification.

TCC's safety management includes "Occupational Safety and Health Management Regulations," "Occupational Safety and Health Management Plan," and "Occupational Safety and Health Code of Practice." TCC, part of the Taiwan Cement Manufacturers' Association, crafted the "Formulating Safety Partnership Implementation Plan" with the OSHA, Ministry of Labor. This plan focuses on "enhancement of the autonomous management effectiveness of the cement industry," "promotion of OHS education and training," and "compilation of the safety guidelines and manuals for high-risk operations," aiming to boost the industry's self-management.

→ Occupational Safety and Health Committee to Enhance Management System

TCC emphasizes a safe work environment, targeting "zero work-related injuries." A safety management system is established, with the Labor Safety and Health Office (LSH Office) at each location handling safety matters. This office organizes quarterly labor safety and health committee meetings, tracks project progression, assesses improvements, and reports tp the Operation Headquarters.

Composition of Occupational Safety and Health Working Committee (Taiwan-based Operations)

	Operation Headquarters	Cement Plants	RMC Plants
Chairperson	1	2	3
Number of Supervisors and Professionals	5	21	28
Number of Labor Representatives	3	15	17
Percentage of Labor Representatives	33%	39%	35%

To enhance management efficiency, TCC implemented the "Occupational Safety Monthly Report" in 2022. This report covers four key areas: work-related injury statistics, non-conformity issues and resolutions from safety inspections, contractor violations with subsequent actions and outcomes, and details of health and safety training.

→ Hazard Identification & Risk Assessment

TCC conducts hazard identification and risk assessment for routine and non-routine operations, including hazardous workplaces. TCC evaluates health and safety risks across processes and activities. Risk indicators are determined by severity and frequency, leading to measures aligned with legal standards and current controls.

STEP-1	Identify all hazardous sources
STEP-2	Identify hazards and consequences
STEP-3	Confirm existing protective measures
STEP-4	Access hazard risks and conduct risk classification and management
STEP-5	Implement control measures to reduce risks
STEP-6	Confirm the remaining risk after applying control measures

→ AI-Powered Digital Monitoring & 5G Smart Mines to Improve Operational Safety

TCC ensures worker safety with automated systems like Guangdong Yingde Plant's automatic bagging system, reducing exposure to dust. Compliant with Article 18 of the Occupational Safety and Health Act, workers can halt work and evacuate if they detect immediate danger. TCC also utilizes 5G and AI to enhance safety management and reduce risks.

Autonomous Mining Equipment

The Jurong Plant (Jiangsu) replaced fuel trucks with 14 autonomous electric ones. Employing "centrally-controlled route planning," "remote smart dispatching," "automatic parking and unloading," and "artificially-simulated driving," it significantly cut operational risks. TCC considers more expansion. The Yingde Plant (Guangdong) and Chongqing Plant finished digital mine's first phase, while Hoping Plant (Hualien), begins equipment evaluation, amid talks with local authorities.

AI System | The Yingde Plant (Guangdong) equipped mining vehicles with AI cameras. These cameras monitor drivers for signs of distraction or inattention such as eye-closure, phone use, or hands off the wheel. If an issue arises, the AI alerts the central control room, prompting immediate action to prevent accidents. The Suao Plant (Yilan) and Taipei RMC Plant plan to install AI systems in 2024.

Real-time | The Guangan Plant's (Sichuan) "grid safety management system" assigns risk levels and safety duties by staff position. The plant introduced a "safe production management tool app" and a "WeChat safety management group." Employees can now conduct inspections, declare safety, report incidents, and undergo safety training on their phones, enhancing the efficiency and ease of risk reporting.

↑ AI Image Recognition
Detected personnel not wearing a safety helmet and reflective vest, immediately issued a warning.

Incident Investigation and Improvement Process

STEP 1 Incident Occurrence → **STEP 2 Incident Cause Investigation** → **STEP 3 Incident Review and Improvement**

After a significant occupational accident, a report is submitted immediately to the LSH Office and superiors. Contractors must phone the supervising unit within 30 minutes and alert firefighting and medical services if needed. The local labor inspection must be notified within 8 hours.

Following a major accident, the LSH Office assists each unit in forming an "Occupational Disaster Investigation and Handling Taskforce." This team, together with labor representatives and department supervisors, performs on-site inspections and audits. They submit the "Incident Prevention Report" to the President and convene a review meeting within one week to assess the incident and its resolution.

All TCC units must monitor progress until the completion of corrections based on the Taskforce recommendations. A comprehensive review is conducted, and photos along with investigation reports of major accident scenes are submitted to the LSH Office for educational and training materials to prevent similar incidents.

In 2023, TCC reported 13 minor work-related injuries in Taiwan and Mainland China. Investigations led to enhanced inspections at high-risk sites, more frequent plant inspections, and additional education and training to prevent future incidents and aim for "zero work-related injuries."

→ Health and Safety Education and Trainings to Elevate Occupational Safety Awareness

TCC is committed to enhancing health and safety awareness among employees. It holds annual training on labor safety and accident prevention, emphasizes proper management of workspaces, equipment, and hazardous materials, and carries out fire safety drills. TCC ensures ongoing training for first aid, hypoxia, and safety equipment handling. Staff engage in government-organized safety seminars and certification programs.

→ Safety Management of Contractors

"Anyone entering a TCC plant is like a family member." To meet safety goals, TCC implements "Contractor OSH and Environmental Management Rules," mandating compliance with safety standards. Contractors are required to sign an HSE Letter of Undertaking, undergo OHS training prior to plant entry, and complete the Workplace Environmental Hazards Notice for full adherence.

5.5_

Human Rights Protection

TCC is committed to a work environment that promotes employee development, unity, and collective success for company, employees, and society.

Human Rights Policy

TCC KEY FACT

Human rights education training hours totaled 1,886.5 hours. Average engagement score was 4.648 out of 5.

→ Human Right Due Diligence

To uphold human rights, TCC establishes a triennial due diligence process to assess risks, expanding to include suppliers and contractors in 2024 with appropriate evaluations. This encompasses all operational sites (including Mainland China, subsidiaries, affiliated enterprises) and joint ventures. The risk idenfied are enhanced for employee rights, with solutions for high-risk issues monitored and optimized.

Human Rights Due Diligence Process

STEP 1

Care for and identify human rights issues

Referencing international human rights conventions, TCC monitors trends, analyzes issues of concern, and develops annual questionnaires for different survey targets to design.

STEP 2

Assess human rights risks

Triennially, TCC assesses operations, value chain, and new business relationships (e.g., mergers and acquisitions, joint ventures, etc.) to identify human rights risks.

STEP 3

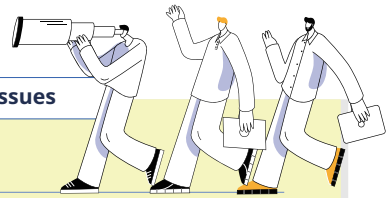
Determine human rights risks

TCC reviews high-risk human rights issues in TCC operations, and evaluates supplier self-assessment results, and reports findings to the Corporate Sustainable Development Committee.

STEP 4

Formulate and track risk management measures

TCC set improvement goals to address high-risk human rights issues, implement mitigation and remedial measures, and regularly track results to uphold human rights.



Care for and Identify Human Rights Issues

Target	Employees of TCC
Guiding Policies	TCC Human Rights Policy TCC Anti-Discrimination and Anti-Harassment Policy
PotentiaHuman Rights Issues	Diversity, inclusion, and equaemployment opportunities (including equal remuneration) Maintenance of the health, well-being, and work-life balance of employees Respect for the freedom of assembly and of association of employees Provision of a safe and healthy work environment
Groups Exposed to Human Rights Risks	Employees | Women | Indigenous people
Investigation Method	Human rights due diligence for employees

Target	Significant Tier-1 Suppliers
Guiding Policies	TCC Human Rights Policy TCC Supplier Management Policy TCC Supplier Code of Conduct TCC Letter of Undertaking for Health, Safety, and Environment
PotentiaHuman Rights Issues	Forced labor | Human trafficking | Child labor Freedom of association | Right to collective bargaining | Wages and benefits | Discrimination
Groups Exposed to Human Rights Risks	Third-party contract workers
Investigation Method	Supplier Sustainability Questionnaire Supplier human rights due diligence (projected to commence in 2024)

→ Assess and Determine Human Rights Risks

TCC conducted human rights due diligence for all employees, analyzing "frequency of human rights risks" and "level of impact to the company and employees." This identified key human rights risk issues. The survey covered 39 sites, including subsidiaries and joint ventures, with a 98.14% response rate, revealing no significant human rights risks. In addition, in 2023, TCC expanded the survey to include suppliers, initially inquiring about human rights issues through a questionnaire. In 2024, TCC will launch supplier human rights due diligence based on the UN Guiding Principles on Business and Human Rights (UNGPs) in Taiwan, extending to Mainland China in 2025.

The supplier human rights due diligence process identifies risks in Critical Tier-1 Suppliers through questionnaire survey with TCC employees and supplier employees in office and plant operations. The scope of issues includes, but is not limited to, forced labor, human trafficking, child labor, freedom of association, collective bargaining, wages and benefits, and discrimination.

TCC KEY FACT

Human rights due diligence response rate was 98.14%

No significant human rights risks found as the result for TCC.

→ Formulate and Track Risk Management Measures

Although survey results from TCC's operations showed no major human rights risks, yet TCC has proactively developed and 100% implemented mitigation and remedial measures to prevent potential risks and address any violations in the workplace.

Remedial Measure

Enforce welfare policies

Mitigation Measures in Force

- Regular free health checkups and health management lectures
- Annual influenza vaccinations
- 3 days of paid leave and 3 days of paid family care leave
- Remote work and flexible hours
- Annual employee gatherings: Christmas party, year-end party, Family Day, and promotion dinner
- Employee Stock Option Program
- Regular Employee Welfare Committee meetings to review policies

Future Improvements

- Administer annual health and stress questionnaires; arrange counselors as needed
- Regularly organize sports competitions for healthy benefits
- Provide stress relief massages by visually impaired masseurs

Remedial Measure

Optimize Relaxation Spaces

Mitigation Measures in Force

- Set up a gym on B1 and free snack pantries on each floor at HQ
- Convert idle spaces into relaxation and breast-feeding facility with resources
- Improve and design spaces in plants
- Install smart vending machines for snacks and beverages

Future Improvements

- Develop coaching sessions (e.g., weight loss, muscle gain)
- Continuously optimize plant layouts for a multifunctional, healthy environment

Remedial Measure

Workplace Environment Education and Training

Mitigation Measures in Force

- Include sexual harassment prevention in new recruit orientation
- Annual retraining on sexual harassment prevention
- Biannual fire safety and first aid drills at each plant
- Regular annual occupational health and safety training
- Provide training for licensed professional employees
- Require participation in government fire prevention and air pollution control training
- Annual human rights protection training

Future Improvements

- Administer feedback and satisfaction surveys on environmental training
- Provide inquiry platforms for external occupational safety training
- Set minimum annual mandatory hours/-sessions for environmental training

TCC plans to create mitigation and remedial measures for identified human rights risks in 2024 supplier human rights risk assessment. TCC will terminate cooperation with any supplier having high human rights risks. TCC will keep monitoring human rights risks and engage in communication, education, and training with suppliers.

→ Enhanced Human Rights Management

Human Rights Education and Training

Important policies like the "Human Rights Policy," "Statement of Integrity and Ethical Conduct," and "Anti-Discrimination and Anti-Harassment Policy" are included in TCC's annual mandatory training. All employees must read the policy documents and pass the tests. 94.7% online reading rate for employees in 2023, with 1,886.5 total training hours based on 15 minutes per document.

Eliminate Illegal Activities & Create A Healthy, Friendly Workplace

TCC values employee feedback and rights, proactively creating a safe, diverse, and inclusive workplace. TCC has established the "Anti-Discrimination and Anti-Harassment Policy" to ensure employees prevent and respond to workplace violations. An online care platform and employee feedback email allow confidential handling by dedicated personnel. Legal protection measures safeguard whistleblowers' data and privacy, preventing unfair retaliation. Additionally, specific grievance channels for discrimination and harassment prevention ensure employees' well-being and a harmonious work environment.

Penalties arising from violation of the Gender Equality in Employment Act: 0

Grievances related to workplace discrimination and harassment: 0

Freedom of Association and Collective Bargaining

Labor unions have been established at all TCC plants in Taiwan, and collective bargaining agreements were signed, covering 100% of employees. In 2023, 64% of TCC employees joined the union. Those not in the union follow standard work rules.

TCC holds quarterly labor-management meetings with labor representatives and unions to exchange opinions and communicate thoroughly. Additionally, a quarterly Town Hall Meeting features keynote speeches by the Chairman, live Q&A sessions, and anonymous online Q&A channels to address employee needs and suggestions promptly.

Employee Engagement Survey

Employees' dedication and support fulfill TCC's sustainable mission of " In service for life." TCC conducts annual employee engagement surveys to gather opinions on various aspects of the company. TCC analyzes the findings, communicates with managers and employees, and develops improvement and optimization plans. Progress is monitored through regular meetings to review and track the outcomes.

The 2023 engagement survey covered all employees, including those in Mainland China and affiliates, focusing on organization identification, work environment, career development, and team relations. A total of 7,559 employees participated, with an average score of 4.648 out of 5. In Taiwan (including affiliates), the coverage rate was 97%, with an average score of 4.526. In Mainland China, the coverage rate was 94.5%, with an average score of 4.670.

Job Level	Taiwan	Mainland China
General Employees (Direct Labor)	**4.52**	**4.64**
General Employees (Indirect Labor)	**4.44**	**4.72**
Low-level Managers	**4.60**	**4.83**
Mid-to-senior-level Managers	**4.76**	

Engagement Survey Results by Seniority

Seniority	Taiwan	Mainland China
Below 3 years	**4.49**	**4.64**
3-10 years	**4.68**	**4.66**
Over 10 years	**4.61**	**4.70**

Dynamic Analysis via AI Algorithms to Listen to Employees

NHOA, a TCC subsidiary, employs the Beaconforce platform, combining workplace psychology and AI to understand and predict employee sentiments. By daily asking two questions and analyzing responses with algorithms, TCC seeks to foster a more engaging work environment. Employee satisfaction and engagement are displayed in real-time on dashboards, aiding in identifying professional challenges and motivations. This also allows supervisors to monitor team dynamics and prevent burnout, ensuring timely intervention.

5.6_

Social Inclusion

Social Engagement Policy |

Doing Better Together

For TCC, social welfare isn't just financial contributions, but integrating technologies and services with its core businesses for environmental, social, and governance actions.

TCC KEY FACT

As of 2024/04

TCC DAKA:

8.44 million Visits

Contributed amount by Hoping Sustainability Charity Foundation

NT$550,000

→ TCC DAKA Open Eco-Factory

DAKA, which means an observation tower in ethnic Truku language, signals a new beginning for both TCC and the Heping community.

Located in Heping Village, Hualien, TCC DAKA Open Eco-Factory (TCC DAKA) enhances industry-society dialogue. Since its 2020 launch as a non-profit, regular contribution from the month surpluses of 7-ELEVEN Lienhe Store and Starbucks are directed to the Hoping Sustainability Charity Foundation. Additionally, income from DAKA Eco-Tour Itinerary and DAKA Market stall fees finance the Hoping Environmental Education Project.

→ Hoping Sustainability Charity Foundation

Earmarked Fund for Purposes of Tribal Consensus Emergency Relief Fund to Alleviate Financial Burden

By opening the gates, the Hoping Plant in Hualien fosters a closer relationship with the local tribe, aiming to develop Heping Village together with TCC. TCC has observed significant aging in the tribe and identified disparities in income and legal challenges, highlighting the need for medical and elderly care. In response, TCC established the Hoping Sustainability Charity Foundation in October 2022 to offer sustainable support to the tribe. The foundation operates on a tribal consensus model, led by the village leader and three tribal chairs. Additionally, the Hoping Emergency Relief Fund was created to ease financial hardships of the needs.

Hoping Plant's data reveals that Heping Village undertakes 3 to 5 evacuations yearly due to typhoons. Addressing the lack of proper shelters and resident inconveniences, the foundation aims to repurpose old Hoping Mine buildings into an emergency shelter in 2024. This facility will feature bathrooms, kitchens, air conditioning, and be accessible on the first floor, accommodating 120 people at no cost during evacuations.

→ Home Repair Project Team | To Solve Home Repair Difficulties in Rural Areas

Heping Village, a 30-minute drive from Hualien, faced high repair costs and service delays, leaving many issues unresolved for years. In July 2022, TCC DAKA launched the Home Repair Service Center, employing two locals and suppliers' staff as electricians and engineers, with the Hoping Plant supplying basic parts for free. Known for their efficiency and quality, the team was honored at the tribe's New Year's Eve event. In 2023, the initiative extended to the Suao Plant in Yilan, enhancing community relations and goodwill.

TCC KEY FACT

As of the end of 2023

Home Repair Project the Hoping Plant completed 735 cases totaling 2,063.5 hours

The Suao Plant completed 66 cases totaling 136 hours

Hoping Care Bus 1,458 accesses cumulatively

→ Hoping Care Bus Supports the Elderly in the Tribe to Seek Medical Assistance Downtown

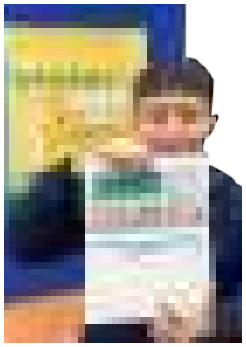
TCC expanded the Heping Community Bus Service. Since 2022, the Hoping Village Care Bus, equipped with an automatic lift, has facilitated access for individuals with disabilities. The bus transports Heping villagers to and from downtown Hualien for business, medical needs, and grocery shopping.

→ Open Eco-Factory, Shaoguan Plant

TCC's first Open Eco-Factory in Mainland China, the Shaoguan Plant and Water Park in Guangdong, was inaugurated on November 18, 2021. This demo factory follows TCC DAKA, promoting industry-society communication. The water park near the Shaoguan Plant spans almost 10,000 m^2, with zones for water fun, family entertainment, relaxation, services, and green leisure. The water is heated by the cement kiln, offering a constant temperature all year and free access to local residents. In 2023, the park hosted events like a Lunar New Year tour, Lantern Festival riddles, cement craft workshops, and a villager homecoming, attracting 4,127 visits.

→ Carbon Reduction Parent-Child Bankbook | Carbon Reduction Practices in Life from School to Family

The strategies for achieving net-zero are transition of industries, energy, society, and lifestyles, with the latter needing public collaboration. In 2023, TCC initiated the "Hoping Carbon Reduction Parent-Child Bankbook" with Heping Elementary School in Heping Village. This initiative provides eco-friendly courses, encourages recycling, and energy saving, rewarding parents and children for adopting green habits. Participants log their activities in a passbook to earn "carbon coins," exchangeable for eco-friendly products at the Hoping Plant. By 2024, the program will extend to Dong Ao Elementary School near the Suao Plant in Yilan.



TCC KEY FACT

Participants:

Heping Elementary School, Hualien
85 students and their 60 parents

Dong Ao Elementary School,Yilan
54 students and their 37 parents

Total carbon reduced **-1,715.98kg CO_2e**

→ Sustainable Talents Developed Locally to Strengthen Social Network and Support System

The Hoping Carbon Reduction Parent-Child Bankbook Program motivates tribal students to minimize food waste by consuming entire school meals and recycling used batteries, cans, and PET bottles at TCC DAKA, and adopt energy-saving, low-carbon habits at home. Throughout the program, TCC observed that staff felt accomplished, and plant employees started teaching carbon reduction to nurture local skills. Feedback from Heping Elementary parents highlighted the importance of parent-child education for sustainable practices at home. TCC plans to extend the program to Dong Ao Elementary near the Suao Plant and involve Hoping Power Plant staff and the Hoping Tribal Mothers' Class to create a supportive network in Heping Village. This network aims to foster sustainable behaviors, offer social support, and encourage collective responsibility.

→ Corporate Resources Leveraged to Construct Innovative Practice Models for Sustainable Education

TCC identified a gap in carbon education among Taiwanese teachers and leveraged the GHG inventory skills of the Hoping Plant and environmental education experts at Hoping EcoPort. By partnering with NGOs such as The Society of Wilderness (SOW) for courses on energy conservation and carbon reduction, TCC broadened its social impact, enhanced ties with schools, communities, businesses, and NGOs, and fostered mutual support.

↑ SOW Yilan Branch teaches "Save Energy, Reduce Carbon, Love the Earth" at Yilan Dong Ao Elementary School.

→ Little Champions for Carbon Reduction

Shou-Wei CHEN won first place in carbon reduction. He discussed with his mother ways to decrease refrigerator door openings and recycling PET bottles at TCC DAKA, saving over 166 kg of carbon in a semester.

An-Zhen LI, the leading energy-saving student from a family of 10, saved 287 kWh of electricity by gathering together for meals and activities, using bedroom air conditioning solely at night.

Class 3A led in carbon reduction, cutting 212 kg in a semester. Teacher Li-Ya LAI observed students now collect street litter and bring recyclables to class.

"The most impressive part is the students' better understanding of carbon reduction," said Principal Shih-Sheng AI about the "Hoping Carbon Reduction Parent-Child Bankbook." The school is now a demonstration place for sustainable education.

"Last year, we collaborated with TCC to promote the program, targeting parents and children to incorporate carbon reduction into daily life. Students apply it at school and home, and parents also began saving energy and reducing emissions. This meaningful cycle connects Heping Village with TCC."

Shih-Sheng Ai, Principal,
Heping Elementary School,
Hualien County, 2024/03/14

→ EARTH HELPER, the Carbon Reduction Sustainability Action

EARTH HELPER
is a basic attitude toward life
for each one of us to share
commonly the Earth Planet

WE — THE EARTH HELER

Since launching EARTH HELPER in 2022, TCC and its partners have promoted green lifestyles, aligning with UN SDG Target 12.8. "ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature" The initiative aims to expand from Taiwan to TCC's global operations.

TCC KEY FACT

2023 Joint Carbon Reduction Target:
585,595 kg CO_2e
Achievements:

2,086,112.05 kWh of charging

1,420,683kg CO_2e

Includes sustainability initiatives

2024 Target
Charging Amount: 739,050.72 kWh
Carbon Reduction: 586 tons CO_2e

Includes sustainability initiatives

→ Earth Helper Sustainability Actions in 2023

Energy Conservation and Carbon Reduction Monopoly

TCC calls for the public to jointly conserve energy daily. The top 20% of participants saving the most electricity will earn bonus.

Participants | 765 people | **Bonus awarded | NT$ 72,000**
- 42,477 kg CO_2e (save energy 85,813 kWh)

Mr. Lai from Chiayi shared that switching to an inverter air conditioner they only turn on when needed, instead of running 24/7, yielded great results.

Mr. Lin from Kaohsiung replaced all his appliances in 2023, switching to an inverter air conditioner and LED bulbs. He enthusiastically noted that setting the water heater to heat an hour before showers saved his family significant electricity.

Earth Day Campaign

TCC partnered with eco-organizations for beach cleanups, green market involvement, and biodiversity learning, stressing its significance with climate change. Doing Better Together!

Participants: 793 people
- 1,912 kg CO_2e

Recycle with Peace (Hoping) Now!

TCC DAKA installed GEMMA smart recycling machines and, in collaboration with the Hualien Environmental Protection Bureau and Formosa Biomedical Technology Corp., set up package-free detergent refill stations. Visitors are encouraged to bring their own containers.

2023 Total Sales |
Top 3rd Refill Station in Taiwan

Package-free laundry detergent: 4,338 L
Package-free dishwashing detergent: 1,321 L
-1,054.93 kg CO_2e

DAKA Sustainable Tours SDG 12, SDG 14, SDG 15

MARINE SUSTAINABILITY TOUR | A recycling studio educates on transforming marine waste into crafts and explores coral recovery and hermit crab habitats at Hoping EcoPort.

CIRCULAR ECONOMY EXPLORATION TOUR Edible Wild Plants Edition | Explore Yayut Agronomy's forging and edible plant experiences, Hoping Mine's circular economy, and Truku culture with attire experience.

DAKA AGRONOMIST MARKET | Enjoying wild vegetables and local produce at TCC DAKA, making eco-friendly choices that honors land sustainability.

Participants | 412 people

5.7_

Environmental Education

Living in harmony with nature requires collective effort. TCC fosters environmental education and urges employees and the public to participate in environmental initiatives for sustainability.

TCC KEY FACT

TCC DAKA Eco-Tour Itinerary 33,706 visits

As of 2024/04

Ecological Tour Satisfaction: 96.2%

Hoping EcoPort Environmental Education Environmental Education Courses: 39 sessions

1,552 Participants

Hanben Ocean Station Beach Cleaning Total Garbage Collected: 318kg

Participants: 307 people

→ TCC DAKA Eco-Tour Itinerary

Itineraries at TCC DAKA allow the public to explore the Hoping Mine and Hoping EcoPort, showcasing TCC's efforts in environmental management, restoration, and its zero-emission, zero-pollution, zero-waste circular economy model.

→ DAKA Tower

The DAKA Tower, opening in 2024, is an exhibition space showcasing TCC's core values. Through text, images, videos, and interactive experiences, it highlights the three pillars of sustainability: "low-carbon construction materials," "resource recycling," and "green energy." The space will host events promoting local collaboration. It aligns with TCC DAKA Renewable Resource Recycling Center's plans and aims to receive environmental education facility certification by 2026.

→ Environmental Education with Hoping EcoPort

Hoping EcoPort, certified as Taiwan's first port-based environmental education facility in 2022, offered "Tenants of Harbor" and "Big Boats Entering the Port" courses in 2023. It initiated its first campus outreach at National Dong Hwa University, discussing coral ecology and conservation. Additionally, the port collaborated with TPCA Environment Foundation to extend environmental education to rural schools via the ECO Expert School Sharing platform.

Hoping EcoPort's environmental education programs are widely recognized. Representing Hualien County in the Private Sector category at the 9th National Environmental Education Awards, it won the Excellence Award among 13 contestants. Hoping EcoPort plans to enrich its education themes and train more personnel to reach more schools and the public.

→ Science Train Program

At the 2023 Science Train Program by National Dong Hwa University, Hoping EcoPort showcased its biodiversity and coral restoration efforts. The event included a game called "Who Is My Relative?" to introduce biodiversity, with over 600 people participated. This annual event at Hoping EcoPort aims to promote marine conservation, ocean education, and encourage more people to join conservation efforts.

→ Environmental Education Extended to the Value Chain

Since establishing an environmental education system, Hoping EcoPort has allocated at least one hour training annually to internalize conservation awareness among employees and contractors. In 2023, 31 individuals received 31 hours of training. In 2024, training will expand to at least 4 hours annually, including coral knowledge and the latest international TNFD framework. Contractors will also join the Water Environment Watch to extend efforts to the value chain.

→ Hanben Ocean Station, Aohua

Hanben Ocean Station in Aohua, Yilan, is a collaboration between TCC's Hoping Power Plant and the Coast Guard Administration. In 2023, it hosted the "Oceanscape" Exhibition and participated in the Science Train Program and NSTC's "Kiss Science," educating the public on marine debris, biodiversity, and OTEC. The Convenient Beach Cleaning initiative provides tools for travelers to clean beaches anytime. Hoping Power Plant plans to expand environmental education spaces and apply for facility certification, with personnel training underway.

→ Ecological & Environmental Education Practice Base in Guigang

Since 2020, the Guigang Plant has led in cement kiln co-processing of solid waste in Mainland China, with the highest single-plant capacity and most waste types handled. Serving also as an educational site, it welcomed over 200 visitors in 2023, including officials, industry colleagues, schools, locals, and clients, educating them on solid waste management and recycling. In 2021, it was designated as "Guigang City Ecological and Environmental Protection Promotion and Education Practice Demonstration Base," and in February 2023, it received the title of "Guangxi Ecological and Environmental Promotion and Education Practice Base" from the Guigang City Bureau of Ecology and Environment.

Wild Vegetables are Well-suited to Their Local Environment and are Weather-Resistant

TCC Hosts a Field Collection Event to Learn about Resilient Food Ingredients

Urbanization threatens native plants crucial for indigenous diets, like chicory and spiny onion, staples in the Hualien Hoping mining area for the Taroko tribe. In August 2023, TCC DAKA hosted a sustainable eco-tourism event on foraging wild vegetables, led by Liu Xi of Wild Rhyme Agriculture. Participants learned to make wild vegetable wraps, connecting with the environment and Taroko culinary traditions. The event showcased the ecological diversity of the mine, discovering over 40 edible wild plants, aligning with the mining team's efforts in native species rehabilitation.

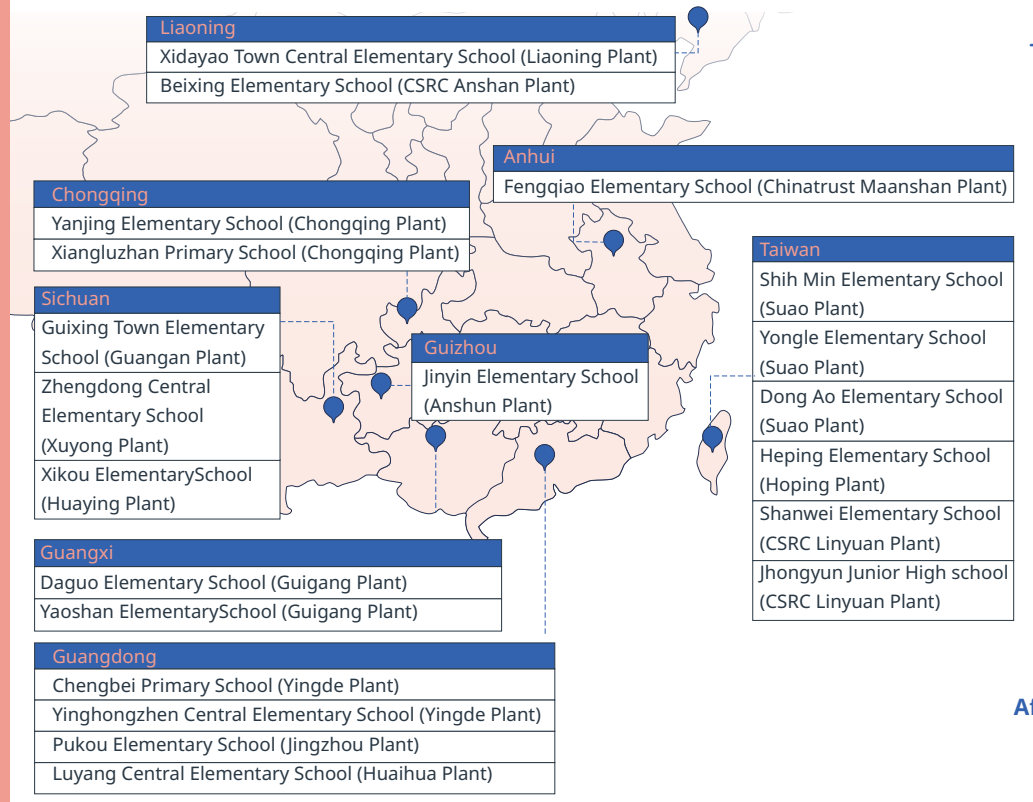
At the Yilan Su'ao plant, wild vegetables are not only food but also a link to cultural heritage. The plant worked with Dongyue tribe elders to share foraging traditions with staff and local youth. This effort educates about the environment and facilitates cultural transmission.

5.8_

Cement Academy

Grassroot Education for Harmonious, Happy, Shrewd and Studious Talents

The Cement Academy was founded by the late TCC Chairman, Mr. KOO Chen-Fu. . The name of the program in Chinese, “Shiming,” comes from the English for “cement”. “Shih” denotes a talented individual and “Ming” indicates a love of learning.
Since its establishment in 2012, TCC's Cement Academy has implemented SDG 4 Quality Education, focusing on "character, education, and quality." It assists underprivileged elementary students near cement plants in Taiwan and Mainland China. In 2023, 21 partner schools benefited 1,293 students.



→ A Day at the Cement Academy

Morning

Donated Stationery and Books | Students start their day for learning.

Children’s Day Activities and Summer Camp | On Children’s Day, TCC managers and staff visit schools for games and contests with students.

Noon

Nutritious Meal | Providing lunchboxes, bread, snacks, and milk to supplement growth needs.

Afternoon

TCC Cement Plant Tour | Leading teachers and students to understand TCC's local operations and community benefits.

After-school Program | Offering English, computer, and talent courses to cultivate diverse interests.

→ Result Presentation of 4 Cement Academies

As Christmas approaches, the annual presentation showcases children's development.

Shih Min Elementary School

The Cement Academy cheerleading team won third place in the senior group at the 2023 National Cheerleading Championships.

Heping Elementary School

The campus featured students’ paintings, and the ukulele and xylophone teams' annual performance made TCC staff say, "It's not Christmas without the show!"

Yongle Elementary School

From skateboarding and hip-hop to singing in Minnan, Indigenous, and English, these kids are truly versatile!

Dong Ao Elementary School

Offering archery, dance, and indigenous drama courses to preserve tribal culture. Supported by Cement Academy, students joined the 2023 Asian Youth Archery Open in Philippines, winning 4 gold, 5 silver, and 4 bronze medals.

5.8_

Cultural Conservation

Culture encompasses the lifestyle, values, and beliefs of an ethnicity and reflects social integration. In 2023, TCC allocated over NT$11 million in domestic cultural development, supporting the C.F. Koo Foundation's preservation of traditional operas and arts, and sponsoring events such as the Yilan International Children's Folklore & Folkgame Festival and the Lanyang Mazu Cultural Festival.

The C.F. Koo Foundation, committed to "cultural conservation," established Taipei Li-yuan Peking Opera Theatre in 1997. Led by veteran LI Baochun and young professionals, the theatre conserves traditional opera, produces "New Old Plays," and performs newly adapted works. It promotes traditional opera, cultivates performers, and builds audiences, ensuring cultural continuity.

The C.F. Koo Foundation

→ Interactive Lecture for Peking Opera Education on Campus

Campus lectures always begin with, "Have you ever seen Peking Opera?" After extensive promotion, the idea that "You just don't know you like Peking Opera" has been validated. Without exposure, preference remains unknown. The C.F. Koo Foundation introduces Peking Opera to schools, allowing students and teachers to explore its aesthetics, enjoy performances, and learn about costumes, props, and stage design, thus revealing the art's diverse beauty.

A total of 15 lectures organized across 12 campuses from elementary schools to universities in 2023

1,100 participants cumulatively

→ New Generation Succession Training Plan

In 2023, Taipei Li-yuan Peking Opera Theatre joined the National Center for Traditional Arts' "Successors of Traditional Arts- Resident Performance and Training Program" for the first time, selecting four trainees. The program focuses on enhancing trainees' abilities in various aspects such as singing, acting, martial arts, and music performance through extensive stage practice and work with a troupe, aiming to nurture the next generation of traditional arts successors.

A total of 1,176 hours of training with professional training program

→ Taiwan's Only Online Theater Channel- Koo Cloud Theater

Online plays provide the convenience, control, and opportunity to closely observe performers' expressions and actions. Besides, an online manager enhances the viewing experience during premieres by facilitating audience interaction. The C.F. Koo Foundation has created guides to assist seniors in accessing online performances, covering various opera genres and puppetry. In 2024, Koo Cloud Theater will offer 6 live shows and 43 highlight replays from Taipei Li-yuan Peking Opera Theatre. In 2023, the platform saw 997,615 views, marking a 23% growth from 2022..

Creative Fusion: When Peking Opera Singing Meets Western Vocal Music

In 2023, the newly adapted Peking Opera plays *On Stage*, *Off Stage and Granny Liu & Wang Xi-Feng* incorporated Western theatrical technology. The former is set in early Republican China, while the latter is inspired by the classic novel *Dream of the Red Chamber*. Both plays used high-tech imagery, stage design, and Hollywood movie soundtracks, blending traditional Chinese and Western bands to create multi-layered music. A musical soprano was also invited, introducing a vocal performance distinct from Peking Opera, providing an exceptional audio-visual experience for new audiences.

CHAPTER 6

ESG KEY INDICATORS

6.1 / ESG Data Sheet

→ TCC Key Indicators | Environmental

GHG Emissions in 4 Years | Unit: tCO_2e

Item		2020	2021	2022	2023
Cement Plants					
Scope 1	Taiwan	4,411,086	4,797,296	4,312,390	3,457,601
	Mainland China	31,255,633	25,867,678	20,715,305	17,405,089
	Subtotal	35,666,719	30,664,974	25,027,695	20,862,690
Scope 2	Taiwan	202,312	212,407	210,273	186,576
	Mainland China	1,257,882	1,094,397	846,574	642,045
	Subtotal	1,460,194	1,306,804	1,056,847	828,621
Scope 1+2 Total	Taiwan	4,613,398	5,009,703	4,522,663	3,644,176
	Mainland China	32,513,515	26,962,075	21,561,879	18,047,134
	Subtotal	37,126,913	31,971,778	26,084,542	21,691,311
Scope 3	Taiwan	22,427	28,761	16,709	511,001
	Mainland China	-	-	-	1,104,573
	Subtotal	22,427	28,761	16,709	1,655,574
RMC Plants					
Scope 1	Taiwan	2,059	1,517	1,776	1,893
Scope 2		7,101	6,866	6,571	5,905
Scope 1+2 Total		9,160	8,383	8,347	7,798
Scope 3		-	-	181,053	267,430
Distribution Stations[4]					
Scope 1	Tawan & Mainland China	-	-	-	4
Scope 2		-	-	-	1,451
Scope 1+2 Total		-	-	-	1,455

Item		2020	2021	2022	2023
Operations Offices					
Scope 1	Taiwan	140	132	146	137
	Mainland China	-	-	-	19
	Subtotal	140	132	146	156
Scope 2	Taiwan	1,199	1,119	1,636	1,544
	Mainland China	-	-	-	110
	Subtotal	1,199	1,119	1,636	1,654
Scope 1+2 Total	Taiwan	1,339	1,251	1,782	1,681
	Mainland China	-	-	-	129
	Subtotal	1,339	1,251	1,782	1,810
Scope 3	Taiwan	-	-	719	5,499,459
Ho Sheng Mining Co., Ltd. (GRI 14)					
Scope 1	Taiwan	-	-	-	3,999
Scope 2		-	-	-	297
Scope 1+2 Total		-	-	-	4,296
Scope 3		-	-	-	297.04

Note 1. The GHG emissions were inventoried in terms of operational control. The formula used is emissions = activity data × emissions factor (EF) × global warming potential (GWP). The EF used for Taiwan is subject to the EPA GHG Emissions Factor Management Table (v. 6.0.4); the GWP for the Cement Plants is derived from the IPCC Fourth Assessment Report (2007); the GWP for RMC Plants and Operation Headquarters is derived from the IPCC Sixth Assessment Report (2021). The EF for Mainland China is subject to the Guidelines for Accounting and Reporting Greenhouse Gas Emissions: China Cement Production Enterprises (Trial), the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, and the 2019 Refinement, and the GWP is derived from the IPCC Sixth Assessment Report (2021).

Note 2. For the data of the Cement Plants in Taiwan in 2022, the Scope 1 draws reference from the EPA GHG Emissions Factor Management Table (v. 6.0.4); the Scope 2 draws reference from the electricity EF of 0.495 kg of CO_2e/kWh from the Energy Administration, MOEA in 2022.

Note 3. Since 2018, the most important activity associated with Scope 3 emissions: Upstream Transportation and Distribution has been inventoried based on the GHG Protocol - Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBCSD), and it is verified by a third-party entity. In 2023, TCC conducted inventory and verification on all categories. Details please refer to ESG Section on TCC Corporate Website.

Note 4. In 2023, due to operational adjustments, the Liaoning and Huaihua Cement Plants, as well as the grinding plants in Mainland China, are excluded from the disclosure scope. New additions include "Distribution Stations" (excluding those under the jurisdiction of RMC Plants) and "Operations Offices in Mainland China." Cement Plants in Mainland China and Operations Offices in Taiwan have added "Scope 3" disclosures.

Note 5. The base year for the GHG inventory of Cement Plants is 2016, with emissions of 4,621,312 tCO_2e for Scope 1 and Scope 2 in Taiwan and 32,523,195 tCO_2e in Mainland China.

Note 6. From 2020 to 2023, TCC did not procure renewable energy or RECs, resulting in market-based Scope 2 emissions being the same as location-based Scope 2 emissions.

Note 7. The 2023 GHG emissions data for Cement Plants, RMC Plants, and Operations Offices have been verified under ISO 14064-1 verification. The data for RMC Plants includes emissions from Distribution Stations under their jurisdiction, as well as the Hualien Plant.

GHG Emissions from Scope 1 in 2023 | Unit: tCO_2e

Item	2023 Taiwan
CO_2	3,451,687.86
CH_4	1,436.22
N_2O	6,086.47
HFCs	406.82
PFCs	0
SF_6	0
NF_3	0

Note 1: The scope encompasses Cement Plants, RMC Plants, the Operation Headquarters, and the Low-carbon R&D Center across Taiwan.

Energy Use in 4 Years

Energy Usage | Raw Consumption		2020	2021	2022	2023
Cement Plants					
Coal	Taiwan	699	757	703	499
(thousand metric ton)	Mainland China	5,424	4,446	3,369	2,822
	Subtotal	6,123	5,203	4,072	3,321
Diesel (KL)	Taiwan	460	981	1,235	1,029
	Mainland China	17,749	16,991	13,239	12,143
	Subtotal	18,209	17,972	14,474	13,172
Gasoline (KL)	Taiwan	-	-	22	21
	Mainland China	271	340	252	254
	Subtotal	271	340	274	275
Purchased	Taiwan	412	439	428	395
Electricity (GWh)	Mainland China	2,584	2,272	1,601	1,361
	Subtotal	2,996	2,711	2,029	1,756
Power Generation by	Taiwan	119	138	108	64
Waste Heat Recovery(GWh)	Mainland China	1,283	1,034	811	738
	Subtotal	1,402	1,172	919	802

Energy Usage | Raw Consumption		2020	2021	2022	2023
Cement Plants					
Alternative Fuels	Taiwan	-	-	668,807	1,322,967
(GJ)	Mainland China	208,779	1,141,467	5,667,469	8,539,446
	Subtotal	208,779	1,141,467	6,336,276	9,862,413
RMC Plants					
Diesel (KL)	Taiwan	634	450	538	441
Gasoline (KL)		180	152	165	165
Purchased Electricity (GWh)		14	14	13	12
Distribution Stations[9]					
Diesel (KL)	Taiwan & Mainland China	-	-	-	1
Gasoline (KL)		-	-	-	0
Purchased Electricity (GWh)		-	-	-	389
Operations Offices					
Diesel (KL)	Taiwan	-	4	3	2
	Mainland China	-	-	-	-
	Subtotal				2
Gasoline (KL)	Taiwan	-	2	8	1
	Mainland China	-	-	-	8
	Subtotal	-	2	8	9
Natural Gas (m^3)	Taiwan	5,150	3,750	1,723	1,742
	Mainland China	-	-	-	-
	Subtotal	5,150	3,750	1,723	1,742
Purchased Electricity	Taiwan	3	3	4	4
(GWh)	Mainland China	-	-	-	0.2
	Subtotal	3	3	4	4.2
Renewable Energy					
Renewable Energy (kWh)	Taiwan	79,358	272,840	307,683	2,803,569
	Mainland China	-	-	889,310	14,029,781
	Subtotal	79,358	272,840	1,196,993	16,833,350

Energy Usage | Raw Consumption		2020	2021	2022	2023
Ho Sheng Mining Co., Ltd. (GRI 14)					
Diesel (KL)	Taiwan	-	-	-	1,449
Gasoline (KL)		-	-	-	13
Purchased Electricity (GWh)		-	-	-	0.6

Energy Use | In terms of Gigajoule (GJ)		2020	2021	2022	2023
Cement Plants					
Coal	Taiwan	16,300,593	17,632,953	16,355,419	11,577,410
	Mainland China	124,879,180	102,356,312	77,566,859	64,978,651
	Subtotal	141,179,773	119,989,265	93,922,278	76,556,061
Diesel	Taiwan	16,168	34,505	43,426	36,179
	Mainland China	624,110	597,427	465,515	426,968
	Subtotal	640,278	631,932	508,941	463,147
Gasoline	Taiwan	-	-	718	678
	Mainland China	8,857	11,115	8,228	8,308
	Subtotal	8,857	11,115	8,946	8,986
Purchased Electricity	Taiwan	1,481,726	1,580,660	1,540,800	1,423,590
	Mainland China	9,303,773	8,179,002	5,763,600	4,898,715
	Subtotal	10,785,499	9,759,662	7,304,400	6,322,305
Power Generation by Waste Heat Recovery	Taiwan	428,486	497,725	388,800	228,780
	Mainland China	4,620,139	3,723,552	2,919,600	2,565,800
	Subtotal	5,048,625	4,221,277	3,308,400	2,794,580
Alternative Fuels	Taiwan	-	-	668,807	1,322,967
	Mainland China	208,779	1,141,467	5,667,469	8,539,446
	Subtotal	208,779	1,141,467	6,336,276	9,862,413
Total	Taiwan	18,226,973	**19,745,843**	**18,997,970**	**14,589,604**
	Mainland China	139,644,838	**116,008,875**	**92,391,271**	**81,417,888**
	Subtotal	**157,871,811**	**135,754,718**	**111,389,241**	**96,007,492**

Energy Use | In terms of Gigajoule (GJ)		2020	2021	2022	2023
RMC Plants					
Diesel	Taiwan	22,293	15,823	18,917	15,493
Gasoline		5,877	4,963	5,387	5,408
Purchased Electricity		50,219	48,636	46,800	43,852
Total		**78,389**	**69,422**	**71,104**	**64,753**
Distribution Stations[9]					
Diesel	Taiwan & Mainland China	-	-	-	28
Gasoline		-	-	-	2
Purchased Electricity		-	-	-	9,642
Total					**9,672**
Operations Offices					
Diesel	Taiwan	-	161	108	53
	Mainland China	-	-	-	-
	Subtotal	-	161	108	53
Gasoline	Taiwan	-	134	261	40
	Mainland China	-	-	-	267
	Subtotal		134	261	307
Natural Gas	Taiwan	251	139	58	58
	Mainland China	-	-	-	-
	Subtotal	251	139	58	58
Purchased Electricity	Taiwan	12,420	11,700	14,400	13,524
	Mainland China	-	-	-	697
	Subtotal	12,420	11,700	14,400	14,221
Total	Taiwan	**12,671**	**12,134**	**14,827**	**13,675**
	Mainland China	**-**	**-**	**-**	**964**
	Subtotal	**12,671**	**12,134**	**14,827**	**14,639**

Energy Use | In terms of Gigajoule (GJ)		2020	2021	2022	2023
Renewable Energy					
Renewable Energy	Taiwan	286	982	1,108	10,093
	Mainland China	-	-	3,202	50,507
	Subtotal	286	982	4,310	60,600

Energy Use | In terms of Gigajoule (GJ)	2020	2021	2022	2023
Ho Sheng Mining Co., Ltd. (GRI 14)				
Diesel	-	-	-	50,953
Gasoline	-	-	-	409
Purchased Electricity	-	-	-	2,164
Total				**53,526**

Note 1. The heating values of coal for the Cement Plants in Taiwan are converted per the respective settings of the plants. The converted heating value of coal for the Suao Plant: 5,532.69 kcal/kg; the converted heating value of coal for the Hoping Plant: 5,570.14 kcal/kg; the converted heating value of coal for other plants: 5,500 kcal/kg. The values for other items are converted based on the heating values in the Emissions Factor Management Table (v. 6.0.4) released on the Energy Administration's website. The values are 5,500 kcal/kg for coal, 8,400 kcal/l for diesel, 7,800 kcal/l for gasoline, 3,600 GJ/GWh for electricity, and 8,000 (kcal/m^3) for natural gas. The scope 2 draws reference from the electricity EF of 0.495 kg of CO_2e/kWh from the Energy Administration, MOEA in 2022.

Note 2. The data of energy use is subject to the reported data to the Energy Administration.

Note 3. The Cement Plants in Taiwan started collecting data on gasoline use in 2022, which were used all by corporate cars.

Note 4. Based on the 2023 cementitious materials yield of 4,736,970 metric tons in Taiwan, the energy consumption is 2.8007 GJ/metric ton of cementitious materials. In Mainland China, based on the 2023 cementitious materials yield of 26,811,285 tons, the energy consumption is 2.7182 GJ/metric ton of cementitious materials.

Note 5. In Taiwan, based on a 2023 clinker production of 4,399,442 tons, the electricity consumption for cement plants was 104.33 kWh/metric ton of clinker. In Mainland China, based on a 2023 clinker production of 21,652,988 tons, the electricity consumption for cement plants was 96.94 kWh/metric ton of clinker.

Note 6. Based on the 2023 concrete yield of 4,923,159.50 m^3 in Taiwan, the energy consumption in concrete production is 0.01315 GJ/m^3 of concrete.

Note 7. The purchased electricity includes the electricity consumed by the mining system; nevertheless, since the mining system is owned by the subsidiary, Ho Sheng Mining Co., Ltd., it is not included in the ISO 14064-1 GHG inventory data.

Note 8. In 2023, due to operational adjustments, the Liaoning and Huaihua Cement Plants, as well as the grinding plants in Mainland China, are excluded from the disclosure scope. New additions include "Distribution Stations" (excluding those under the jurisdiction of RMC Plants) and "Operations Offices in Mainland China."

Note 9. The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.

Note 10. In 2023, the total internal energy consumption of Taiwan sites was 14,678,126 GJ. Of this, non-renewable energy consumption was 13,651,712 GJ, and renewable energy consumption was 1,026,414 GJ. The categories of non-renewable energy included coal, diesel, gasoline, natural gas, purchased electricity, power Generation by waste Heat recovery, and non-renewable alternative fuels, with non-renewable alternative fuels totaling 306,646 GJ. The categories of renewable energy included renewable biomass fuels and self-generated solar power. Renewable biomass fuels, converted at 4.186 kJ per kcal, amounted to approximately 1,016,321 GJ. Self-generated solar power, converted at 3.6 GJ/kWh, amounted to approximately 10,093 GJ.

Air Pollution Emissions on Cement Plants in 4 Years | Unit: metric ton

Item	2020	2021	2022	2023
Taiwan				
NOx	6,164	6,473	5,427	4,923
SOx	106	113	65	97
VOCs	0.00457	0.00422	0.00428	0.00424
Particulate Matters	249	214	158	168
Total	**6,519**	**6,800**	**5,650**	**5,188**
Mercury Emissions	0.27546	0.27876	0.22635	0.16686
Mainland China				
NOx	12,089	9,908	8,207	5,053
SOx	1,293	997	1,096	962
Paticulate Matters	827	569	317	402
Total	14,209	**11,474**	**9,620**	**6,417**
Mercury Emissions	-	-	-	0.024156
Mercury Emissions (Unit: mg/m^3)	<0.0001	0.005	0.005	0.013

Note 1. The calculation method is direct measurement of emissions or calculation based on specific site data; coefficient source: Appendix 1 (Emission Coefficient of Particulate Pollutants in Industry Processes) and Appendix 3 (Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium In Industry Processes, Dioxin Emission Coefficient) of Emissions of Particulate Pollutants, Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium, and Dioxin Reported for Air Pollution Control Fees from Fixed Pollution Sources in Public and Private Places Coefficient, Control Efficiency and Other Measurement Requirements and Declaration of Fixed Pollution Sources in Public and Private Places Industry Process Emission Coefficients, Operating Unit (Including Equipment Components) Emission Coefficients, Control Efficiency and Other Measurement Requirements for Volatile Organic Compounds in Air Pollution Control Fees.

Note 2. Starting from the Q3 of 2018, heavy metal monitoring data was added at the request of the Ministry of Environment. The heavy metals (lead, cadmium, mercury, arsenic, and hexavalent chromium) emitted in 2023 was 0.752 metric ton.

Note 3. Starting from the Q4 of 2018, the cement plants in Taiwan reported mercury emissions in accordance with legal requirements. No mercury was emitted by RMC plants. In 2023, additional disclosures include the co-processing cement plants in Mainland China.

Note 4. The Hualien Plant did not operate in 2023 and had no air pollutant emissions.

Note 5. The 2023 dioxin emissions from the cement plants in Taiwan were 0.0299 g I-TEQ.

Note 6. The business of RMC plants was cement product ingredients mixing and transportation, thus had no air pollutant emissions.

Note 7. Shaoguan Cement Plant in Mainland China completed construction in November 2021, thus the data of air emissions from it was included starting from 2022. Due to operational adjustments in 2023, the Liaoning and Huaihua Plants are excluded from the disclosure scope.

Water Resources Use in 4 Years | Unit: million liters

Item		2020	2021	2022	2023
Cement Plants					
Municipal Water[1]	Taiwan	0	0	0	9.31
	Mainland China	438.19	405.19	372.90	504.65
	Subtotal	438.19	405.19	372.90	513.96
Groundwater	Taiwan	1,014.34	822.52	829.44	723.95
	Mainland China	33.60	520.47	350.27	0
	Subtotal	1,047.94	1,342.99	1,179.71	723.95
Industrial Water	Taiwan	1,051.01	1,039.03	819.37	721.85
	Mainland China	634.30	516.49	455.50	782.08
	Subtotal	1,685.31	1,555.52	1,274.87	1,503.93
Rainwater/	Taiwan	-	-	-	693.64
Spring Water	Mainland China	0.16	0.11	6.00	447.89
	Subtotal	0.16	0.11	6.00	1,141.53
Surface Water (rivers)	Mainland China	16,184.48	12,318.97	8,324.62	8,176.99
Lake/Reservoir		816.29	348.21	135.32	99.42
Mining Water		-	-	-	32.78
Discharged Reclaimed Water[2]	Taiwan	93.48	102.43	112.81	73.07
Total	Taiwan	**2,158.83**	**1,963.98**	**1,761.62**	**2,221.82**
	Mainland China	**18,107.02**	**14,109.44**	**9,644.61**	**10,043.81**
	Subtotal	**20,265.85**	**16,073.42**	**11,406.23**	**12,265.63**
Process Recycled Water	Taiwan	94,049.42	90,787.46	87,945.39	62,047.29
	Mainland China	15,510.87	11,773.31	9,609.60	9,779.46
	Total	109,560.29	102,560.77	97,554.99	71,826.75
Other Recycled Water	Taiwan	-	-	-	54.49

Item		2020	2021	2022	2023
RMC Plants					
Municipal Water	Taiwan	368.32	309.77	295.15	264.10
Groundwater		212.58	279.79	343.19	398.73
Total		**580.90**	**589.56**	**638.34**	**662.83**
Reclaimed Process Water		307.39	430.20	448.61	438.00
Distribution Stations[8]					
Municipal Water	Taiwan & Mainland China	-	-	-	17.38
Operations Offices					
Municipal Water	Taiwan	14.96	12.69	13.60	14.23
	Mainland China	-	-	-	2.04
Total		**14.96**	**12.69**	**13.60**	**16.27**

Water Withdrawal from Water-stress Regions in 2 Years

Item	2022	2023
Municipal Water	170.94	214.18
Industrial Water	455.50	782.08
Surface Water (rivers)	838.08	826.94
Mining Water	6.00	32.78
Rainwater Harvesting	-	76.44
Total water withdrawal from Water-stressed Regions	1,470.53	1,932.42

Note 1. The water use data on cement plants is the sum of the reported data. The municipal water use on RMC plants is the sum of water used on the water bills, and the groundwater data is the sum of the reported data, as the water use data is subject to the actual months of water use. The municipal water use data on the Operation Headquarters is the sum of water used on the water bills.

Note 2. The scope of disclosure for RMC plants is the water for which TCC holds water rights. Disclosure of groundwater began in 2019. The water use data for the water for which TCC holds no water rights in 2020 is estimated on the basis of sales.

Note 3. All the sources of water are freshwater.

Note 4. TCC employed WRI's Aqueduct Water Risk Atlas to assess the future water supply. The result revealed that only the Guangan Plant (including Guangan Jiuyuan Environmental Protection) and the Huaying Plant in Sichuan as well as the Anshun Plant in Guizhou are located in the regions of high-water stress, while all other operation sites in Taiwan and Mainland China are not located in water stress areas.

Note 5. In 2023, due to operational adjustments, the Liaoning and Huaihua Cement Plants, as well as the grinding plants in Mainland China, are excluded from the disclosure scope. New additions include "Distribution Stations" (excluding those under the jurisdiction of RMC Plants) and "Operations Offices in Mainland China"; The disclosure items for the cement plant have been updated to include "Rainwater/Spring Water Extraction" in Taiwan, and "Process Recycled Water" has been renamed to "Discharged Reclaimed Water."

Note 6. The 2023 use of tap water of Cement Plant in Taiwan is due to the expansion of the statistical scope to include TCC DAKA.

Note 7. The increase in water use data in Taiwan's RMC Plants in 2022 compared to 2021 is attributed to the expansion of scope.

Note 8. The water discharge from the cement plants in Taiwan was 265.95 megaliters, and those in Mainland China was 0, with all being disposed of in accordance with local regulations. Taiwan's cement plants consumed 11,999.51 million liters of water; Mainland China's cement plants consumed 10,043.64 million liters of water. The total water consumption for cement plants was 1,955.87 million liters; RMC plants achieved zero discharge.

Note 9. The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.

Note 10. The increase in water withdrawal from water-stress regions in 2023 is due to the inclusion of Guangan Jiuyuan Environmental Protection in the scope, as well as the addition of Mining Water and Rainwater in the statistics.

2023 Energy Conservation Projects

Operation Sites	Energy Conservation Project	Cumulative Period	Energy Saved	Base Year
Guishan Branch	Expansion of the air compressor room and renovation of the air compressor system of Unit 3 Expansion of the air compressor room and renovation of the air compressor system of Unit 3 Expansion of the air compressor room and renovation of the air compressor system of Unit 3	2023/05–2023/12	Electricity saved: 30,057 kWh	2022
Taoyuan Second Branch	Upgrade project of compressor system's air compressor	2023/07–2023/12	Electricity saved: 7,800 kWh	2022
Chiayi Branch	Upgrade of concrete mixer's main dust collector	2023/06–2023/12	Electricity saved: 2,401 kWh	2022
Taichung Plant	Replacement of the old with the new 3-meter mixer	2023/02–2023/12	Electricity saved: 2,379 kWh	2022
Taichung Plant	Installation of motion sensors for parking lot lighting	2023/01–2023/12	Electricity saved: 1,314 kWh	2022
Taichung Plant	Replacement of the IE3 water pump motor	2023/01–2023/12	Electricity saved: 126 kWh	2022
Dadoo Branch	Replacement of the air conditioners in the office	2023/10–2023/12	Electricity saved: 263 kWh	2022
Dadoo Branch	Replacement of the office lighting with LEDs	2023/11–2023/12	Electricity saved: 600 kWh	2022
Hoping Plant	Air compressor system energy efficiency management	2023/06-2023/12	Electricity saved: 2,150,564 kWh	2022
Hoping Plant	Retrofit of No. 2 kiln's clinker cooler	2023/08-2023/12	Electricity saved: 1,152,398 kWh	2023
Hoping Plant	Replacement of all the grinding workshop lighting on the plant with LEDs	2023/01–2023/12	Electricity saved: 1,217,786 kWh	2022
Suao Plant	Replacement of the kiln system lighting with LEDs	2023/01–2023/12	Electricity saved: 201,392 kWh	2022
Suao Plant	Replacement of the road lighting on the plant with LEDs	2023/01–2023/12	Electricity saved: 121,282 kWh	2022
Suao Plant	Alternative fuel delivery system	2023/11-2023/12	Coal saved: 2,673 metric tons	2019
Operation Headquarters	Adjustment of office lighting hours	2023/01–2023/12	Electricity saved: 1,320 kWh	2022
Operation Headquarters	Adjustment of chilled water system outlet temperature	2023/01–2023/12	Electricity saved: 39,308 kWh	2022
Operation Headquarters	Adjustment of elevator operating hours	2023/01–2023/12	Electricity saved: 8,409 kWh	2022
Total Energy Savings Converted to GJ				**17,837 GJ**
Capital Investment				**NT$508,173 thousand**
Operating Expenses				**NT$205 thousand**
Costs Saved				**NT$156,671 thousand**

2023 Water Conservation Projects

Operation Sites	Water Conservation Project	Cumulative Period	Total Water Saved	Base Year
Suao Plant	Increase the utilization of discharged water from discharge outlets and the recovery of wastewater for waste heat power generation	2023/01-2023/12	108,000 cubic meters	2022
Hoping Plant	Reuse of rainwater runoff from the mine	2023/01-2023/12	8,840 cubic meters	2022
Hoping Plant	Reuse of reclamation from branch lines	2023/08-2023/12	1,128 cubic meters	2022
Hoping Plant	Membrane Bioreactor (MBR) treatment system	2023/01-2023/12	54,486 cubic meters	2022
Guangan Plant	Recovery and treatment of waste heat power generation wastewater and domestic sewage	2023/01-2023/12	72,496 cubic meters	2022
Huaying Plant	Reclamation of belt tunnels' seepage	2023/01-2023/12	10,800 cubic meters	2021
Anshun Plant	Reclamation of cable duct's seepage	2023/04-2023/12	76,441 cubic meters	2022
Guigang Plant	Reservoirs and Membrane Bioreactor (MBR) treatment system	2023/01-2023/12	84,067 cubic meters	2022
Taipei Plant	Rainwater reuse integrated into mixing system	2023/01-2023/12	4,372 cubic meters	2022
Zhongli Second Branch	Direct runoff rainwater in plant for tire washing equipment	2023/06-2023/12	5,502 cubic meters	2022
Guishan Branch	Rainwater reuse integrated into mixing system	2023/01-2023/12	2,264 cubic meters	2022
Taichung Plant	Installation of high-pressure washing machine to save mixing machine cleaning water	2023/02-2023/12	649 cubic meters	2022
Dadu Branch	Installation of new car washing equipment	2023/11-2023/12	810 cubic meters	2022
Kaohsiung Plant	Upgrade project for centralized recovery water system in sedimentation tanks	2023/10-2023/12	38 cubic meters	2022
Luzhu Branch	Adjustment of internal sprinkler system pipelines	2023/05-2023-12	3,144 cubic meters	2022
Total Water Savings			**433,037 cubic meters**	
Capital Investment			**NT$6,035 thousand**	
Operating Expenses			**NT$843 thousand**	
Costs Saved			**NT$1,526 thousand**	

2023 Consumption of Alternative Raw Materials and Fuels | Unit: metric ton

Taiwan

Resource Reused	Alternative Type	Volume (metric ton)
Calcium Fluoride Sludge	Alternative Raw Material	18,269
Inorganic Sludge	Alternative Raw Material	13,289
Coal Ash	Alternative Raw Material	434,709
Water Treatment Plant Sludge	Alternative Raw Material	643
Desulfurized Gypsum	Alternative Adjunct	230,922
Incinerated Recycled Aggregates	Alternative Raw Material	4,562
Reducing Slag from EAF	Alternative Raw Material	67,359
Construction Waste Soil	Alternative Raw Material	201,380
Waste Compression Molding	Alternative Raw Material	222
Slag	Alternative Raw Material	56,993
Waste Ceramic	Alternative Raw Material	5,592
Waste Foundry Sand	Alternative Raw Material	750
Copper Slag	Alternative Raw Material	182
Basic-Oxygen-Furnace (BOF) Slag	Alternative Raw Material	2,381
Gasifier Bottom Slag	Alternative Raw Material	649
Mineral Fines	Alternative Raw Material	3,631
Sandy Loam	Alternative Raw Material	5,184
Spent Refractories	Alternative Raw Material	4,668
Air-cooled Slag	Alternative Clinker	3,777
Blast Furnace Slag	Alternative Clinker	11,613
Wood Chips	Alternative Fuel	76,281
Solid Recovered Fuel (SRF)	Alternative Fuel	11,670
Non-Hazardous Oily Sludge	Alternative Fuel	10
Rubber Sheet	Alternative Fuel	509
Waste Plastic	Alternative Fuel	145

Mainland China

Resource Reused	Alternative Type	Volume (metric ton)
Waste Textiles	Alternative Fuel	345,114
Plastic Fragments	Alternative Fuel	214
Waste Industrial Label Paper	Alternative Fuel	19,624
Solid Recovered Fuel (SRF)	Alternative Fuel	13,977
Rubber Scraps	Alternative Fuel	8,019
Regenerated Rubber Granules	Alternative Fuel	15,553
Tire Scraps	Alternative Fuel	6,773
Tire Crumb	Alternative Fuel	5,154
Waste Foaming Slag	Alternative Fuel	152
Biofuels	Alternative Fuel	55,474
Waste Tree Roots	Alternative Fuel	29,402
Others- Wastes	Alternative Fuel	12,948
Desulfurized Gypsum	Alternative Raw Material	1,095,306
Industrial Gypsum	Alternative Raw Material	41,752
Fly Ash	Alternative Raw Material	893,286
Coal Gangue	Alternative Raw Material	676,310
Construction Waste Soil	Alternative Raw Material	387,453
White Clay	Alternative Raw Material	83,233
Metal Slag	Alternative Raw Material	1,236,731
Cinder	Alternative Raw Material	563,853
Others- Industrial Waste	Alternative Raw Material	30,259
Construction and Demolition Waste (C&D Waste)	Alternative Raw Material	1,075
Inorganic Sludge	Alternative Raw Material	36,919
Volcanic Ash	Alternative Raw Material	29,561

Taiwan			Mainland China		
Resource Reused	Alternative Type	Volume (metric ton)	Resource Reused	Alternative Type	Volume (metric ton)
Waste Man–Made Fibers	Alternative Fuel	83	**Burnt Shale**	Alternative Raw Material	21,010
Waste Wood	Alternative Fuel	212	**Basalt**	Alternative Raw Material	22,556
Domestic Waste	Alternative Fuel	13,762			
Waste Paper	Alternative Fuel	15			
Total Resources Reused in Taiwan		1,169,462	**Total Resources Reused in Mainland China**		5,631,708
Total Resources Reused (Taiwan + Mainland China)					6,801,170

2023 Consumption of Raw Materials | Unit: metric ton

	Taiwan		Mainland China	
Category	Raw Material	Volume (metric ton)	Raw Material	Volume (metric ton)
Non-recycled Raw Materials	**Limestone**	5,514,229	**Limestone**	30,240,890
	Silica Sand	89,119	**Silica Sand**	2,410,756
	Imported Low-alkali Cement	178,841	**Clay**	800,793
	Imported Iron Slag	80,717	**Iron Slag**	786,259
			Basalt	22,556
			Volcanic Ash	29,561
			Burnt Shale	21,010
Recycled Raw Materials	**Reducing Slag**	67,359	**Desulfurized Gypsum**	1,095,306
	Calcium Fluoride Sludge	18,269	**Fly Ash**	893,286
	Construction Waste Soi	201,380	**Coal Gangue**	676,310
	Inorganic Sludge	13,289	**Construction Waste Soil**	387,453
	Desulfurized Gypsum	230,922	**White Clay**	83,233
	Coal Ash	434,709	**Metal Slag**	1,236,731
	Slag (Ore Slime)	56,993	**Others- Industrial Gypsum**	41,752
	Incinerated Recycled Aggregates	4,562	**Cinder**	563,853
	Waste Ceramic	5,592	**Others- Industrial Waste**	30,259

	Taiwan		Mainland China	
Category	Raw Material	Volume (metric ton)	Raw Material	Volume (metric ton)
Recycled Raw Materials	**Waste Foundry Sand**	750	**Waste (C&D Waste)**	1,075
	Water Treatment Plant Sludge	643	**Inorganic Sludge**	36,919
	Copper Slag	182		
	Basic-Oxygen-Furnace (BOF) Slag	2,381		
	Waste Compression Molding	222		
	Gasifier Bottom Slag	649		
	Mineral Fines	3,631		
	Sandy Loam	5,184		
	Spent Refractories	4,668		
	Air-cooled Slag	3,777		
	Blast Furnace Slag	11,613		
	Alternative Clay	456,776		
Total Amount of Raw Materials		**7,386,457**		**39,358,003**
Ratio of Recycled Raw Materials (Recycled Raw Materials/Total Raw Materials)		**20.6%**		**12.8%**

Waste disposal in 2023 | Unit: tons

Operation Sites		General waste (domestic waste)	Industrial waste	Valuable metal recycling	Total
Cement Plants	Taiwan	176.35	4,212.10	2,941.75	**7,330.20**
	Mainland China	1,719.96	1,703.54	4,580.02	**8,003.52**
	Subtotal	1,896.31	5,915.64	7,521.77	**15,333.72**
RMC Plants	Taiwan	178.18	1,465.15	188.75	**1,832.08**
Operations Offices	Taiwan	32.50	0	0	**32.50**
	Mainland China	3.17	0	0	**3.17**
	Subtotal	35.67	0	0	**35.67**
Distribution Stations[2]	Taiwan & Mainland China	3.75	3.93	0.02	**7.70**
Total		**2,113.91**	**7,384.72**	**7,710.54**	**17,209.17**

Note 1: The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.

Note 2: In 2023, due to operational adjustments, the Liaoning and Huaihua Cement Plants, as well as the grinding plants in Mainland China, are excluded from the disclosure scope. New additions include "Distribution Stations" (excluding those under the jurisdiction of RMC Plants) and "Operations Offices in Mainland China".

Note 3: TCC does not have any waste landfilled.

→ TCC Key Indicators | Social

Employee Diversity in 2023

Item		Taiwan		Mainland China		
		Female	Male	Female	Male	**Total**
Number of Employees						
Employment	Permanent Employees	251	1,049	1,064	4,031	**6,395**
	Temporary Employees	3	7	171	606	**787**
	Non-guaranteed Hours Employees	0	0	0	0	**0**
Contract Types	Full-time Employees	251	1,049	1,232	4,632	**7,164**
	Part-time Employees	3	7	3	5	**18**
		254	1,056	1,235	4,637	
Total			**1,310**		**5,872**	**7,182**
Number of Workers Who Are Not Employees						
Cleaning Staff		42	54	113	42	**251**
Security Personnel		3	68	0	39	**110**
Cooks		6	6	41	13	**66**
Landscaping Workers		0	3	12	12	**27**
Others		2	19	3	42	**66**
Number of Full-time Employees						
Age	Under 30	25	96	121	394	**636**
	30-50	193	651	1,101	3,387	**5,332**
	Over 50	33	302	10	851	**1,196**
Educational Attainment	Doctoral Degree	0	5	0	0	**5**
	Master's Degree	48	99	6	3	**156**
	Bachelor's Degree	143	396	107	320	**966**
	Associate Degree	33	158	336	876	**1,403**
	Senior Secondary Education or Below	27	391	783	3,433	**4,634**

Item		Taiwan		Mainland China		Total
		Female	Male	Female	Male	
Educational Category	Senior-level Managers	5	13	1	74	93
	Mid-level Managers	31	93	33	227	384
	Low-level Managers	30	70	77	501	678
	Professionals	73	142	200	504	919
	Direct Employees	112	731	921	3,326	5,090
Total of Full-time Employees		**251**	**1,049**	**1,232**	**4,632**	**7,164**

Note 1: Managers per the definitions in Taiwan: Executives are the Assistant Vice President or above. Mid-level managers are Managers or Deputy Managers. Low-level managers are Section Chiefs. Professionals are Engineers, Specialists, or Management Associates

Note 2: Managers per the definitions in Mainland China: Executives are the Vice President or above. Mid-level managers are middle managers. Low-level managers are Position Worker 1-3. Professionals are Position Worker 4-5.

Note 3: Other workers who are not employees include resident technicians from mechanical and electrical companies, outsourced personnel, water pump operators, packing and delivery personnel, etc.

Note 4: The above information is based on the number of employees as of December 31, 2023.

Distribution of full-time employees by demographic groups

Ethnicity	Headcount	Percentage in the Total Workforce	Headcount in Management	Percentage in Management
Zhuang	354	4.94%	26	2.25%
Miao	308	4.30%	17	1.47%
Dong	121	1.69%	16	1.39%
Truku	95	1.33%	1	0.09%
Others	192	2.68%	31	2.68%

Note 1: Other ethnicities (Others) include the peoples of Pinuyumayan, Saisiyat, Seediq, Rukai, Bunun, Paiwan, Li, Yi, Gelao, Chuanching, Hui, Bai, Tujia, Mongol, Sui, Ge, Yao, Mulam, She, and Manchu.

New Recruits & Former Employees in 2023

		Taiwan		Mainland China		Total	
New Recruits		Headcount	Percentage	Headcount	Percentage	**Headcount**	**Percentage**
Gender	Female	53	4.05%	16	0.27%	**69**	**0.96%**
	Male	101	7.71%	43	0.73%	**144**	**2.01%**
Age	Under 30	60	4.58%	31	0.53%	**91**	**1.27%**
	30-50	92	7.02%	26	0.44%	**118**	**1.64%**
	Over 50	2	0.15%	2	0.03%	**4**	**0.06%**
Total		**154**	**11.76%**	**59**	**1.00%**	**213**	**2.97%**
Former Employees							
Gender	Female	32	2.44%	589	10.03%	**621**	**8.65%**
	Male	87	6.64%	1,496	25.48%	**1,583**	**22.04%**
Age	Under 30	30	2.29%	346	5.89%	**376**	**5.24%**
	30-50	59	4.50%	1,423	24.23%	**1,482**	**20.63%**
	Over 50	30	2.29%	316	5.38%	**346**	**4.82%**
Total		**119**	**9.08%**	**2,085**	**35.51%**	**2,204**	**30.69%**
Voluntary Separation							
Gender	Female	21	1.60%	89	1.52%	**110**	**1.53%**
	Male	55	4.20%	315	5.36%	**370**	**5.15%**
Age	Under 30	24	1.83%	152	2.59%	**176**	**2.45%**
	30-50	42	3.21%	234	3.99%	**276**	**3.84%**
	Over 50	10	0.76%	18	0.31%	**28**	**0.39%**
Total		**76**	**5.80%**	**404**	**6.88%**	**480**	**6.68%**

Hours and Investments in Education and Training in 2023 | Unit: Hours

Item		Taiwan		Mainland China		Total Hours	Average Hours
		Female	Male	Female	Male		
Age	Under 30	1,175.55	16,398.58	1,791.13	13,675.60	**33,040.87**	**51.95**
	30-50	8,020.03	29,022.38	15,964.87	107,946.92	**160,954.19**	**30.19**
	Over 50	1,181.77	8,649.47	220.00	24,795.28	**34,846.52**	**29.14**
Job Level	Senior-level Managers	85.33	249.20	24.65	1,121.93	**1,481.12**	**15.93**
	Mid-level Managers	1,170.08	3,989.60	450.42	3,245.53	**8,855.63**	**23.06**
	Low-level Managers	967.13	3,633.05	1,116.33	11,045.00	**16,761.52**	**24.72**
	Professionals	3,208.43	16,625.86	2,871.22	8,181.18	**30,886.69**	**33.61**
	Direct Employees	4,946.37	29,572.72	13,513.38	122,824.15	**170,856.62**	**33.57**
Total Hours		**10,377.35**	**54,070.43**	**17,976.0**	**146,417.80**	**228,841.58**	**-**
Average Hours		**41.34**	**51.54**	**14.59**	**31.61**	**-**	**31.86**
Average Cost on Training and Development per Full-time Employee			**Taiwan NT$16,000.55**		**Mainland China RMB380.46**		**Total NT$ 4,272.51**

Note 1. Education and training hours are calculated by age, gender, and job levels in 2023.

Note 2. Executives are the Assistant Vice President or above. Mid-level managers are Managers or Deputy Managers. Low-level managers are Assistant Managers or Section Chiefs. Professionals are Engineers, Specialists, or Management Associates.

Note 3. The scope of education and training hours covers overseas regions.

Note 4. The exchange rate for the Renminbi is based on the average rate of NT$4.396 in 2023.

Parental Leave in 4 Years

Item	2020		2021		2022		2023	
	Female	Male	Female	Male	Female	Male	Female	Male
Employees Eligible for Parental Leave without Pay in the Year (A)	16	73	22	70	20	74	22	72
Employees Applying for Parental Leave without Pay in the Year (B)	2	1	1	2	6	2	4	1
Employees Scheduled to Resume Work in the Year (C)	3	0	2	2	4	3	3	3
Actual Employees Resuming Work (D)	3	0	1	2	4	1	1	2
Employees Continuing Work at TCC after Resumption of Work for 12 Months (E)	1	0	3	0	1	2	4	1
Resumption Rate after Parental Leave without Pay (D/C)	100%	-	50%	100%	100%	33%	33%	67%
Retention Rate One Year after Resumption of Work (E/D in the Previous Year)	100%	-	100%	-	100%	100%	100%	100%

Note 1 Full-time employees who have been onboard for at least six months in the year are entitled to parental leave without pay.

Work-related Injuries in 2023

Work-related Injuries of Employees

Operation Sites	Occupational Accidents			Fatality Rate	Rate of High-consequence Work-related Injuries	Rate of Recordable Work-related Injuries (TRIR)	Work-related Injury Rate (LTIR)	Actual Working Hours
	Fatalities	Number of High-consequence Work-related Injuries	Number of Recordable Work-related Injuries					
Operation Headquarters	0	0	0	0	0	0	0	398,206
Plants in Taiwan	0	0	3	0	0	0.32	0.32	1,881,618
Plants in Mainland China	0	0	10	0	0	0.14	0.14	13,855,954
Total	**0**	**0**	**13**	**0**	**0**	**0.16**	**0.16**	**16,135,778**

Note 1 Work-related injuries are based on the monthly occupational accident reports submitted by each plant.

Note 2 The main types of occupational injuries are entanglement, strikes, falls, and cuts.

Note 3 Fatality Rate = (total number of fatalities / total actual working hours) × 200,000

Note 4 Rate of High-consequence Work-related Injuries = (total number of high-consequence work-related Injuries – number of fatalities / total actual working hours) × 200,000.

Note 5 Rate of Recordable Work-related Injuries = (number of recordable work-related injuries / total actual working hours) × 200,000

Note 6 Work-related Injury Rate = (total number of work-related injuries – number of fatalities) / total actual working hours × 200,000

Note 7 The scope of plants in Taiwan does not include distribution stations under the RMC plants, Ho Sheng Mining, and E.G.C. Cement; the scope of plants in Mainland China does not include Hong Kong Cement, Guangan Jiuyuan Environmental Protection, and the Mainland China Operations Offices (including: Beijing Environmental Technology Company, Hangzhou Office (including Hangzhou Environmental Protection)), and survey of these sites will be initiated in 2024.

Work-related Injuries of Contractors

Operation Sites	Occupational Accidents			Fatality Rate	Rate of High-consequence Work-related Injuries	Rate of Recordable Work-related Injuries (TRIR)	Work-related Injury Rate (LTIR)	Actual Working Hours
	Fatalities	Number of High-consequence Work-related Injuries	Number of Recordable Work-related Injuries					
Taiwan	2	0	3	0.23	0	0.34	0.11	1,762,803
Mainland China	0	0	1	0	0	0.12	0.12	1,650,488
Total	**2**	**0**	**4**	**0.12**	**0**	**0.23**	**0.12**	**3,413,291**

Note 1. Work-related injuries are based on the monthly occupational accident reports submitted by each plant.

Note 2. The main types of occupational injuries are entanglement, strikes, and falls.

Note 3. Fatality Rate = (total number of fatalities / total actual working hours) × 200,000

Note 4. Rate of High-consequence Work-related Injuries = (total number of high-consequence work-related Injuries – number of fatalities / total actual working hours) × 200,000.

Note 5. Rate of Recordable Work-related Injuries = (number of recordable work-related injuries / total actual working hours) × 200,000

Note 6. Work-related Injury Rate = (total number of work-related injuries – number of fatalities / total actual working hours) × 200,000

Note 7. Some actual working hours are estimated based on the number of personnel entering the plant multiplied by 8 hours.

Note 8. The scope of plants in Taiwan does not include distribution stations under the RMC plants, Ho Sheng Mining, and E.G.C. Cement; the scope of plants in Mainland China does not include Hong Kong Cement, Guangan Jiuyuan Environmental Protection, and the Mainland China Operations Offices (including: Beijing Environmental Technology Company, Hangzhou Office (including Hangzhou Environmental Protection)), and survey of these sites will be initiated in 2024.

Frequency-Severity Index (FSI) in Taiwan in 2 Years

Category	2022			2023		
	Disabling Injury Frequency Rate (FR) Per 1 Million Hours Worked	Disabling Injury Severity Rate Per 1 Million Hours Worked	Frequency-Severity Index (FSI)	Disabling Injury Frequency Rate (FR) Per 1 Million Hours Worked	Disabling Injury Severity Rate Per 1 Million Hours Worked	Frequency-Severity Index (FSI)
Employee	1.65	81	0.36	0.81	25	0.14
Contractor	1.72	14	0.15	1.70	6810	3.40

Social Welfare Contribution in 2023 | Unit: NT$1,000

Contribution Type	Total
Monetary Contribution	39,626
Volunteering Hours Contribution	1,367
In-kind (Cement) Contribution	5,677
Management Costs	3,330
Total	**50,000**

Note 1: The volunteering hours are calculated on the basis of the hourly wage of MAs multiplied by volunteering hours.

Note 2: The data scope encompasses Taiwan and Mainland China.

→ TCC Key Indicators | Governance

2023 TCC Tax Information | Unit: NT$1,000

Jurisdiction	Taiwan	Mainland China (Hong Kong included)	Italy	United States	Others
Operating Revenue	72,349,213	47,898,933	5,002,360	2,078,414	6,397,414
Income Tax Accrued	3,028,945	273,710	54	136,752	182,042
Income Tax Paid	1,049,858	462,326	1,119	2,188	252,677
Cost-to-income Ratio	59.38%	26.15%	0.06%	0.12%	14.29%
Primary Activities	Cement manufacturing and distribution, logistics transportation, manufacturing and distribution of slag powder, sand and gravel screening and ready-mixed concrete sales, waste removal and disposal, resource recycling technology development, etc.		Investment holding, renewable energy and energy storage system construction, renewable energy and charging business, electric vehicle charging equipment.	Renewable energy and energy storage system construction, electric vehicle charging equipment.	Renewable energy and charging business, battery research and development and sales, shipping transportation, and other activities.
Effective Tax Rate					**30.31%**
Cash Tax Rate					**11.92%**

Note 1: The data in the table above has not been adjusted to offset transactions with related parties that should be included in the consolidated entities.

Note 2: For the number of employees in Taiwan and Mainland China, please refer to Section 6.1 of the ESG Data Sheet – Employee Diversity Composition for 2023.

2023 Financial Performance | Unit: NT$ for EPS & DPS; NT$1,000 for the remainders

Category	Item	2022	2023
Economic Value Generated	Operating Revenue	113,929,706	109,314,335
	Operating Income (Loss)	1,162,138	10,030,160
	Non-operating Income and Expenses	5,483,959	4,326,671
Economic Value Distributed	Operating Costs	103,794,557	88,780,566
	EPS	0.74	1.06
	DPS	0.5	1.0
	Cash Dividend per Share	0.5	1.0
	Stock Dividend per Share	0	0
	Income Tax	2,489,012	4,352,218
	Employee Wages and Benefits	9,769,560	10,606,016
	Community Investments	276,550	356,825
Economic Value Retaine	Retained Earnings	66,527,594	70,576,781

Table of Significant Environmental Law/Regulation Violations in 4 Years

Item	2020	2021	2022	2023
Violations of Legal Obligations/Regulations	2	1	1	0
Amount of Fines as the Result of Significant Penalty Cases Above | Unit: NT$1,000	1,547	434	425	0
Accrued Year-end Penalty Amount | Unit: NT$1,000	0	0	0	0

[Note 1]Disclosures here are made according to the S&P Corporate Sustainability Assessment definition, where cases with a penalty amount of NT$300,000 or above.

Contributions & Other Spending in 4 Years | Unit: NT$

Total Amount Allocated	2020	2021	2022	2023
Lobbying, Interest Representation or Similar	0	0	0	0
Local, Regional or National Political Campaigns / Organizations / Candidates	100,000	0	800,000	700,000
Trade Associations or Tax-exempt Groups	13,814,082	14,354,553	16,875,288	2,156,336
Other	0	0	0	0
Total	**13,914,082**	**14,354,553**	**17,675,288**	**2,856,336**
Data Coverage	100%	100%	100%	100%

Table of Supply Chain Procurement Amount in 2023 | Unit: NT$

6 Categories	Procurement Amount		
	Taiwan	Mainland China	Total
Raw Materials	9,877,535,944	17,953,048,968	**27,830,584,912**
Outsourcing & Subcontracting	539,161,763	0	**539,161,763**
Equipment & Parts	1,697,707,046	3,820,223,351	**5,517,930,397**
Transport	1,480,002,121	170,618,928	**1,650,621,049**
Construction	1,706,058,764	1,317,871,895	**3,023,930,659**
Explosives	69,333,755	212,929,790	**282,263,545**
Total	**15,369,799,393**	**23,474,692,932**	**38,844,492,325**

Client Satisfaction in 4 Years | Unit: Percentage

	2020	2021	2022	2023
Satisfaction Rate	95.11	96.67	96.86	98.64

Number of Significant Suppliers and Procurement Share in 2023 (Taiwan and Mainland China)

Item		2023
Total number of Tier-1 suppliers		2,719
Total number and Share of significant suppliers in Tier-1	299	11.0%
Share of total spend on significant suppliers in Tier-1		81.2%
Total number of significant suppliers in non Tier-1		47
Total number of significant suppliers		346

Supplier Assessment Performance and Goals for 2023

Supplier Assessment	FY2023	Target for FY 2023
Total number of suppliers assessed (via desk assessments/on-site assessments)	301	208
Results		
Number of suppliers assessed with substantial actual/potential negative impacts	12	-
Share of suppliers with agreed corrective action/improvement plan	100%	-
Number of suppliers that were terminated	1	-
Supplier corrective plan performance and targets		
Total number of suppliers with substantial actual/potential negative impacts expected to be supported in corrective action plan implementation	11	11
Total number of suppliers supported in corrective action plan implementation	11	-
Performance and goals of suppliers capacity building programs		
Total number of suppliers in capacity building programs	290	183

6.2 / GCCA Key Performance Indicators

→ GCCA Charter Compliance third-party verified in 2022

Next verification year is 2026

CO_2		2020	2021	2022	2023
Number of facilities using GCCA's Cement CO_2 and Energy Protocol		165	165	172	153
Percentage of facilities using GCCA's Cement CO_2 and Energy Protocol (%)		100%	100%	100%	100%
Total CO_2 emissions	Total direct CO_2 emissions - gross	37.13	31.97	26.08	20.78
(million metric tons/year)	Total direct CO_2 emisssions - net	37.10	31.93	25.72	20.38
Emission intensity of cementitious materials	Specific CO_2 emissions-gross	705	693	679	661
(kg/ ton of cementitious materials)	Specific CO_2 emissions-net	704	692	669	649
Scope 2 emissions (million metric tons/year)		1.46	1.31	1.06	0.89
Scope 3 emissions (million metric tons/year)		0.022 (Only covers Category 4 - Upstream transportation and distribution)	0.029 (Only covers Category 4 - Upstream transportation and distribution)	0.017 (Only covers Category 4 - Upstream transportation and distribution)	Expected disclosure after ISO 14064-1 certification by July 2024
Energy consumption intensity of clinker (MJ/metric ton of clinker)		3,274,285	3,254,621	3,293,785	3,324,510
Proportion of alternative fuels: the ratio of alternative fuels used in kilns (as the percentage in the thermal energy consumption)		-	1.20%	7.65%	12.60%
Proportion of biofuels: the ratio of biofuels used in kilns (as the percentage in the thermal energy consumption)		-	0.54%	1.86%	2.49%
Clinker/cement ratio: the ratio of total clinker consumption to cement production calculated in accordance with the GCCA's Cement CO2 and Energy Protocol		0.826	0.823	0.816	0.799

Emissions Monitoring & Reporting

Percentage of "kilns of clinker production" covered by the continuous monitoring systems for main emissions	NOx	100%	100%	100%	100%
	SOx	100%	100%	100%	100%
	PM	100%	100%	100%	100%
	VOC/THC1	0%	0%	0%	0%
	PCDD/F (Only covers plants in Taiwan)	0%	0%	0%	0%

Emissions Monitoring & Reporting		2020	2021	2022	2023
Percentage of "kilns of clinker production" covered by the continuous monitoring systems for main emissions	Hg	0%	0%	0%	0%
	HM1 (Only plants in Taiwan; only counts Cd)	0%	0%	0%	0%
	HM2 (Only plants in Taiwan; only counts Pb、As、Cr6+)	0%	0%	0%	0%
Absolute emissions (metric ton)	NOx	18,253	16,381	13,634	10,622
	SOx	1,399	1,110	1,161	1,088
	PM	1,076	783	475	593
	VOC/THC	0.0042 (Plants in Taiwan)	0.0042 (Plants in Taiwan)	0.0043 (Plants in Taiwan)	0.7575
	PCDD/F (Only plants in Taiwan)	0.00000020490	0.00000096570	0.00000075760	0.00000003110
	Hg2	0.2794 (Plants in Taiwan)	0.2793 (Plants in Taiwan)	0.2263 (Plants in Taiwan)	0.2010
	HM1 (Only plants in Taiwan; only counts Cd)	0.0190	0.0295	0.0279	0.0211
	HM2 (Only plants in Taiwan; only counts Pb、As、Cr6+)	0.5332	0.7047	0.6910	0.5652
Specific emissions (g/metric ton of clinker)	NOx	418	437	441	383
	SOx	20	19	12	41
	PM	46	36	30	22
	VOC/THC	0.0008	0.0004	0.0008	0.0010
	PCDD/F (Only plants in Taiwan)	0.00000004	0.00000016	0.00000014	0.00000017
	Hg2	0.0519	0.0315	0.0427	0.0483
	HM1 (Only plants in Taiwan; only counts Cd)	0.0035	0.0044	0.0053	0.0062
	HM2 (Only plants in Taiwan; only counts Pb、As、Cr6+)	0.0958	0.0842	0.1233	0.1479

Water				
Water usage (m^3)	-	8,798,576	8,839,610	11,523,452
Water Intensity (liters/metric ton of Cementitious materials)	-	-	301.47	352.47

Health and Safety		2023
Fatalities	Number of fatalities, directly employed	0
	Fatality rate, per 10,000 direct employees	0
	Number of fatalities, indirectly employed (contractors & sub-contractors)	1
	Number of fatalities of third parties (not employed)	0
Lost time injuries (LTI)	Number of LTI, directly employed	12
	LTI frequency rate, directly employed (per 1 million hours worked)	0.71
	Number of LTI, indirectly employed (contractors & sub-contractors)	4

Note 1. The scope includes cement plants in Taiwan and Mainland China. In 2023, due to operational adjustments, the Liaoning and Huaihua Plants are excluded from the disclosure scope.

Note 2. Total volatile organic compound (VOC) emissions were previously covered for the Hoping and Suao plants until 2022. From 2023, it extends to include the Gangan Plant, with plans for further gradual expansion of the scope.

Note 3. Total mercury (Hg) emissions were previously covered for the Hoping Port and Suao plants until 2022. From 2023, it extends to include co-processing plants in Taiwan and Mainland China.

Note 4. Water usage data collection started in 2021, with complete coverage of all plants within the scope from 2022 onwards.

6.3 / Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies

→ Sustainability Disclosure Indicators for the Cement Industry

Code	Indicator	Category	Section for Reference	Page	Note
1	Total energy consumption, percentage of purchased electricity, and utilization rate (renewable energy/total energy)	Quantitative		-	In 2023, the total energy consumption amounted to 96,147,485 GJ. The percentage of purchased electricity was 6.64%. The proportion of self-generated renewable energy was 0.07% in Taiwan, and the weighted average of Taiwan and Mainland China was 0.06%.
2	Total water withdrawal and total water consumption	Quantitative	6.1 ESG Data Sheet	160	
3	Total waste generated, percentage of hazardous waste and percentage recycled	Quantitative	6.1 ESG Data Sheet	160	No hazardous wastes at TCC
4	Number of employees in and rate of occupational accidents	Quantitative	6.1 ESG Data Sheet	160	
5	Production by product category	Quantitative		-	Clinker yield in 2023: 26,052,430.66 metric tons | 2023 clinker yield: 26,052,430.66 metric tons | 2023 cement yield: 27,386,534.75 metric tons | 2023 cementitious materials yield: 31,548,254.73 metric tons 2023 production of 280-grade concrete: 4,540,188.50 tons. | 2023 production of 350-grade concrete: 1,891,155.45 tons. | 2023 production of 420-grade concrete: 894,781.65 tons.

→ Climate-related Information of TWSE- and TPEx-Listed Companies - Risks and opportunities for companies arising from climate change and the relevant responses taken thereby

Item	Section for Reference	Page
1.Describe the board of directors' and management's oversight and governance of climate-related risks and opportunities.	Please refer to the 2023 annual report	86
2. Describe how the identified climate risks and opportunities affect the business, strategy, and finances of the business (short, medium, and long term).		86-87
3. Describe the financial impact of extreme weather events and transformative actions.		87
4. Describe how climate risk identification, assessment, and management processes are integrated into the overall risk management system.		87-88

Item	Section for Reference	Page
5. If scenario analysis is used to assess resilience to climate change risks, the scenarios, parameters, assumptions, analysis factors and major financial impacts used should be described.	Please refer to the 2023 annual report	88-89
6. If there is a transition plan for managing climate-related risks, describe the content of the plan, and the indicators and targets used to identify and manage physical risks and transition risks.		89-90
7. If internal carbon pricing is used as a planning tool, the basis for setting the price should be stated.		90
8. If climate-related targets have been set, the activities covered, the scope of greenhouse gas emissions, the planning horizon, and the progress achieved each year should be specified. If carbon credits or renewable energy certificates (RECs) are used to achieve relevant targets, the source and quantity of carbon credits or RECs to be offset should be specified.		90
9. GHG inventory and assurance status, reduction targets, strategies, and specific action plans	Please refer to the table below	

GHG Inventory Information

The Company, in accordance with the Sustainable Development Guidemap for TWSE- and TPEx-Listed Companies, must disclose at least:

1.The parent company should begin its inventory in 2023.

2.Subsidiaries included in the consolidated financial report should begin their inventory in 2025.

The Company establishes a greenhouse gas inventory mechanism based on the ISO 14064-1 Greenhouse Gas Inventory Standard published by the International Organization for Standardization (ISO). Since 2016, an annual inventory of the Company's entities has been conducted, and since 1995, greenhouse gas emissions from subsidiaries included in the consolidated financial reports have been gradually initiated. This ensures complete control over the use and emissions of greenhouse gases and verifies the effectiveness of reduction measures. Furthermore, the greenhouse gas inventory data for the last two years is compiled according to the operational control method, which includes emissions from the company and all subsidiaries in the consolidated financial reports, as detailed below:

		2022 Total Emissions (tCO_2e)	2023 Total Emissions (tCO_2e)
The Company	Scope 1 Direct GHG Emissions	4,314,312	3,459,504
	Scope 2 Indirect GHG Emissions	218,480	194,025
	Subtotal	4,532,792	3,653,529
	Intensity (tCO_2e/NT$ million revenues)	178.7315	140.4042
Consolidated Financial Statements of Subsidiaries[1]	Scope 1 Direct GHG Emissions	NA	66,926
	Scope 2 Indirect GHG Emissions	NA	30,283
	Subtotal	NA	97,209
Total Emissions		**4,532,792**	**3,750,738**

Note [1]The scope of the Company's data covers: the cement and concrete businesses in Taiwan, encompassing cement manufacturing at the Hoping Plant and Suao Plant; RMC production at the Taipei RMC Plant, Taichung RMC Plant, Kaohsiung RMC Plant, and the 19 operation sites thereunder (excluding distribution stations.); offices, including TCC Operation Headquarters and Low-carbon R&D Center.

Note [2]The scope of subsidiary data covers: In 2023, 15 subsidiaries obtained ISO 14064-1 certification, including Taiwan Transport & Storage Corporation, TJ Transport Corporation, TCC Green Energy Corporation, Ta-Ho Maritime Corporation, Ta-Ho Maritime Holdings Limited, THC International S.A., Ta-Ho Maritime (Hong Kong) Limited, Ta-Ho Maritime (Singapore) Pte. Ltd., TCC Information Systems Corporation, Ho-Ping Industrial Port Corporation, E.G.C. CEMENT CORP., Feng Sheng Enterprise Company Limited, TCC Energy Storage Technology Corporation, Energy Helper TCC Corporation, and E-One Moli Energy Corp.

Note [3]In 2023 and 2022, the Company's GHG emissions intensities were calculated based on TCC Group Holdings CO.,LTD revenues of NT$26,021,513 thousand and NT$25,360,898 thousand, respectively.

→ GHG Assurance Information

Item	2022	2023
Scope of Assurance	Scope 1 & 2 emissions	Scope 1 & 2 emissions
Data Percentage	TCC Group Holdings CO.,LTD 100%	TCC Group Holdings CO.,LTD 100% and the aforementioned 15 subsidiaries 100%
Assurance Provider	Deloitte Touche Tohmatsu Limited	British Standards Institution Taiwan Branch (BSI) and SGS Taiwan Ltd (SGS).
Assurance Standard	ISAE 3000 Revised	ISO 14064-3:2019
Assurance Opinion	Limited assurance	Unqualified opinion

GHG Reduction Targets, Strategies, and Specific Action Plans

Please refer to **"Total Climate Commitment"**

Greenhouse Gas Inventory Management Platform

TCC follows the "Sustainable Development Guidemap for TWSE- and TPEx-Listed Companies" issued by the FSC, requiring all subsidiaries to designate personnel for inventory and establishes a greenhouse gas inventory management system, which assists colleagues digitally. The platform offers Traditional Chinese, Simplified Chinese, and English to meet the needs of overseas subsidiaries. It is expected to be fully operational by August 2024. Subsequently, the platform will be optimized to directly integrate with SAP data, allowing monthly fixed import of inventory data and reducing manual labor time.

6.4 / Taiwan Sustainable Taxonomy

In 2022, TCC participated in the trial of the ' Taiwan Sustainable Taxonomy' (hereinafter referred to as 'the Taxonomy'), through on-site interviews and questionnaire, providing feedback on the applicability of the questionnaire, and assisting in optimizing the guideline manual and FAQ content. In 2023, the general economic activities applicable to the Taxonomy for TCC included 'manufacturing of cement clinker,' 'freight truck transportation,' and 'products/services supporting low-carbon highway transport and public transportation infrastructure.' Prospective economic activities included 'renewable energy installation,' 'development and system setup of smart grids and energy storage technology,' and 'other applications related to low-carbon and circular economy technologies.'

All the aforementioned main economic activities of TCC were 'in compliance' with the Taxonomy, with the related inventory results as follows:

→ Primary Economic Activities (Operating Revenue)

Steps	Economic Activity						
1 Economic Activity Category	Manufacturing of cement clinker	Freight truck transportation	Products/services supporting low-carbon highway transport and public transportation infrastructure(charge station)	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Other applications related to low-carbon and circular economy technologies	Other
2 2023 Operating revenue and its proportion of Total Operating Revenue Unit: NT$1,000 (%)	48,544,706 (44.41%)	419,262 (0.38%)	2,311,130 (2.11%)	496,301 (0.45%)	3,009,966 (2.75%)	748,807 (0.69%)	53,784,163 (49.21%)
3 Whether"Ordinary economic activities (OEAs)" and "Forward-looking economic activities (FLEAs)." under this guideline are applicable	OEA	OEA	OEA	FLEA	FLEA	FLEA	Not eligible
4 Determine whether the activities are a sustainable economic activity based on the following criteria.							
Criterion 1: Compliance with the technical screening criterion of "making substantial contributions to mitigating climate change."	Yes	No	Yes				
Criterion 2: whether the activity "does no significant harm (DNSH) to the other five environmental objectives"	Yes	Yes	Yes	Yes	Yes	Yes	

Steps	Economic Activity						
Economic Activity Category	Manufacturing of cement clinker	Freight truck transportation	Products/services supporting low-carbon highway transport and public transportation infrastructure(charge station)	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Other applications related to low-carbon and circular economy technologies	Other
4 Criterion 3: Compliance with the criterion of "not causing significant harm to social security."	Yes	Yes	Yes	Yes	Yes	Yes	
Is there any improvement plan?		Yes					
5 Results: Compliance and sustainability level	Yes	Working on it	Yes	Yes	Yes	Yes	Not eligible

→ Economic Activities of Capital Expenditure Projects

Steps	Economic Activity								
1 Economic Activity Category	Manufacturing of cement clinker	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Manufacturing and application of high-energy-efficiency equipment and technologies	Application of low-carbon transportation technologies	Construction, modernization, operation, and maintenance of infrastructure supporting low-carbon water transport	Other applications related to low-carbon and circular economy technologies	Equipment for water conservation, water resource recycling, or development of emerging water sources	Other
2 2023 capital expenditures and their proportion of Total Capital Expenditures Unit: NT$1,000 (%)	4,998,962 (20.22%)	509,454 (2.06%)	8,691,842 (35.15%)	28,175 (0.11%)	44,788 (0.18%)	80,999 (0.33%)	2,604,415 (10.53%)	36,518 (0.15%)	7,731,113 (31.27%)
3 Whether"Ordinary economic activities (OEAs)" and "Forward-looking economic activities (FLEAs)." under this guideline are applicable	OEA	FLEA	FLEA	FLEA	FLEA	FLEA	FLEA	FLEA	Not eligible

Steps	Economic Activity								
Economic Activity Category	Manufacturing of cement clinker	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Manufacturing and application of high-energy-efficiency equipment and technologies	Application of low-carbon transportation technologies	Construction, modernization, operation, and maintenance of infrastructure supporting low-carbon water transport	Other applications related to low-carbon and circular economy technologies	Equipment for water conservation, water resource recycling, or development of emerging water sources	Other
4 Determine whether the activities are a sustainable economic activity based on the following criteria.									
Criterion 1: Compliance with the technical screening criterion of "making substantial contributions to mitigating climate change."	Yes								
Criterion 2: whether the activity "does no significant harm (DNSH) to the other five environmental objectives"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Criterion 3: Compliance with the criterion of "not causing significant harm to social security."	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is there any improvement plan?									
5 Results: Compliance and sustainability level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Not eligible

→ Economic Activities of Operating Expense Projects

Steps	Economic Activity							
1 Economic Activity Category	Manufacturing of cement clinker	Freight truck transportation	Products/services supporting low-carbon highway transport and public transportation infrastructure	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Research and innovation in carbon capture, utilization, and storage (CCUS) technology	Other applications related to low-carbon and circular economy technologies	Other
2 2023 Operating expenses and their proportion of Total Operating Expenses Unit: NT$1,000 (%)	4,765,570 (45.37%)	102,865 (0.98%)	1,232,481 (11.73%)	135,639 (1.29%)	1,680,078 (16.00%)	2,552 (0.02%)	144,542 (1.38%)	2,439,882 (23.23%)

→ Economic Activities of Operating Expense Projects

Steps	Economic Activity							
Economic Activity Category	Manufacturing of cement clinker	Freight truck transportation	Products/services supporting low-carbon highway transport and public transportation infrastructure	Renewable energy installation	Research and development and system installation of smart grids and energy storage technologies	Research and innovation in carbon capture, utilization, and storage (CCUS) technology	Other applications related to low-carbon and circular economy technologies	Other
3 Whether"Ordinary economic activities (OEAs)" and "Forward-looking economic activities (FLEAs)." under this guideline are applicable	OEA	OEA	OEA	FLEA	FLEA	FLEA	FLEA	Not eligible
4 Determine whether the activities are a	sustainable economic activity based							
Criterion 1: Compliance with the technical screening criterion of "making substantial contributions to mitigating climate change."	Yes	No	Yes					
Criterion 2: whether the activity "does no significant harm (DNSH) to the other five environmental objectives"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Criterion 3: Compliance with the criterion of "not causing significant harm to social security."	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
5 Is there any improvement plan?								
Results: Compliance and sustainability level	Yes	Working on it	Yes	Yes	Yes	Yes	Yes	Not eligible

6.5 / GRI Standards Reference Table

Statement of use	TCC Group Holdings CO.,LTD has reported in accordance with the GRI Standards for the period from January 1, 2023 to December 31, 2023.
GRI 1 used	GRI 1: Foundation 2021
Applicable GRI Sector Standard	GRI 14: Mining Sector

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
General Disclosures					
GRI 2: General Disclosures 2021					
2-1	Organizational details	About the Report	01		
		Green Globalization: Diversity | Resilience Innovation | Growth Global Presence around the World	05		
2-2	Entities included in the organization's sustainability reporting	About the Report	01		
2-3	Reporting period, frequency and contact point	About the Report	01	No restatement of information in 2023	
2-4	Restatements of information	-	-		
2-5	External assurance	About the Report	01		
		Appendix AA 1000 Assurance Opinion Statement	215		
		Appendix ISAE 3000 Assurance Report	216	No significant changes to the operations of TCC in 2023	
2-6	Activities, value chain and other business relationships	Appendix ISAE 3000 Assurance Report	216		
		Sustainable Value Chain: SDG Alignment	11		
		1.7 Sustainable Supply Chain Management	56		
2-7	Employees	6.1 ESG Data Sheet	160		
2-8	Workers who are not employees	6.1 ESG Data Sheet	160		
2-9	Governance structure and composition	1.1 Sustainable Governance	39		
2-10	Nomination and selection of the highest governance body	1.1 Sustainable Governance	39		
2-11	Chair of the highest governance body	1.1 Sustainable Governance	39	Mr. Nelson An-ping Chang is the Chairman of TCC, overseeing all affairs of subsidiaries and affiliated companies, and supervising the managers of the company, subsidiaries, and affiliated companies. This role is different from that of Mr. Roman Cheng, President of TCC. Therefore, the Chairman and the President of TCC are different individuals.	
2-12	Role of the highest governance body in overseeing the management of impacts	1.1 Sustainable Governance	39		
		Double Materiality Analysis of Sustainability Issues	26		

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
2-13	Delegation of responsibility for managing impacts	1.1 Sustainable Governance	39		
2-14	Role of the highest governance body in sustainability reporting	About the Report	01		
2-15	Conflicts of interest	1.1 Sustainable Governance	39	For the important resolutions of the Board of Directors, and the Director recusal due to conflicts of interest, please refer to the section “Board of Directors” on TCC Official Website.	
2-16	Communication of critical concerns	1.1 Sustainable Governance	39	For matters pertaining to communication, please refer to the minutes of the Board of Directors and of the Corporate Sustainable Development Committee at “Investors – Committees” on TCC Official Website.	
		1.3 Risk Management Implementation Framework	44		
2-17	Collective knowledge of the highest governance body	1.1 Sustainable Governance	39		
2-18	Evaluation of the performance of the highest governance body	1.1 Sustainable Governance	39		
2-19	Remuneration policies	1.1 Sustainable Governance	39	Please refer to TCC Annual Report for the remunerations paid to Directors, Supervisors, President, and Vice Presidents. In addition, there is no clawback mechanism in place at TCC.	
2-20	Process to determine remuneration	1.1 Sustainable Governance	39	Please refer to the Remuneration Committee Charter.	
2-21	Annual total compensation ratio	-	-	The ratio of the annual total compensation for the organization’s highest-paid individual to the median annual total compensation for all employees in 2023 is 79:1 (compensation includes: salary, year-end bonus, and variable bonus). The ratio of the percentage increase in the annual total compensation in 2023 is -5%.	
2-22	Statement on sustainable development strategy	Chairman’s Address	02		
2-23	Policy commitments	Total Climate Commitment	15		
		Total Care Commitment	21		
2-24	Embedding policy commitments	5.5 Human Rights Protection	147		
2-25	Processes to remediate negative impacts	Double Materiality Analysis of Sustainability Issues	26		
		5.5 Human Rights Protection	147		
2-26	Mechanisms for seeking advice and raising concerns	1.6 Ethical Management	54		

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
2-27	Compliance with laws and regulations	1.6 Ethical Management	54		
2-28	Membership associations	6.8 External Participation and Engagement Performances	209		
2-29	Approach to stakeholder engagement	Double Materiality Analysis of Sustainability Issues	26		
2-30	Collective bargaining agreements	5.5 Human Rights Protection	147		
Material Topics					
GRI 3: Material Topics 2021					
3.1	Process to determine material topics	Double Materiality Analysis of Sustainability Issues	26		
3.2	List of material topics	Double Materiality Analysis of Sustainability Issues	26		
Material Topic | Climate Actions & Net-zero Emissions					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.1.1 , 14.2.1
GRI 201: Economic Performance 2016					
201-2	Financial implications and other risks and opportunities due to climate change	1.4 TCFD for Climate-related Risks & Opportunities	46		14.2.2
GRI 302: Energy 2016					
302-1	Energy consumption within the Organization [Note]	6.1 ESG Data Sheet	160	In 2023, the total internal energy consumption was 96,157,155 GJ. Of this, non-renewable energy consumption was 94,087,833 GJ, and renewable energy consumption was 2,069,322GJ. The categories of non-renewable energy included coal, diesel, gasoline, natural gas, purchased electricity, power generation by waste heat recovery, and non-renewable alternative fuels, with non-renewable alternative fuels totaling 7,853,691GJ. The categories of renewable energy included renewable biomass fuels and self-generated solar power. Renewable biomass fuels, converted at 4.186kJ per kcal, amounted to approximately 2,008,722GJ. Self-generated solar power, converted at 3.6GJ/kWh, amounted to approximately 60,600GJ.	14.1.2

Note The scope of energy consumption includes the cement and concrete business, covering cement plants in Taiwan and Mainland China, RMC Plants, Distribution Stations (excluding those under the jurisdiction of RMC plants), and Operations Offices.

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
302-3	Energy intensity	6.1 ESG Data Sheet	160		14.1.3
302-4	Reduction of energy consumption	6.1 ESG Data Sheet	160	In 2023, energy-saving plan of plants achieved a total electricity savings of 4,937 thousand kWh and coal savings of 2,673 tons, which, converted using 3.6 GJ per thousand kWh for electricity and a conversion factor of 5,532.69 kcal/kg for coal at the Suao plant, equates to 17,837 GJ.	
GRI 305: Emissions 2016					
305-1	Direct (Scope 1) GHG emissions	6.1 ESG Data Sheet	160	The greenhouse gases include CO_2, CH_4, N_2O, and HFCs, with no GHG emissions of PFCs, SF_6, and NF_3.	14.1.4
		6.3 Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies	189		
305-2	Energy indirect (Scope 2) GHG emissions	6.1 ESG Data Sheet	160		14.1.5
		6.3 Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies	184		14.1.6
305-3	Other indirect (Scope 3) GHG emissions	6.1 ESG Data Sheet	160		14.2.2
		6.3 Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies	189		
305-4	GHG emissions intensity	6.1 ESG Data Sheet	160		14.1.7
		6.3 Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies	189		
Material Topic | Resource Co-processing					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.5.1

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
GRI 306: Waste 2020					14.5.2
306-1	Waste generation and significant waste-related impacts	2.2 Low-carbon Production Value Chain	71		
		2.3 Resource Recycling	79		
306-2	Management of significant waste-related impacts	2.2 Low-carbon Production Value Chain	71		14.5.3
		2.3 Resource Recycling	79		
306-3	Waste generated	2.2 Low-carbon Production Value Chain	71		14.5.4
306-4	Waste diverted from disposal	2.2 Low-carbon Production Value Chain	71		14.5.5
Material Topic | Green Energy and Energy Storage					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		
GRI 302: Energy 2016					
302-1	Energy consumption within the Organization Note	6.1 ESG Data Sheet	160	In 2023, the total internal energy consumption was 96,157,155 GJ. Of this, non-renewable energy consumption was 94,087,833 GJ, and renewable energy consumption was 2,069,322 GJ. The categories of non-renewable energy included coal, diesel, gasoline, natural gas, purchased electricity, power generation by waste heat recovery, and non-renewable alternative fuels, with non-renewable alternative fuels totaling 7,853,691 GJ. The categories of renewable energy included renewable biomass fuels and self-generated solar power. Renewable biomass fuels, converted at 4.186 kJ per kcal, amounted to approximately 2,008,722 GJ. Self-generated solar power, converted at 3.6 GJ/kWh, amounted to approximately 60,600 GJ.	
302-3	Energy intensity	6.1 ESG Data Sheet	160	In 2023, energy-saving plan of plants achieved a total electricity savings of	
302-4	Reduction of energy consumption	6.1 ESG Data Sheet	160	4,937 thousand kWh and coal savings of 2,673 tons, which, converted using 3.6 GJ per thousand kWh for electricity and a conversion factor of 5,532.69 kcal/kg for coal at the Suao plant, equates to 17,837 GJ.	

Note The scope of energy consumption includes the cement and concrete business, covering cement plants in Taiwan and Mainland China, RMC Plants, Distribution Stations (excluding those under the jurisdiction of RMC plants), and Operations Offices.

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
Material Topic | Sustainable Products and Services					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		
GRI 301: Materials 2016					
302-1	Recycled input materials used	6.1 ESG Data Sheet	160		
Material Topic | Legal Compliance					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		
GRI 205: Anti-corruption 2016					
205-3	Confirmed incidents of corruptionand actions taken	1.6 Ethical Management	54		
GRI 206: Anti-competitive Behavior 2016					
206-1	206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	1.6 Ethical Management	54		
Material Topic | Workplace Health and Safety					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.16.1
GRI 403: Occupational Health and Safety 2018					
403-1	Occupational health and safety management system	5.4 Occupational Health & Safety	145		14.16.2
403-2	Hazard identification, risk assessment, and incident investigation	5.4 Occupational Health & Safety	145		14.16.3

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
403-3	Occupational health services	5.4 Occupational Health & Safety	145	In compliance with Article 18 of the Occupational Safety and Health Act, TCC offers procedures for laborers to report occupational hazards or danger as well as policies and procedures for them to withdraw from conditions that may lead to harm or illness, and the laborers shall be free from any unfavorable treatment as a result.	14.16.4
403-4	Worker participation, consultation, and communication on occupational health and safety	5.4 Occupational Health & Safety	145		14.16.5
403-5	Worker training on occupational health and safety	5.4 Occupational Health & Safety	145		14.16.6
403-6	Promotion of worker health	5.4 Occupational Health & Safety	145		14.16.7
403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	5.4 Occupational Health & Safety	145		14.16.8
403-8	Workers covered by an occupational health and safety management system	5.4 Occupational Health & Safety	145		14.16.9
403-9	Work-related injuries	6.1 ESG Data Sheet	160		14.16.10
403-10	Work-related ill health	5.4 Occupational Health & Safety	145	▌In 2023, there were no cases of work-related ill health among employees in Taiwan (excluding E.G.C. CEMENT CORP and Ho Sheng Mining Co., Ltd.). ▌Information on work-related ill health among non-employee workers for 2023 was unavailable, thus relevant information was not disclosed.	14.16.11

Material Topic | R&D Innovation					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
Material Topic | Biodiversity					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		
GRI 101: Biodiversity 2024					
101-1	Policies to halt and reverse biodiversity loss	4.1 Nature Action at TCC	114		14.4.2
101-2	Management of biodiversity impacts	4.1 Nature Action at TCC	114		14.4.3
101-3	Access and benefit-sharing	4.1 Nature Action at TCC	114		14.4.4
101-4	Identification of biodiversity impacts	4.1 Nature Action at TCC	114		14.4.5
101-5	Locations with biodiversity impacts	4.1 Nature Action at TCC	114	▌Please refer to the 2023 TNFD Report for further details. ▌In 2023, TNFD LEAP methodology was applied to analyze cement plants and mining areas in Taiwan, as well as Ho-Ping Power Company and Ho-Ping Port. Future plans include extending the assessment scope to other operational sites and suppliers.	14.4.6
101-6	Direct drivers of biodiversity loss	4.1 Nature Action at TCC	114		14.4.7
101-7	Changes to the state of biodiversity	4.1 Nature Action at TCC	114		14.4.8
101-8	Ecosystem services	4.1 Nature Action at TCC	114		
Material Topic | Local Inclusion					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.10.1
GRI 413: Local Communities 2016					
413-1	Operations with local community engagement, impact assessments, and development programs	5.6 Social Inclusion	150	▌The Hoping Plant has engaged a comprehensive communication and impact assessment of local communities, which accounted for 50% of the cement plants.	14.10.2
413-2	Operations with significant actual and potential negative impacts on local communities	5.6 Social Inclusion	150	▌In 2023, the Hoping Emergency Relief Fund approved 21 subsidy cases, with a total subsidy amount of NT$550,000. ▌TCC has introduced the Social Return on Investment (SROI) and has been accredited by Value UK in December 2021 that for every NT$1 invested by TCC DAKA, social value worth of NT$3.54 was generated. Please refer to TCC SROI Report for relevant information.	14.10.3

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
Material Topic | Talent Cultivation and Development					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.17.1
GRI 404: Training and Education 2016					
404-1	Average hours of training per year peremployee	5.2 Employee Development of DEI	137		14.17.7
		6.1 ESG Data Sheet	160		
404-3	Percentage of employees receiving regular performance and career development reviews	5.2 Employee Development of DEI	137		
Material Topic | Pollution Control and Management					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.3.1
GRI 305: Emissions 2016					
305-7	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	2.2 Low-carbon Production Value Chain	71		14.3.2
		6.1 ESG Data Sheet	160		
Material Topic | Water Resources Management					
GRI 3: Material Topics 2021					
3.3	Management of material topics	Double Materiality Analysis of Sustainability Issues	26		14.7.1
GRI 303: Water and Effluents 2018					
303-1	Interactions with water as a shared resource	2.2 Low-carbon Production Value Chain	71		14.7.2
303-2	Management of water discharge-related impacts	2.2 Low-carbon Production Value Chain	71		14.7.3
303-3	Disclosure Water withdrawal	6.1 ESG Data Sheet	160		14.7.4
303-4	Water discharge	6.1 ESG Data Sheet	160		14.7.5
303-5	Water consumption	6.1 ESG Data Sheet	160		14.7.6

Item	Disclosure	Corresponding Section	Page	Description/Synopsis	GRI Sector Standard Ref
Specific Topic Disclosures					
GRI 204: Procurement Practices 2016					
204-1	Proportion of spending on local suppliers	1.7 Sustainable Supply Chain Management	56		
GRI 401: Employment 2016					
401-1	New employee hires and employee turnover	6.1 ESG Data Sheet	160		
401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	5.3 Employee Remuneration & Benefits	140		
401-3	Parental leave	6.1 ESG Data Sheet	160		
GRI 405: Diversity and Equal Opportunity 2016					
405-1	Diversity of governance bodies and employees	1.1 Sustainable Governance	39		
		5.2 Employee Development of DEI	137		
		6.1 ESG Data Sheet	160		
405-2	Ratio of basic salary and remuneration of women to men	-	-	2023 Ratio of basic salary and remuneration of women to men	

Taiwan

Employee Type	Base Salary	Annual Remuneration
Top management	99:100	122:100
Management level	103:100	101:100
Non-management level	99:100	94:100

Mainland China

Employee Type	Base Salary	Annual Remuneration
Top management	100:100	101:100
Management level	97:100	99:100
Non-management level	87:100	85:100

Note [1]Management level: Assistant Vice President and above; Mid-level managers: Section Specialist to Senior Manager; General staff: Direct Employees, Specialists, Engineers, Researchers.
Note [2]Base salary: Monthly salary (including year-end bonus); Annual remuneration: Base salary and variable bonuses.
Note [3]The scope of TCC's significant locations of operation is consistent with the scope of disclosure in 2023 TCC Sustainability Report.

Note [1] The disclosure topics without corresponding GRI Sector Standards are not of the material topics identified this year, including topics 14.6, 14.8 to 14.15, and 14.18 to 14.25.
Note [2]The Material Topic "Talent Cultivation and Development" corresponds to the disclosure items in "Topic 14.17 Employment practices" of GRI 14; nevertheless, since items 14.17.2 to 14.17.6 and 14.17.9. to 14.17.10 have low relevance to talent cultivation and development, they are not applicable to the Material Topic.
Note [3]Information for disclosure items 14.1.9, 14.5.6, 14.10.4, and 14.16.9 have not been fully collected yet for the company's mining-related subsidiaries, as GRI 14 will be issued in 2024. The information will be disclosed once it is complete.

6.6 / Sustainability Accounting Standards Board (SASB) Reference Table

Construction Materials

Topic	Code	Category	Metric	Page		
Greenhouse Gas Emissions	EM-CM-110a.1	Quantitative	Gross global Scope 1 emissions	160	No TCC operation sites is located in the areas of emissions-limiting regulations.	
			Percentage covered under emissions-limiting regulations	-		
	EM-CM-110a.2	Qualitative	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	15		
Air Quality	EM-CM-120a.1	Quantitative	Air emissions of the following pollutants: (1) NOx (excluding N_2O), (2) SOx, (3) particulate matter (PM10), (4) dioxins/furans, (5) volatile organic compounds (VOCs), (6) polycyclic aromatic hydrocarbons (PAHs), and (7) heavy metals	160	The scope of disclosure covers mainly the stationary sources.	
Energy Management Note	EM-CM-130a.1	Quantitative	Total energy consumed	-	96,157,155 GJ	The total energy consumed in the organization in 2023 was 9,862,413 GJ.
			Percentage grid electricity	-	6.65%	The proportion of grid electricity was the proportion of purchased electricity in the total energy consumption.
			Percentage alternative	-	Taiwan 9.01% Taiwan and Mainland China (weighted average) 10.26%	The proportion of alternative energy was the proportion of alternative fuels (including woodchips, SRF, and waste paper) in the total energy consumption.
			Percentage renewable	-	Taiwan 0.07% Taiwan and Mainland China (weighted average) 0.06%	The proportion of renewable energy was the proportion of self-generated renewable energy for self-consumption in the total energy consumption.
Water Management	EM-CM-140a.1	Quantitative	Total fresh water withdrawn	-	Total fresh water withdrawn: 30,322.56 megaliters Total water consumption: 30,040.34 megaliters Total water withdrawn in water-stressed areas: 1,923.40 megaliters Total water consumption in water-stressed areas: 1,923.40 megaliters	
			Total water consumed	-		
			Percentage in regions with High or Extremely High Baseline	-		
			Water Stress			

Note The scope of energy consumption includes the cement and concrete business, covering cement plants in Taiwan and Mainland China, RMC Plants, Distribution Stations (excluding those under the jurisdiction of RMC plants), and Operations Offices.

Topic	Code	Category	Metric	Page	
Waste Management	EM-CM-150a.1	Quantitative	Amount of waste generated	160	No hazardous wastes at TCC
			Percentage hazardous	-	
			Percentage recycled	-	
Biodiversity Impacts	EM-CM-160a.1	Qualitative	Description of environmental management policies and practices for active sites	112	A total of 756.54 hectares have been mined at operational sites in Taiwan and Mainland China. Of this, 188.96 hectares have been restored and reforested, achieving a recovery rate of 25%.
	EM-CM-160a.2	Quantitative	Terrestrial acreage disturbed	-	
			Percentage of impacted area restored	-	
Workforce Health & Safety	EM-CM-320a.1	Quantitative	Total recordable incident rate (TRIR) for full-time employees and contract employees	160	
	EM-CM-320a.2	Quantitative	Near miss frequency rate (NMFR) for full-time employees and contract employees	160	
		Quantitative	Number of reported cases of silicosis	-	No cases of silicosis reported at TCC in 2023
Product Innovation	EM-CM-410a.1	Quantitative	Percentage of products that qualify for credits in sustainable building design and construction certifications	-	Of the TCC concrete products sold to clients in 2023, the sales for green building applications accounted for 5.5% of the total revenue.
	EM-CM-410a.2	Quantitative	Total addressable market and share of market for products that reduce energy, water, and/or material impacts during usage and/or production	-	36% (Note)
Pricing Integrity & Transparency	EM-CM-520a.1	Quantitative	Total amount of monetary losses as a result of legal proceedings associated with cartel activities, price fixing, and anti-trust activities	-	None
Activity Metrics	EM-CM-000.A	Quantitative	Production by major product line	-	2023 Production (metric ton)

	Taiwan	Mainland China	Total
Clinker	4,399,442.26	21,652,988.40	26,052,430.66
Cement	4,048,125.74	23,338,409.01	27,386,534.75
Cementitious materials	4,736,969.65	26,811,285.08	31,548,254.73
280-grade concrete	4,540,188.50		4,540,188.50
350-grade concrete	1,891,155.45		1,891,155.45
420-grade concrete	894,781.65		894,781.65

Note Low-carbon products sold in 2023 include Type I Portland cement and Type II (MH) Portland cement that have obtained the carbon reduction label and have been certified as low-carbon cyclic materials by the Ministry of the Interior in Taiwan; Portland limestone cement and Portland limestone cement concrete; cement with a binding material ratio of less than 50% that has obtained a carbon reduction label or green building material certification; and low-carbon cement certified in Mainland China.

6.7 / United Nations Global Compact (UNGC) Cross-Reference Table

The United Nations Global Compact (UNGC) consists of ten universal principles formulated for corporate operational strategies and policies, covering human rights, labor, environmental protection, and anti-corruption.

Area	UNGC	TCC Practices	Corresponding Sections
Human Rights	1.Businesses should support and respect the protection of internationally proclaimed human rights 2.Make sure that they are not complicit in human rights abuses.	TCC is committed to complying with labor regulations globally, protecting employee rights, and upholding principles stated in key international human rights treaties such as the United Nations Global Compact, the Universal Declaration of Human Rights, the International Labour Organization's Declaration on Fundamental Principles and Rights at Work, the United Nations Guiding Principles on Business and Human Rights, the United Nations Declaration on the Rights of Indigenous Peoples, and the International Labour Organization Convention No. 169. The implementation guidelines include: ▌Promoting diversity, inclusion, and equal job opportunities (including the prohibition of child labor, forced labor, and employment discrimination) ▌Providing a safe and healthy work environment ▌Respecting the freedom of association and the right to collective bargaining for employees ▌Assisting employees in maintaining mental and physical health and work-life balance ▌Addressing the needs of stakeholders ▌Protecting personal data	5.5 Human Rights Protection
Labor	3.Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; 4.the elimination of all forms of forced and compulsory labor 5.the effective abolition of child labor 6 the elimination of discrimination in respect of employment and occupation.		
Environment	7. Businesses should support a precautionary approach to environmental challenges 8. undertake initiatives to promote greater environmental responsibility 9. encourage the development and diffusion of environmentally friendly technologies.	TCC focuses on decarbonization and green transition as its core strategy, promotingLow-Carbon Building Materials, Resource Recycling, and Green Energy. TCC reduces carbon emissions in construction materials, optimizing new energy, and develops negative carbon technologies to expand growth momentum within its own operations in the value chain, enhance the 'green content', and seize the green business opportunities. These include: 1.Low-Carbon Construction Materials: Expanding the market for low-carbon products. 2.Resource Recycling: Smart low-carbon production and co-processing of waste. 3.Green Energy: Setting up new energy projects and participating in the electricity trading market. 4.Negative Carbon Technologies: Application of oxygen-enriched and pure oxygen combustion technologies for carbon capture and reuse.	Total Climate Commitment 02 Reducing Carbon | Joint Effort to Build a Green Future 03 Greening | The New Era Led by Green Energy
Anti-Corruption	10. Businesses should work against corruption in all its forms, including extortion and bribery.	TCC adheres to high standards of integrity in all business interactions and adopts a zero-tolerance approach to corruption and bribery. TCC has established an 'Anti-Corruption and Anti-Bribery Policy.' In 2021, TCC implemented the ISO 37001 Anti-Bribery Management System, setting clear guidelines, and provides guidance for stakeholders to help prevent corrupt and bribery activities.	

6.8 / External Participation and Engagement Performances

Participation in Industry Associations/Sustainability Initiatives & Organizations

TCC is committed to addressing climate change, advancing the circular economy, protecting biodiversity, and fostering new tech R&D. TCC collaborate with global sustainability associations, contributing to GCCA's carbon neutrality roadmap and promoting low-carbon products together with fellow peers worldwide. Domestically, TCC participates in sustainability seminars, influence regulations, and have developed industry-specific OHS guidelines and translated the Circular Transition Indicators and Water Circularity Metric. In line with global trends, TCC joined the Taiwan Nature Positive Initiative and endorsed Business for Nature's "Make it Mandatory" pledge. TCC actively engage with a network of experts to learn and share insights on sustainability.

Association	Board of Directors/ Supervisors	Professional Committee	Member-ship	Topic(s) for Collaboration
Climate Group			▲	EP100
Global Cement and Concrete Association (GCCA)			▲	▌Green procurement issues ▌Low-carbon products ▌Net-zero emissions issues
International Corporate Governance Network (ICGN)			▲	
Morgan Stanley Capital International (MSCI)			▲	Information of international ratings
The Third Wednesday Club	▲		▲	
Chinese National Association of Industry and Commerce, Taiwan	▲		▲	
Chinese Institute of Mining & Metallurgical Engineers			▲	
Taiwan Corporate Governance Association			▲	
Taiwan-Turkey Business Association			▲	
CNS Certification Mark Association			▲	
Chinese Arbitration Association, Taipei			▲	
Cranes and Hoist Equipment Association, R.O.C.			▲	
Kaohsiung City Renwu Industrial Park Manufacturers' Association			▲	
The Institute of Internal Auditors –Chinese Taiwan			▲	
CommonWealth CWS			▲	Team Leader of "Social Participation", Sustainability Capacity-building Workshop
Taiwan Photovoltaic Industry System Association	▲		▲	Assistance to the association members to promote aquavoltaics
Tainan City General Industrial Association			▲	
Taiwan Institute for Sustainable Energy				
Taiwan Bio-energy Technology Development Association				
Taiwan Cement Manufacturers' Association	▲	▲	▲	Guidelines for Safety and Health at Work for the Cement Industry

Association	Board of Directors/ Supervisors	Professional Committee	Member-ship	Topic(s) for Collaboration
Taiwan Marble Association	▲	▲	▲	
Taiwan Concrete Institute	▲	▲	▲	Concrete quality/engineering specifications
Taiwan Institute of Directors	▲		▲	
Taiwan Electric Power Association		▲	▲	
Taiwan Carbon Capture Storage and Utilization Association			▲	
Taiwan Business Council for Sustainable Development		▲	▲	
Monte Jade Science and Technology Association of Taiwan			▲	
Taiwan Accreditation Foundation			▲	
Cross-Strait CEO Summit		▲	▲	
Yilan County Industrial Association			▲	
Chinese Alliance for Solidarity Association			▲	
Chinese Blood Donation Association			▲	
Taiwan Society for Circular Economy			▲	
Taiwan Stock Affairs Association			▲	
Hualien County Industrial Association			▲	
Kaohsiung Chamber of Industry			▲	
Chinese International Economic Cooperation Association			▲	
Association of Taiwan Net Zero Emissions		▲	▲	
New Taipei City Industrial Association			▲	
Accounting Research and Development Foundation			▲	
Chiayi Hsien Industrial Association			▲	
Minsyong (with Touciao) Industrial Park Manufacturers Association			▲	
Kaohsiung Linhai Industrial Park Manufacturers Association			▲	
Taiwan Ready-Mixed Concrete Industry Association	▲	▲	▲	Business/technical exchange
Taichung City Ready-Mixed Concrete Industry Association	▲		▲	Business/technical exchange
ACPAC			▲	Exchange of information on the Asian cement market
Taiwan Electrical and Electronic Manufacturers' Association			▲	
Taiwan Photovoltaic Industry Association	▲		▲	Support to the association members in solar power plant development
Center for Corporate Sustainability			▲	

Association	Board of Directors/ Supervisors	Professional Committee	Member-ship	Topic(s) for Collaboration
Business for Nature			▲	Business for Nature “Call to Action” & Business for Nature “Make it Mandatory”
Taiwan Electric Vehicle (EV) Power Charging Technology Promotion Alliance			▲	Staying abreast of the latest EV charging system specifications and regulations, and collaborating with peers to track industry trends
ESG Global Views Common Good Ecosphere			▲	

Participation Concerning Policies and Regulations

Organization	Topic for Participation	Contributions of TCC
National Fire Agency (NFA) Industrial Technology Research Institute	NFPA855, UL9540A, and other fire safety and regulatory	TCC’s dialogue with the NFA on NFPA855 and UL9540A standards led to the revision of fire safety guidelines for outdoor energy storage, enhancing safety measures. The contents amended include: ①The capacity limit in Article 7 has been revised to allow for a higher threshold than the previous 50 kWh per unit. ②Design and installation issues were addressed in Articles 4 to 6. The NFA granted exemptions based on performance-based regulations and international standards like IEC62933 and UL9540. ③Article 7 now permits a reduced installation distance for energy storage systems to three meters from buildings and public areas, down from thirty meters. NHOA.TCC can present a TAF-accredited laboratory’s report on UHPC panels’ 2-hour temperature increase curve under CNS12514-1/-8 standards for compliance.
Taipei City Government	Safety of energy storage cabinet	Proposed aligning UHPC cabinet fire safety certification with UL Standards, including UL 263: Fire Tests of Building Construction and Material, UL 10C: Standard for Positive Pressure Fire Tests of Door Assemblies, UL 1479 Standard Method of Fire Tests Through-Penetration Firestops, and NFPA 5000: Building Construction and Safety Code. Also suggested assessing compliance with European Standards for the global market.
Industrial Development Bureau, MOEA	The Program for Green Factory Label System and Clean Production Assessment Mechanism	The Green Factory Program was executed by the Foundation of Taiwan Industry Service, which TCC assisted in the evaluation and discussion of the green environment sustainable optimization indicators questionnaire.

Participation in International Organizations and Initiatives

International Organization/Initiative	Performance in 2023
Global Cement and Concrete Association Low Carbon Procurement Task	▌Participation in the promotion video for Women's Day. ▌Participation in the Third-Party Verification of the 2022 GCCA Charter Compliance Audit. ▌Support to Mission Possible Partnership (MPP) in presenting the industrial transition Accelerator at COP28. ▌Participation in the CEO Gathering. Contributions of TCC: ▌Participation in the low-carbon procurement group to discuss the green procurement regulations for public constructions. ▌Participation in the standardization group to assist in establishing the sustainability performance indicators for the industry and align with the European standards for the cement industry. ▌Participation in the Getting the Numbers Right (GNR) project to help establish the carbon emissions database for the cement industry. ▌Participation in the Innovandi Global Cement and Concrete Industry Research Network (GCCRN) to explore the innovative technologies for carbon reduction.
EP100	▌Selected for the EP100 2024 Annual Progress and the Insights Report "Energy efficiency: Net Zero's invisible ally," with the Chairman invited to provide a foreword. ▌TCC exceeded its 2022 energy efficiency target by 40%. Contributions of TCC: ▌Taiwan's first large-size manufacturer to join EP100 in July 2022. ▌Improve energy productivity by 50% by 2040 relative to a 2016 baseline year. ▌100% cement plants in Taiwan and Mainland China obtained ISO 50001 certification, enhancing power generation by waste heat recovery, energy-saving technological improvements, and expanding the use of alternative fuels.
Business for Nature - It's Now for Nature	▌Recognized by Business for Nature, representing the construction materials industry alongside global companies such as ENGIE, GSK, and Kering as part of the It's Now for Nature strategy partnership. Contributions of TCC: ▌Since 2016, TCC has rehabilitated mining areas, establishing nurseries and facilities for native species. A PV-powered irrigation system with energy storage, windbreaks, and rainwater harvesting are implemented to address environmental challenges. ▌In 2023, began carbon sequestration surveys in mining areas. Proportion of soil organic matter increased by 1.3 times which suggests the rehabilitated mines have begun to recover ecosystem services. ▌Continuously applying and evaluating natural strategies within the TNFD framework, responding to the United Nations CBD and the It's Now for Nature goals, and aims to halt and reverse biodiversity loss by 2030.

Participation in International Organizations and Initiatives

International Organization/Initiative	Performance in 2023
The Taskforce on Nature-related Financial Disclosures, TNFD	▌The first major TNFD Early Adopter. ▌Release 2022 Nature & Biodiversity Report-TNFD Pilot Program. Contributions of TCC: ▌Participated in the TNFD pilot program and subsequently adopts the official framework. ▌Launched the Biodiversity Management Plan (BMP) and Quarry Rehabilitation Plan (QRP) in Taiwan, and the Coral Rehabilitation Project at Hoping Port. ▌Initiated research of soil carbon sequestration and biodiversity in soil at Hoping Plant and the rehabilitation areas of Hoping Mine. ▌Long-term supporter of the KBCC, establishing a world-class botanical conservation base.
CDP Climate Change	▌2023 CDP Climate Change B Contributions of TCC: ▌Participated in MOE meetings, providing industry data and experience to assist in formulating climate policies. ▌Promoted low-carbon products to customers and encouraged RMC clients to apply for green building certification. ▌Required suppliers to complete GHG inventories and established supplier carbon management capabilities through guidance and workshops. ▌Actively engaged in industry associations to exchange views on carbon and climate issues with peers.
CDP Water Security	▌2023 CDP Water “B” Contributions of TCC: ▌Water resource management plan adheres to government-imposed water usage restrictions and related policies. ▌Information provided during customer factory visits on production water usage and water recycling & reuse for the reduction on water consumption. ▌Suppliers are required to sign the Supplier Code of Conduct, which includes environmental objectives related to water resources management. ▌Participated in relevant meetings of industrial parks to communicate with local communities about the water reduction targets and management approaches.

APPENDIX

Appendix 1 External Independent Verification Statement

AA1000 Assurance Opinion Statement

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By Royal Charter

INDEPENDENT ASSURANCE OPINION STATEMENT

2023 TCC Group Holdings Sustainability Report

The British Standards Institution is independent to TCC Group Holdings (hereafter referred to as TCC in this statement) and has no financial interest in the operation of TCC other than for the assessment and verification of the sustainability statements contained in this report.

This independent assurance opinion statement has been prepared for the stakeholders of TCC only for the purpose of assuring its statements relating to its sustainability report, more particularly described in the Scope below. It was not prepared for any other purpose. The British Standards Institution will not, in providing this independent assurance opinion statement, accept or assume responsibility (legal or otherwise) or accept liability for or in connection with any other purpose for which it may be used, or to any person by whom the independent assurance opinion statement may be read.

This independent assurance opinion statement is prepared on the basis of review by the British Standards Institution of information presented to it by TCC. The review does not extend beyond such information and is solely based on it. In performing such review, the British Standards Institution has assumed that all such information is complete and accurate.

Any queries that may arise by virtue of this independent assurance opinion statement or matters relating to it should be addressed to TCC only.

Scope

The scope of engagement agreed upon with TCC includes the followings:

1. The assurance scope is consistent with the description of 2023 TCC Group Holdings Sustainability Report.
2. The evaluation of the nature and extent of the TCC's adherence to AA1000 AccountAbility Principles (2018) in this report as conducted in accordance with type 1 of AA1000AS v3 sustainability assurance engagement and therefore, the information/data disclosed in the report is not verified through the verification process.

This statement was prepared in English and translated into Chinese for reference only.

Opinion Statement

We conclude that the 2023 TCC Group Holdings Sustainability Report provides a fair view of the TCC sustainability programmes and performances during 2023. The sustainability report subject to assurance is free from material misstatement based upon testing within the limitations of the scope of the assurance, the information and data provided by the TCC and the sample taken. We believe that the performance information of Environment, Social and Governance (ESG) are fairly represented. The sustainability performance information disclosed in the report demonstrate TCC's efforts recognized by its stakeholders.

Our work was carried out by a team of sustainability report assurors in accordance with the AA1000AS v3. We planned and performed this part of our work to obtain the necessary information and explanations we considered to provide sufficient evidence that TCC's description of their approach to AA1000AS v3 and their self-declaration in accordance with GRI Standards were fairly stated.

Methodology

Our work was designed to gather evidence on which to base our conclusion. We undertook the following activities:

- a top level review of issues raised by external parties that could be relevant to TCC's policies to provide a check on the appropriateness of statements made in the report.
- discussion with managers on approach to stakeholder engagement. However, we had no direct contact with external stakeholders.
- 28 interviews with staffs involved in sustainability management, report preparation and provision of report information were carried out.
- review of key organizational developments.
- review of the findings of internal audits.
- review of supporting evidence for claims made in the reports.
- an assessment of the organization's reporting and management processes concerning this reporting against the principles of Inclusivity, Materiality, Responsiveness, and Impact as described in the AA1000AP (2018).

Conclusions

A detailed review against the Inclusivity, Materiality, Responsiveness, and Impact of AA1000AP (2018) and GRI Standards is set out below:

Inclusivity

This report has reflected a fact that TCC has continually sought the engagement of its stakeholders and established material sustainability topics, as the participation of stakeholders has been conducted in developing and achieving an accountable and strategic response to sustainability. There are fair reporting and disclosures for the information of Environment, Social and Governance (ESG) in this report, so that appropriate planning and target-setting can be supported. In our professional opinion the report covers the TCC's inclusivity issues.

Materiality

TCC publishes material topics that will substantively influence and impact the assessments, decisions, actions and performance of TCC and its stakeholders. The sustainability information disclosed enables its stakeholders to make informed judgements about the TCC's management and performance. In our professional opinion the report covers the TCC's material issues.

Responsiveness

TCC has implemented the practice to respond to the expectations and perceptions of its stakeholders. An Ethical Policy for TCC is developed and continually provides the opportunity to further enhance TCC's responsiveness to stakeholder concerns. Topics that stakeholder concern about have been responded timely. In our professional opinion the report covers the TCC's responsiveness issues.

Impact

TCC has identified and fairly represented impacts that were measured and disclosed in probably balanced and effective way. TCC has established processes to monitor, measure, evaluate, and manage impacts that lead to more effective decision-making and results-based management within the organization. In our professional opinion the report covers the TCC's impact issues.

GRI Sustainability Reporting Standards (GRI Standards)

TCC provided us with their self-declaration of in accordance with GRI Standards 2021 (For each material topic covered in the applicable GRI Sector Standard and relevant GRI Topic Standard, comply with all reporting requirements for disclosures). Based on our review, we confirm that sustainable development disclosures with reference to GRI Standards' disclosures are reported, partially reported, or omitted. In our professional opinion the self-declaration covers the TCC's sustainability topics.

Assurance level

The moderate level assurance provided is in accordance with AA1000AS v3 in our review, as defined by the scope and methodology described in this statement.

Responsibility

The sustainability report is the responsibility of the TCC's chairman as declared in his responsibility letter. Our responsibility is to provide an independent assurance opinion statement to stakeholders giving our professional opinion based on the scope and methodology described.

Competency and Independence

The assurance team was composed of auditors experienced in relevant sectors, and trained in a range of sustainability, environmental and social standards including AA1000AS, ISO 14001, ISO 45001, ISO 14064, and ISO 9001. BSI is a leading global standards and assessment body founded in 1901. The assurance is carried out in line with the BSI Fair Trading Code of Practice.

For and on behalf of BSI:

Peter Pu, Managing Director BSI Taiwan

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Statement No: SRA-TW-803866
2024-06-24

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Independent Auditors' Limited Assurance Report

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INDEPENDENT AUDITORS' LIMITED ASSURANCE REPORT

TCC Group Holdings Co., Ltd.

We have undertaken a limited assurance engagement on the selected performance indicators in the Sustainability Report ("the Report") of TCC Group Holdings Co., Ltd. ("the Company") for the year ended December 31, 2023.

Subject Matter Information and Applicable Criteria

See Appendix 1 for the Company's selected performance indicators ("the Subject Matter Information") and applicable criteria.

Responsibilities of Management

The management of the Company is responsible for the preparation of the Subject Matter Information in accordance with Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies, Universal Standards, Sector Standards and Topic Standards published by the Global Reporting Initiative (GRI), SASB Standards published by the Sustainability Accounting Standards Board (SASB), and the criteria specifically designed by the Company, and for such internal control as management determines is necessary to enable the preparation of the Subject Matter Information that are free from material misstatement resulted from fraud or error.

Auditors' Responsibilities

Our responsibility is to plan and conduct our limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) "Assurance Engagements Other Than Audits or Reviews of Historical Financial Information" issued by the International Auditing and Assurance Standards Board to issue a limited assurance report on whether the Subject Matter Information (see Appendix 1) is free from material misstatement. The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement and, therefore, a lower assurance level is obtained than a reasonable assurance.

We based on our professional judgment in the planning and conducting of our work to obtain evidence supporting the limited assurance. Because of the inherent limitations of any internal control, there is an unavoidable risk that even some material misstatements may remain undetected. The procedures we performed include, but not limited to:

- Inquiring of management and the personnel responsible for the Subject Matter Information to obtain an understanding of the policies, procedures, internal control, and information system relevant to the Subject Matter Information to identify areas where a material misstatement of the subject matter information is likely to arise.
- Selecting sample items from the Subject Matter Information and performing procedures such as inspection, re-calculation, re-performance, observation, and analytical procedures to obtain evidence supporting limited assurance.

Inherent Limitations

The Subject Matter Information involved non-financial information, which was subject to more inherent limitations than financial information. The information may involve significant judgment, assumptions and interpretations by the management, and the different stakeholders may have different interpretations of such information.

Independence and Quality Control

We have complied with the independence and other ethical requirements of the Norm of Professional Ethics for Certified Public Accountant in the Republic of China, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

The firm applies Standard on Quality Management 1 "Quality Management for Public Accounting Firms" issued by the Accounting Research and Development Foundation of the Republic of China, which requires the firm to design, implement and operate a system of quality management including policies or procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

Conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the Subject Matter Information is not prepared, in all material respects, in accordance with the applicable criteria.

Other Matters

We shall not be responsible for conducting any further assurance work for any change of the Subject Matter Information or the applicable criteria after the issuance date of this report.

Deloitte & Touche

Deloitte & Touche
Taipei, Taiwan
Republic of China

July 31, 2024

Independent Auditors' Limited Assurance Report

APPENDIX

SUMMARY OF SUBJECT MATTER INFORMATION

#	Subject Matter Information			Corresponding Section	Applicable Criteria
1.		Step and Action	Key Performance	Double Materiality Analysis of Sustainability Issues	GRI 3-1: 2021 Process to determine material topics
	Step1	Identify stakeholders Department heads complete a survey to rank and identify key stakeholders.	Categories of stakeholders identified		
	Step2	Zoom in on the sustainability issues of TCC List sustainability issues based on global trends, ratings.	25 sustainability issues cover corporate governance, economy, environment, and people and human rights		
	Step3	Assess impacts of sustainability issues on the economy, environment, people and human rights Hold a workshop on material topics, invite VP-level supervisors to identify impacts, and ask each unit to send survey in Chinese and English to 10 internal/external stakeholders to capture the levels of impact.	337 questionnaires collected		
	Step4	Assess impacts of sustainability issues on operation The Corporate Sustainable Development Committee and VP-level supervisors assess sustainability impacts on operation and rate the significance based on the "level of impact" and "likelihood" of respective impacts.	8 VP-level and above supervisors discussed at management meeting		
	Step5	Double materiality assessment & analysis Summarize internal/external survey results, map double materiality matrix, link issues and TCC sustainability strategies, and decide material topics for 2023.	12 material topics identified by the Corporate Sustainable Development Committee		
	Step6	Determine material topics Submit the 12 material topics identified to the Board of Directors to ensure these material topics are aligned with the business risks and strategies of TCC.	Submitted to the Board of Directors compliance of in sustainability and integrity		

#	Subject Matter Information	Corresponding Section	Applicable Criteria
2.	Energy Use in 2023	6.1 ESG Data Sheet	GRI 302-1: 2016 Energy consumption within the organization

In terms of Gigajoule (GJ)

Taiwan	
Cement Plants	
Coal	11,577,410
Diesel	36,179
Gasoline	678
Purchased Electricity	1,423,590
Power Generation by Waste Heat Recovery	228,780
Total	13,266,637
RMC Plants	
Diesel	15,493
Gasoline	5,408
Purchased Electricity	43,852
Total	64,753
Operations Offices	
Diesel	53
Gasoline	40
Natural Gas	58
Purchased Electricity	13,524
Total	13,675

- The heating values of coal for the Cement Plants in Taiwan are converted per the respective settings of the plants. The converted heating value of coal for the Suao Plant: 5,532.69 kcal/kg; the converted heating value of coal for the Hoping Plant: 5,570.14 kcal/kg; the converted heating value of coal for other plants: 5,500 kcal/kg. The values for other items are converted based on the heating values in the Emissions Factor Management Table (v. 6.0.4) released on the Energy Administration's website. The values are 5,500 kcal/kg for coal, 8,400 kcal/l for diesel, 7,800 kcal/l for gasoline, 3,600 GJ/GWh for electricity, and 8,000 (kcal/m3) for natural gas.
- Based on the 2023 cementitious materials yield of 4,736,970 metric tons in Taiwan, the energy consumption is 2.8007 GJ/metric ton of cementitious materials.
- In Taiwan, based on a 2023 clinker production of 4,399,442 tons, the electricity consumption for cement plants was 104.33 kWh/metric ton of clinker.
- Based on the 2023 concrete yield of 4,923,159.50 m3 in Taiwan, the energy consumption in concrete production is 0.01315 GJ/m3 of concrete.
- The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.
- Non-renewable alternative fuels, with non-renewable alternative fuels totaling 306,646 GJ. The categories of renewable energy included renewable biomass fuels and self-generated solar power. Renewable biomass fuels, converted at 4.186 kJ per kcal, amounted to approximately 1,016,321 GJ. Self-generated solar power, converted at 3.6 GJ/kWh, amounted to approximately 10,093 GJ.

#		Corresponding Section	Applicable Criteria
3.	Water Resources Use in 2023	6.1 ESG Data Sheet	GRI 303-3: 2018 Water withdrawal

Unit: million liters

Taiwan				
Item	Cement Plants	RMC Plants	Operations Offices	Total
Municipal Water	9.31	264.10	14.23	287.64
Groundwater	723.95	398.73	-	1,122.68
Industrial Water	721.85	-	-	721.85
Rainwater/Spring Water	693.64	-	-	693.64
Discharged Reclaimed Water	73.07	-	-	73.07

- The water use data on cement plants is the sum of the reported data. The municipal water use on RMC plants is the sum of water used on the water bills, and the groundwater data is the sum of the reported data, as the water use data is subject to the actual months of water use. The municipal water use data on the Operation Headquarters is the sum of water used on the water bills.
- The scope of disclosure for RMC plants is the water for which TCC holds water rights.
- All the sources of water are freshwater.
- TCC employed WRI's Aqueduct Water Risk Atlas to assess the future water supply Taiwan is not located in water stress areas.
- The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.

Independent Auditors' Limited Assurance Report

#	Subject Matter Information	Corresponding Section	Applicable Criteria
4.	Air Pollution Emissions on Cement Plants in 2023 (Taiwan) Unit: metric ton Item / 2023 NOx: 4,923 SOx: 97 VOCs: 0.00424 Particulate Matters: 168 Total: 5,188 • The calculation method is direct measurement of emissions or calculation based on specific site data; coefficient source: Appendix 1 (Emission Coefficient of Particulate Pollutants in Industry Processes) and Appendix 3 (Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium In Industry Processes, Dioxin Emission Coefficient) of Emissions of Particulate Pollutants, Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium, and Dioxin Reported for Air Pollution Control Fees from Fixed Pollution Sources in Public and Private Places Coefficient, Control Efficiency and Other Measurement Requirements and Declaration of Fixed Pollution Sources in Public and Private Places Industry Process Emission Coefficients, Operating Unit (Including Equipment Components) Emission Coefficients, Control Efficiency and Other Measurement Requirements for Volatile Organic Compounds in Air Pollution Control Fees. • Starting from the Q3 of 2018, heavy metal monitoring data was added at the request of the Ministry of Environment. The heavy metals (lead, cadmium, mercury, arsenic, and hexavalent chromium) emitted in 2023 was 0.752 metric ton. • Starting from the Q4 of 2018, the cement plants in Taiwan reported mercury emissions in accordance with legal requirements. No mercury was emitted by RMC plants. • The Hualien Plant did not operate in 2023 and had no air pollutant emissions. • The 2023 dioxin emissions from the cement plants in Taiwan were 0.0299 g I-TEQ. • The business of RMC plants was cement product ingredients mixing and transportation, thus had no air pollutant emissions.	6.1 ESG Data Sheet	GRI 305-7: 2016 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions
5.	Waste disposal in 2023 Unit: tons Taiwan Operation Sites / General waste (domestic waste) / Industrial waste / Valuable metal recycling / Total Cement Plants: 176.35 / 4,212.10 / 2,941.75 / 7,330.20 RMC Plants: 178.18 / 1,465.15 / 188.75 / 1,832.08 Operations Offices: 32.50 / 0 / 0 / 32.50 The data for the Operations Offices in Taiwan includes subsidiaries and affiliated companies located within the Operation Headquarters building, as well as the foundation.	6.1 ESG Data Sheet	GRI 306-3 2020 Waste generated

#	Subject Matter Information	Corresponding Section	Applicable Criteria
6.	**Work-related Injuries of Employees** Occupational Accidents: Operation Sites / Fatalities / Number of High-consequence Work-related Injuries / Number of Recordable Work-related Injuries; Fatality Rate; Rate of High-consequence Work-related Injuries; Rate of Recordable Work-related Injuries (TRIR); Actual Working Hours Operation Headquarters: 0 / 0 / 0 / 0 / 0 / 0 / 398,206 Plants in Taiwan: 0 / 0 / 3 / 0 / 0 / 0.32 / 1,881,618 • Work-related injuries are based on the monthly occupational accident reports submitted by each plant. • The main types of occupational injuries are entanglement, strikes, falls, and cuts. • Fatality Rate = (total number of fatalities/total actual working hours) × 200,000 • Rate of High-consequence Work-related Injuries = (total number of high-consequence work-related Injuries - number of fatalities/total actual working hours) × 200,000 • Rate of Recordable Work-related Injuries = (number of recordable work-related injuries/total actual working hours) × 200,000 • The scope of plants in Taiwan does not include distribution stations under the RMC plants, Ho Sheng Mining, and E.G.C. Cement. **Work-related Injuries of Contractors** Occupational Accidents: Operation Sites / Fatalities / Number of High-consequence Work-related Injuries / Number of Recordable Work-related Injuries; Fatality Rate; Rate of High-consequence Work-related Injuries; Rate of Recordable Work-related Injuries (TRIR); Actual Working Hours Taiwan: 2 / 0 / 3 / 0.23 / 0 / 0.34 / 1,762,803 • Work-related injuries are based on the monthly occupational accident reports submitted by each plant. • The main types of occupational injuries are entanglement, strikes, and falls. • Fatality Rate = (total number of fatalities/total actual working hours) × 200,000 • Rate of High-consequence Work-related Injuries = (total number of high-consequence work-related Injuries - number of fatalities/total actual working hours) × 200,000 • Rate of Recordable Work-related Injuries = (number of recordable work-related injuries/total actual working hours) × 200,000 • Some actual working hours are estimated based on the number of personnel entering the plant multiplied by 8 hours. • The scope of plants in Taiwan does not include distribution stations under the RMC plants, Ho Sheng Mining, and E.G.C. Cement.	6.1 ESG Data Sheet	GRI 403-9: 2018 Work-related injuries
7.	• No work-related Ill Health. • In 2023, there were no cases of work-related ill health among employees in Taiwan (excluding E.G.C.CEMENT CORP and Ho Sheng Mining Co., Ltd.). • Information on work-related ill health among non-employee workers for 2023 was unavailable, thus relevant information was not disclosed.	5.4 Occupational Health&Safety 6.5/GRI Standards Reference Table	GRI 403-10: 2018 Work-related ill health
8.	• The Hoping Plant has engaged a comprehensive communication and impact assessment of local communities, which accounted for 50% of the cement plants. • In 2023, the Hoping Emergency Relief Fund approved 21 subsidy cases, with a total subsidy amount of NT$550,000. • TCC has introduced the Social Return on Investment (SROI) and has been accredited by Value UK in December 2021 that for every NT$1 invested by TCC DAKA, social value worth of NT$3.54 was generated. Please refer to TCC SROI Report for relevant information.	6.5/GRI Standards Reference Table	GRI 413-1: 2016 Operations with local community engagement, impact assessments, and development programs
9.	2023 Production (Metric Ton) / Taiwan Clinker: 4,399,442.26 Cement: 4,048,125.74 Cementitious materials: 4,736,969.65 280-grade concrete: 4,540,188.50 350-grade concrete: 1,891,155.45 420-grade concrete: 894,781.65	6.6 Sustainability Accounting Standards Board Reference Table	SASB EM-CM-000.A Production by major product line

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#	Subject Matter Information	Corresponding Section	Applicable Criteria
10.	Number of Significant Suppliers and Procurement Share in 2023 (Taiwan and Mainland China) Item: 2023 Total number of Tier-1 suppliers: 2,719 Total number and Share of significant suppliers in Tier-1: 299 Total number of significant suppliers in non Tier-1: 47 Total number of significant suppliers: 346	6.1 ESG Data Sheet	Specifically designed indicator 1: Supplier Screening Process 2023: Total number of Tier-1 suppliers, Total number and Share of significant suppliers in Tier-1, Total number of significant suppliers in non Tier-1, Total number of significant suppliers Tier-1 suppliers: Suppliers who engaged in direct transactions with the company in 2023 Significant suppliers in Tier-1: Suppliers who engaged in direct transactions with the company in 2023, and who have a significant impact on the quality and delivery of the company's products, or whose procurement amount meets a certain threshold or proportion, or who pose a high ESG risk. Significant suppliers in non Tier-1: Suppliers of tier-1 significant suppliers of Tier-1 suppliers Significant suppliers: A Significant Supplier is one crucial to product quality and delivery, meets specific procurement amount or ratio, or poses a high ESG risk, requiring management and evaluation.

#	Subject Matter Information	Corresponding Section	Applicable Criteria
11.	Supplier Assessment Performance and Goals for 2023 Supplier Assessment: 2023 Total number of suppliers assessed (via desk assessments/on-site assessments): 301 Results Number of suppliers assessed with substantial actual/potential negative impacts: 12 Number of suppliers that were terminated: 1 Share of suppliers with agreed corrective action/improvement plan: 100% Supplier corrective plan performance and targets Total number of suppliers with substantial actual/potential negative impacts expected to be supported in corrective action plan implementation: 11 Total number of suppliers supported in corrective action plan implementation: 11 Performance and goals of suppliers capacity building programs Total number of suppliers in capacity building programs: 290	6.1 ESG Data Sheet	Specifically designed indicator 2: Supplier evaluation process: The number of suppliers reviewed in 2023, the number of suppliers with whom cooperation was terminated, and the number of suppliers identified as having potential/actual significant negative impact. Suppliers with potential/actual significant negative impact: Suppliers identified based on internal assessments as having significant actual or potential ESG negative impacts.
12.		6.1 ESG Data Sheet	Specifically designed indicator 3: Number of Suppliers Improved: The number of suppliers with potential/actual significant negative impacts in 2023 who received support for improvement plans, implemented improvement plans, and participated in capacity-building programs. Suppliers Receiving Improvement Plan Support: Suppliers who responded to the company's improvement notice and expressed their willingness to participate. Suppliers Implementing Improvement Plans: Suppliers who received the company's improvement recommendations and underwent subsequent follow-up. Suppliers in Capacity-Building Programs: Suppliers who responded to the company's carbon questionnaire or participated in sustainability governance workshops.

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#	Subject Matter Information	Corresponding Section	Applicable Criteria
13.	Air Pollution Emissions (Taiwan) Unit: Metric ton Item: 2023 Mercury Emissions: 0.16686 • The calculation method is direct measurement of emissions or calculation based on specific site data; coefficient source: Appendix 1 (Emission Coefficient of Particulate Pollutants in Industry Processes) and Appendix 3 (Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium In Industry Processes, Dioxin Emission Coefficient) of Emissions of Particulate Pollutants, Lead, Cadmium, Mercury, Arsenic, Hexavalent Chromium, and Dioxin Reported for Air Pollution Control Fees from Fixed Pollution Sources in Public and Private Places Coefficient, Control Efficiency and Other Measurement Requirements and Declaration of Fixed Pollution Sources in Public and Private Places Industry Process Emission Coefficients, Operating Unit (Including Equipment Components) Emission Coefficients, Control Efficiency and Other Measurement Requirements for Volatile Organic Compounds in Air Pollution Control Fees. • Starting from the Q3 of 2018, heavy metal monitoring data was added at the request of the Ministry of Environment. The heavy metals (lead, cadmium, mercury, arsenic, and hexavalent chromium) emitted in 2023 was 0.752 metric ton. • Starting from the Q4 of 2018, the cement plants in Taiwan reported mercury emissions in accordance with legal requirements. No mercury was emitted by RMC plants. • The Hualien Plant did not operate in 2023 and had no air pollutant emissions. • The 2023 dioxin emissions from the cement plants in Taiwan were 0.0299 g I-TEQ. • The business of RMC plants was cement product ingredients mixing and transportation, thus had no air pollutant emissions.	6.1 ESG Data Sheet	Specifically designed indicator 4: Mercury Emissions in 2023.

APPENDIX 2 EDITORIAL TEAM

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