TCC Vision & Drivers

"The Future is Worth It!
In everything you do, always put people first.
Life is the only answer."
--Chairman Nelson An-ping Chang

Fulfilling its Total Climate and Total Care commitments, TCC propels three core businesses: low-carbon construction materials, green energy, and resource recycling, creating solutions for the complex relationship between human civilization, climate, and nature.
TCC pursues a two-way deployment of carbon reduction and green growth, from reducing carbon emissions in its core business to helping others reduce carbon. Grounded in a human-centered philosophy, the company promotes diverse cross-domain and cross-age integration, driving low-carbon transition and building global competitiveness through four major drivers.

CORPORATE VISION

THE FUTURE IS WORTH IT

SUSTAINABILITY COMMITMENT

- Total Climate Commitment
- Total Care Commitment

CORE BUSINESS

- Resource Recycling
- Low-Carbon Construction Materials
- Green Energy

SUSTAINABILITY DRIVERS

- Robust Capital
- Carbon Competitiveness
- AI Innovation & Electrification
- Diversity and Inclusion

"In today's globalized world, market positioning must adapt to changing circumstances, diversify risks, seize business opportunities, and ensure steady growth."
~
Chairman
Nelson
An-ping Chang

Driver Robust Capital

TCC is transforming from a traditional industry role centered on cement to a diversified enterprise focused on innovation and energy. The cement markets in Taiwan and Mainland China, solidly establishing its growth foundation and forming two major pillars. In response to market changes, TCC proactively pursued internationalization. In March 2024, OYAK CEMENT and CIMPOR were incorporated into the Group, contributing over 30% of operating revenue for that year and becoming the third strong operational pillar.

Meanwhile, TCC is actively developing green energy, energy storage, smart grids, and high-power NCM lithium batteries. Through these efforts, TCC is gradually building a comprehensive new energy industry chain while accumulating key technologies and patent advantages. This has become the fourth pillar supporting TCC's transformation, establishing a stable and robust four-pillar operational structure.

S&P Global
- Long-term Credit Rating: **BBB-**
- Long-term Rating Outlook: **Stable**

FitchRatings
- Long-term Credit Rating: **BBB-**
- Long-term Rating Outlook: **Stable**

中華信用評等 Taiwan Ratings
An S&P Global Company
- Long-term Credit Rating: **twA+**
- Long-term Rating Outlook: **Stable**
- Short-term Credit Rating: **twA-1**

SELECTED COMPONENT STOCKS
As of 2025/05/31
- Dow Jones Sustainability World Index
- Dow Jones Sustainability Emerging Markets Index
- Yuanta MSCI Taiwan ETF
- Fubon TWSE Corporate Governance 100 ETF
- Yuanta FTSE4Good TIP Taiwan ESG ETF
- FTSE Emerging ESG Index
- Yuanta/P-shares Taiwan Top 50 ETF
- Cathay Global Autonomous and Electric Vehicles ETF

SUSTAINABILITY RATING

S&P Global
Dow Jones Sustainability Indices
World Index and Emerging Market Index

CDP DISCLOSURE INSIGHT ACTION
Climate Questionnaire A
Water Questionnaire A-

23.4 SUSTAINALYTICS a Morningstar company

MSCI ESG RATINGS A
CCC | B | BB | BBB | A | AA | AAA
RATING ACTION DATE: December 04,2024

Marsh
CIMPOR | 2024 Risk Rating: 6.9
OYAK CEMENT | 2024 Risk Rating: 7.3

ISS ESG C+PRIME Selected Enterprise

3.9 FTSE Russell FTSE4Good TIP Taiwan ESG Index

Global Green Finance Backs Low-Carbon Transition

TCC Secures a

€500M Green Loan

First published in 2023 and updated in 2025, TCC's Green Financing Framework received a Second Party Opinion (SPO) from ISS-Corporate, enhancing its sustainable finance credibility. The framework partially aligns with the EU Taxonomy and fully complies with the Green Bond and Green Loan Principles from the International Capital Market Association (ICMA) and the Loan Market Association (LMA). In June 2025, TCC secured a five-year, €500 million green loan, saving at least €5 million in annual interest. This facility optimizes TCC's financial structure and underscores international confidence in its credit and clear decarbonization roadmap.

TCC has deployed EnergyArk energy storage cabinets in Caen, Normandy, France.

Leading Sustainable Transformation Investment

Launched Taiwan's First SLCB, Linking Financial Instruments to Climate Commitments

In December 2024, TCC pioneered Taiwan's first Sustainability-Linked Convertible Bond (SLCB) with an issuance of NT$8 billion, setting a domestic market record for the largest issuance of its kind. The bond's maturity yield is linked to TCC's greenhouse gas reduction targets, embodying its 'Total Climate Commitment.'

Global Financial Support for Energy Transition

NHOA Energy Secures Major European Financing for Strategic Growth

NHOA Energy secured €87.7M in performance bonds and £4M in guarantees from BNP Paribas and Italy's SACE for its large-scale storage projects in the UK and Australia. This financing, demonstrating strong international trust in NHOA Energy's technology and stability, will boost development of high-capacity battery storage and Southern Europe's largest EV charging network.

International Financial Reporting Standards S1 and S2

As sustainability and climate-related financial information significantly influence investor decisions, in 2024, TCC piloted the inclusion of sustainable financial information in its annual report, referencing the International Financial Reporting Standards (IFRS) Sustainability Disclosure Standards to lead industry sustainability. In 2025, TCC continues this disclosure with two-year comparative data and expand the scope to include subsidiaries OYAK CEMENT and CIMPOR.

Foresight

In 2024, strategic deployment across 14 key global markets generated NT154.6 billion in consolidated revenue. Net profit after tax reached NT15.6 billion, with NT$11.259 billion attributable to the parent company, marking a 41% year-on-year growth. Sales of European cement and energy products to the US market constitute less than 1% of consolidated revenue. TCC's "local-to-local" supply chain resilience model reduces vulnerability to global tariff and trade fluctuations.

Steadiness

In 2024, 70% of TCC's capital expenditure was allocated to carbon reduction and green initiatives. This investment focuses on deploying low-carbon construction materials and new energy across industrial chains in Europe, Asia, and Africa, aiming to create diverse revenue sources and sustainable growth. These expenditures are fully funded by TCC's own capital.

Diversified Growth

Demonstrating that sustainable development drives profit growth, TCC's sustainability-related businesses generated NT$88.2 billion in revenue in 2024, accounting for 57% of the total. These businesses—including low-carbon cement and concrete, waste treatment, energy storage and charging, renewable energy trading, and batteries—are central to TCC's growth strategy. The 2024 EBITDA margin of 28.82% further reflects high operational efficiency and profitability.

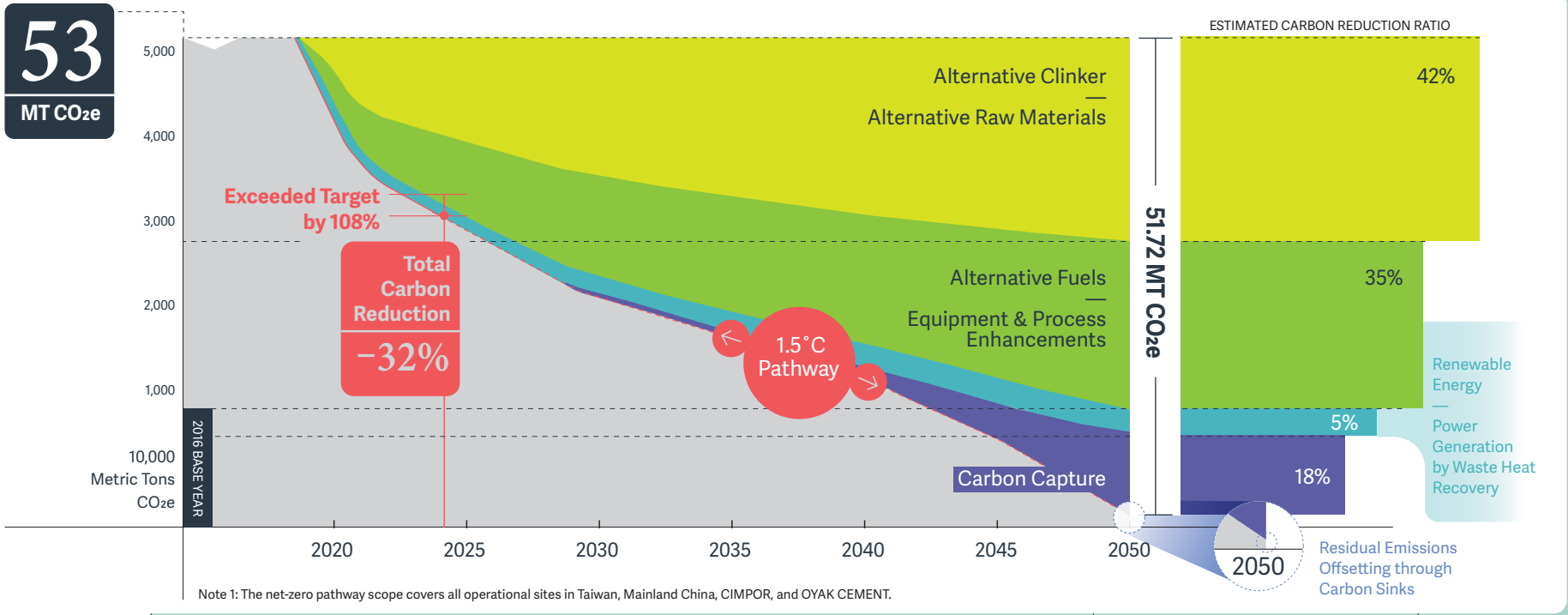
For more information, please refer to 2024 Annual Report

The path we must succeed for the 30 years to come, the path of the carbon revolution!
~
Chairman Nelson An-ping Chang

Driver Carbon Competitiveness

Cement and Concrete Business Units Worldwide Net Zero Pathway

The 2050 net-zero pathway is based on the SBT 1.5°C methodology, ISO IWA 42 net-zero guidelines, and the IEA's Net Zero Pathway and 2024 Energy Outlook reports. Key carbon reduction solutions include Alternative Clinker, Alternative Raw Materials, Alternative Fuels, Power Generation by Waste Heat Recovery, Equipment & Process Enhancements, Renewable Energy, and Carbon Capture. To develop carbon sinks, forest and soil surveys began in 2023 to identify feasible net-zero carbon removal solutions.



Note 1: The net-zero pathway scope covers all operational sites in Taiwan, Mainland China, CIMPOR, and OYAK CEMENT.

2024 Carbon Reduction Performance					
	Alternative Raw Materials/Alternative Clinker	Carbon Reduction Amount(tCO_2e)	9.51 million	Carbon Reduction Contribution	56%
	Alternative Fuels/ Equipment & Process Enhancements		6.73 million		39%
	Renewable Energy/ Power Generation by Waste Heat Recovery/ Power-saving Measures		0.86 million		5%
	Total		**17.10 million**		**100%**

After identifying industry characteristics, emission scale, and reduction opportunities, Scope 3 carbon reduction targets focus on four categories to establish short-term reduction targets for 2030. The overall long-term Scope 3 reduction target for 2050 is set based on the SBT 1.5°C methodology.

Scope 3 Categories — Base Year: 2024	**2024 Emissions (tCO_2e)**	**2030 Targets**	**2050 Targets**
C4 Upstream Transportation and Distribution	**664,210**	**-3.0%**	**All Scope 3 Categories** **-90%**
C9 Downstream Transportation and Distribution	**480,331**	**-3.0%**	
C1 Purchased Goods and Services	**1,220,508**	**-0.5%**	
C3 Fuel-and-energy-related-activities	**1,149,386**		

Note 2: The target covers 73% of the Scope 3 emissions generated by the cement plants in Taiwan and Mainland China.

Carbon Capture, Utilization, and Storage (CCUS) Projects

CIMPOR is advancing CCUS technology at its Alhandra and Souselas plants in Portugal in collaboration with the European Cement Research Academy and the German Cement Industry Association, and through its participation in the EU's 'Strategy CCUS' project (2019-2022). While direct CCUS implementation in Taiwan is paused due to uncertainties in storage and policy, TCC now prioritizes oxygen-enriched combustion for immediate emission reductions while monitoring storage tech progress. In parallel, TCC Sustainability R&D Center has developed advanced, low-carbon Ultra-High Performance Concrete (UHPC) materials for on-site casting and 3D printing.

CIMPOR's Souselas Plant, Portugal

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

SBT Carbon Reduction Target

In January 2025, TCC's Taiwan and Mainland China sites, along with its European subsidiaries CIMPOR and OYAK CEMENT, all achieved the SBT 1.5°C validation and committed to setting 2050 net-zero plans. According to the SBT methodology, the gross GHG emissions per ton of cementitious products is used as the basis for calculating the target carbon emission intensity.

	Target Base Year / 2016	2024	2030	2050
SCOPE 1 (kg CO_2e/t Cementitious Materials)	724	642	-23.9%	COMMITTED
SCOPE 2 (kg CO_2e/t Cementitious Materials)	30	25	-64.4%	Net Zero

	Target Base Year / 2021	2024	2030	2050
SCOPE 1 (kg CO_2e/t Cementitious Materials)	740	621	-20.59%	-95.8%
SCOPE 2 (kg CO_2e/t Cementitious Materials)	49	36	-56.3%	Net Zero

	Target Base Year / 2022	2024	2030	2050
SCOPE 1 (kg CO_2e/t Cementitious Materials)	659	643	-19.5%	-95.2%
SCOPE 2 (kg CO_2e/t Cementitious Materials)	28	7	-55.7%	Net Zero

Note 3: The net-zero targets for Taiwan and Mainland China will have their net-zero target setting completed through the SBT expert meeting by the end of 2025, after completing the calculation of Scope 3 emissions proportion.
Note 4: The targets cover 100% of total emissions from the designated base year.

Sustainable Products and Services

The World Business Council for Sustainable Development (WBCSD) states that while reducing Scope 1, 2, and 3 emissions (Do Less Harm) is essential, businesses must also offer climate solutions to maximize positive impact (Do More Good). TCC reduces operational emissions and develops sustainable products and services to generate external carbon reduction impact (Avoid Emissions) for customers and society.

2023-2024 Carbon Reduction Impact / 2030 targets

Low-carbon Construction Materials

2023 **-1.09 Million**
2024
-962,000
2030 TARGETS
-1.69 Million

Resource Recycling

2023 **-38,000**
2024
-92,000
2030 TARGETS
NA

GREEN ENERGY
Renewable Energy

2023 **-60,000**
2024
-65,000
2030 TARGETS
-530,000

GREEN ENERGY
Energy Storage

2023 **-75,000**
2024
-149,000
2030 TARGETS
-160,000

GREEN ENERGY
Battery

2023 **-2,300**
2024
-3,399
2030 TARGETS
-320,000

Unit: metric ton CO_2e Note 5: In 2024, low-carbon construction materials from TCC's operations in Taiwan, Mainland China, and Europe are calculated in accordance with the latest LCR standard.

Low-carbon Construction Materials

GCCA released the first global Low Carbon Rating (LCR) standard in April 2025. TCC's cement products across Taiwan, Mainland China, Türkiye, Portugal, and West Africa all meet LCR criteria. TCC is also Taiwan's sole company certified for both low-carbon cement and concrete. The company targets 100% low-carbon production and sales at Taiwan sites, and is forming a Low-Carbon Construction Pioneer Alliance to promote early adoption of Portland Limestone (IL) products and support sustainable construction. For more details, please refer to CH2.1.

TCC's Concrete -
The Lowest Carbon Footprint in Taiwan

Launched in 2024, TCC's low-carbon Portland Limestone (IL) cement and concrete series has concrete emissions 53% lower than government standards, making it Taiwan's lowest. By May 2025, over 2,566 projects had adopted it, totaling over 2.04 million cubic meters in deliveries. TCC also exclusively supplies ASML's Linkou plant.

Resource Recycling

The Renewable Resource Recycling Center (RRRC) converts up to 200 metric tons of daily household waste into energy to partially replace fuel. In Mainland China, TCC's plants process over 600 metric tons of waste daily, serving as an alternative fuel while mitigating methane emissions from accumulation. Furthermore, TCC is developing services to treat and recycle concrete from demolished buildings.

Green Energy

TCC actively supports global energy transition. TCC Green Energy develops and manages solar, wind, and geothermal projects, and engages in renewable energy research and partnerships. NHOA.TCC provides integrated energy solutions, including Green Charge & Storage Integrated Charging Station, EnergyArk Energy Storage Cabinet, Green Electricity Matching, and Aggregated Electricity Trading. Molicel's ultra-high-power batteries will play a key role in future urban transport, powering eVTOL such as Archer Aviation's air taxi service in Abu Dhabi.

NHOA Energy Storage Project in Blyth, South Australia

Environmental Product Declaration (EPD) Certification

EPD certification measures environmental impact across a product's life cycle, offering consumers clear comparison data.

- **Portland Limestone (IL) Cement & Concrete:** Expected to obtain EPD certification by the end of 2025.
- **EnergyArk Energy Storage Cabinet:** Expected to initiate EPD certification in the first half of 2026.

  Jurong Plant UHPC Production Base
- **CIMPOR's grey cement products, including** CEM I 52,5 R, CEM I 42,5 R, CEM II/A-L 42,5 R, CEM II/B-L 32,5 N, CEM IV/B (V) 32,5 N – SR, and CEMIV/A(V)42,5R-SR: All obtained EPD certification in 2023 in accordance with ISO14025, EN15804:2012+A2:2019, and EN15942.
- **OYAK CEMENT's cement products, including** CEM I 52.5R, CEM II/A - LL 52.5 R, CEM II/B-LL 42.5 R, CEM I 52.5R, and CEM III/A (S) 42.5 N: All obtained EPD certification in 2025 in accordance with ISO14025, EN 15804:2012+A2:2019/AC:2021, EN 16908, and PCR 2019:14.
- **Molicel batteries:** STSP Plant's P22S is expected to obtain certification by the end of 2025. Xiaogang Plant plans to simultaneously pursue EPD certification for two main battery products, P45B and P50B, in 2025.
- **NHOA Energy Standard System Design:** Integrates proprietary power electronics technology with LFP battery cabinets. Certified under EN ISO 14025 EPD in 2024, the system's modular design enables a replicable evaluation method for other products.

For more information, please refer to the EPD Certification.

R³

TCC DAKA RENEWABLE RESOURCE RECYCLING CENTER

Low Carbon — Circular — New Energy Sustainable Transformation Practice Site

"TCC has always believed that knowledge can resonate with life, and industry can coexist with all things." Since 2020, TCC has opened its factory doors to the public through the TCC DAKA Open Ecological Circular Factory (TCC DAKA). In 2023, the TCC DAKA RRRC, resembling a nautilus shell in appearance, was completed. It serves as a significant milestone in TCC's expansion from low-carbon construction materials to resource recycling and further deepens the complex relationships between industry and society.

LEARN MORE ABOUT RRRC

Circular Economy Injects Sustainable Vitality into Industry

Designed by KPF, one of the world's top ten architectural firms, Renewable Resource Recycling Center (RRRC) won the 2021 A&D Award. Its exterior resembles overlapping planets, following the mountain contours of Hoping Village, and is designed to look like an ecological valley.

The basic construction materials extensively use TCC's self-produced low-carbon construction materials. The perforated exterior walls are made with UHPC, with each wall panel having different curvatures and individually molded, demonstrating UHPC's plasticity and customization possibilities. The surrounding roads are paved with permeable concrete, featuring sublayer materials made from construction waste reutilization. This structure is designed to withstand heavy pressure and manage extreme rainfall caused by the heat island effect. Combining TCC's energy business capabilities, the parking lot is equipped with NHOA.TCC charging stations and TCC's patented EnergyArk energy storage cabinets, providing stable integrated charging and storage services.

a&d AWARDS 2021

During the operational phase, with environmental protection design as its core, RRRC incorporates rainwater recycling and reuse with automatic irrigation systems, rooftop solar panels, and small wind turbines for self-generation and consumption, optimized air conditioning systems, and high-efficiency lighting. Compared to projects of similar scale, RRRC can reduce its carbon footprint by 23.5% over its approximately 60-year lifecycle, achieving overall carbon reduction of over 12,000 metric tons. In 2024, it received Diamond-level certification from both the Ministry of the Interior's Green Building program and the Low Carbon Building Alliance.

TCC Hoping Eco-friendly Low-carbon Energy Park

In 2002, 3-in-1 Park of Port, Power, Cement plant was launched, becoming the first in Asia to integrate a cement plant, industrial port, and power plant. From raw materials to manufacturing and transportation, it practices zero waste cross-industry circular production. In 2018, TCC started to roll out new energy facilities, including solar power, wind energy, ocean thermal energy conversion, energy storage, and EV charging stations. In 2023, the RRRC gasification furnace was put into operation to help process municipal waste, building a fully integrated low-carbon, green energy, and environmentally friendly production and service chain.

The Co-processing Technology of Cement Kilns

The concept of using cement kilns as urban purifiers is made possible by their core operating temperature of 1,300°C, which allows for the harmless treatment of waste without producing any secondary waste requiring further processing. Since the 1970s, countries in Europe, the U.S., and Japan have utilized cement kilns to address waste management challenges.

In 2019, TCC launched a project to add a gasification furnace to its cement kiln system to co-process domestic waste, aiming to tackle the issue of waste overflow in Hualien County. By applying cement kiln co-processing technology, the project helped reduce pressure and waste in Hualien, while also contributing to global carbon reduction. Compared to traditional landfill methods, the high-temperature co-processing technology can reduce methane emissions by 59 kg per metric ton of waste. Additionally, since the waste no longer needs to be transported north to Yilan, the project cuts 500,000 kilometers of land transport each year, equivalent to an annual carbon reduction of 390 metric tons. As of 2024, the RRRC has processed a cumulative total of 41,421 metric tons of domestic waste and stockpiled waste, equivalent to 65% of Hualien County's waste generation during the same year, effectively avoiding 2,441 metric tons of methane emissions that would have resulted from landfilling.

RRRC further processes waste to be completely odorless. First, exhaust fans draw odorous gases into the gasifier and rotary kiln for combustion, where high temperatures break down harmful gases. Meanwhile, toxins in the exhaust gas, such as sulfur, chlorine, and heavy metals, are absorbed and mixed with cement raw materials, and finally sealed in the cement kiln, becoming part of the cement clinker. This process significantly reduces odors, acidic gases, dioxins, and heavy metals, making it both clean and safe. In the future, the public will be able to visit with peace of mind, enjoy a coffee inside, and take in the stunning views of the Pacific Ocean.

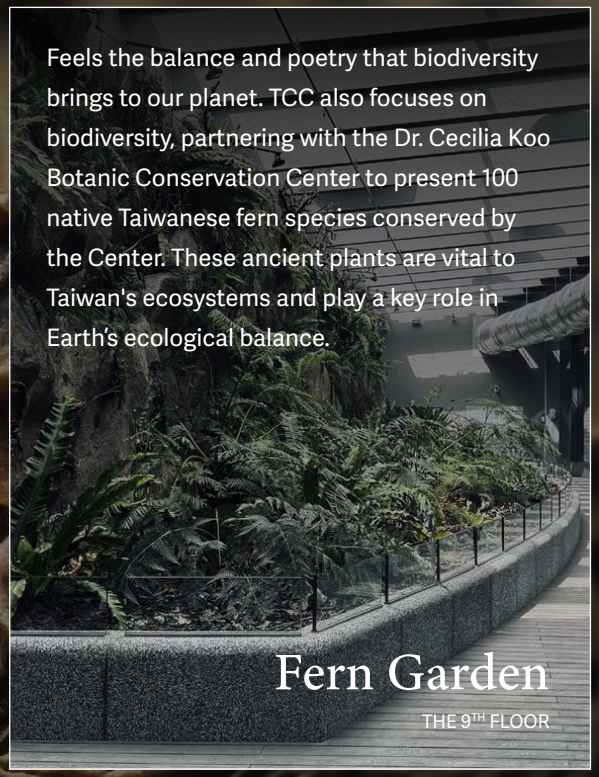
DAKA NEXT!

Nautilus Bibliotheca Grand Opening

Born from a dream, guided by light

Every great story begins with an inquiry into the future and the inspiration of a dream. For TCC, RRRC is not just a factory that produces goods, but also a leisure park, a classroom for knowledge exchange, and a museum of art. Like the structure of a nautilus shell, it holds the mysteries of science, mathematics, literature, aesthetics, and biology. The "Nautilus Bibliotheca", shaped like a nautilus shell, will serve as a key to unlock the future chapters between human civilization and nature with its deep knowledge and endless reflections. It is not only a tranquil sanctuary of knowledge but also a source of inspiration that breathes new life into thoughts.

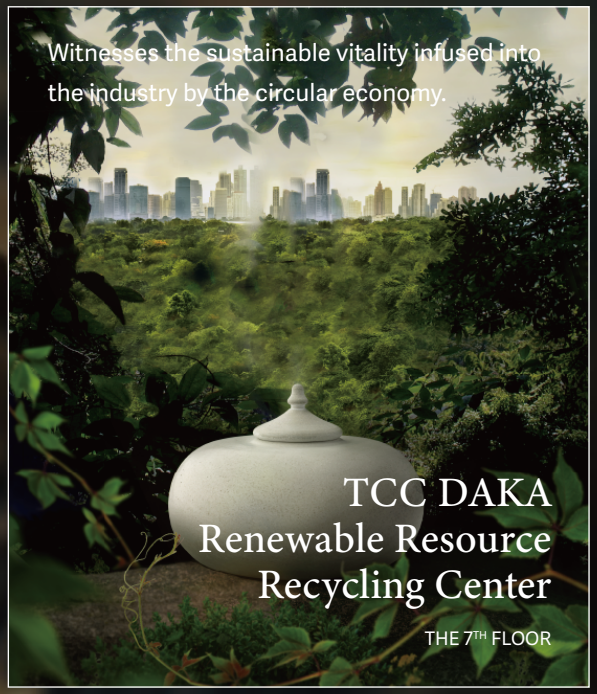
By opening its gates, TCC not only supports industrial growth but also envisions the future of Heping. The story unfolds across floors, linking Heping's past and future like the golden spiral of the nautilus winding through time. TCC hopes RRRC will become a key to unlocking future chapters in the relationship between civilization and nature—fostering endless exploration and reflection on industrial ethics.



Feels the balance and poetry that biodiversity brings to our planet. TCC also focuses on biodiversity, partnering with the Dr. Cecilia Koo Botanic Conservation Center to present 100 native Taiwanese fern species conserved by the Center. These ancient plants are vital to Taiwan's ecosystems and play a key role in Earth's ecological balance.

Fern Garden

THE 9TH FLOOR



Witnesses the sustainable vitality infused into the industry by the circular economy.

TCC DAKA Renewable Resource Recycling Center

THE 7TH FLOOR

Immerses in the warmth of history and engages in dialogue with the legacies of civilization, showcasing the evolution of human civilization and environmental change.

Nautilus Bibliotheca

THE 1ST FLOOR

For refreshments organized by the LDC Hotels & Resorts team, where people can enjoy views of the Pacific Ocean and reflect on the future.

THE 6TH FLOOR

"Future leaders not only adapt to changes but are also active drivers of transformation."
~
Chairman Nelson An-ping Chang

Driver AI Innovation & Electrification

TCC is advancing a new industrial revolution through full AI integration. In low-carbon construction materials, AI supports smart quarrying, process optimization, quality control, and monitoring of equipment and green energy. European subsidiaries CIMPOR and OYAK CEMENT launched the IndustAI project, adding "smart brains" to production lines for real-time alerts and predictive maintenance. Engineers use RealWear AI smart glasses with AR for remote support and precise maintenance. At the Yingde Plant in Mainland China, AI-powered drones conduct autonomous inspections of solar fields and equipment. The Jurong Plant leads with unmanned electric mining trucks using AI for route planning and obstacle avoidance, paired with remote monitoring for safety and efficiency. In the new energy business, European subsidiary Atlante uses charging data and AI to analyze regional demand gaps and optimize station layout. In advanced ternary lithium batteries, a life prediction model supports low-carbon product development. In 2025, TCC launched the "Digital Intelligence Navigator (DIN)" program to recruit global, cross-cultural AI talents to lead key smart projects across its operations.

AI x IoT Machine Health Monitoring Project

CIMPOR partnered with UK startup FIZIX to develop an AI-powered IoT system for machine health monitoring. Smart sensors track equipment data such as vibration, temperature, noise, magnetic flux, and speed—to build digital twins that detect failures weeks in advance, improving reliability and cutting maintenance costs. By 2025, the system was deployed at 25 cement operations across six countries in TCC's global operations. Expansion to plants in Mainland China and Taiwan is planned for 2026.

Innovative inspection with Drones Fast and 5G to improve operational efficiency and safety

5G IoT Smart Factory Demonstration Site

CIMPOR Alhandra Plant

In 2024, CIMPOR collaborated with Vodafone, Ericsson and SAP to deploy a 5G Standalone Mobile Private Network at its Alhandra plant. This setup integrates smart sensors, indoor and outdoor drones, digital twin models, and AI smart glasses. Leveraging 5G's high-speed, low-latency connectivity in combination with AI-powered image analysis, the system enables intelligent inspections and environmental monitoring across the plant. It allows for early warnings of occupational safety risks and environmental anomalies, enhancing both operational efficiency and workplace safety.

Smart Sensors

Integrated with AI to build a cloud-based system for continuous remote monitoring of equipment. Abnormalities can be detected before failures occur, enabling predictive maintenance.

Digital Twin

By using drones equipped with thermal imaging cameras, 3D models of sites and equipment are created to generate digital twins, forming the foundation for Industry 4.0 integration.

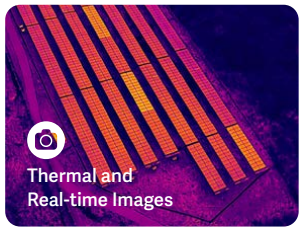
Indoor and Outdoor Drones

Used for monitoring indoor spaces, thermal imaging analysis, structural assessments, and volume measurements-greatly enhancing inspection safety and reducing maintenance costs.

AI Smart Glasses

Engineers wear AI smart glasses linked to the SAP system, enabling hands-free control via voice commands. They can access data, connect with remote support, and perform maintenance tasks efficiently and safely.

Aerial Patrol: AI Cloud Platform with Built-in Thermal Imaging Sensors


Thermal and Real-time Images

Yingde Plant

The Yingde Plant has implemented an AI drone inspection system that autonomously flies along preset routes, coordinated by a centralized cloud platform. Each drone is equipped with dual-sensor cameras that simultaneously display thermal and visible light images, significantly improving the accuracy of inspection assessments. With an integrated AI recognition system, the drones can instantly detect issues such as equipment overheating, insulation damage, and hazardous heat sources. The system also performs photovoltaic field inspections, safety and environmental patrols, plant perimeter monitoring, 3D modeling and measurement, and inventory checks-replacing high-risk manual tasks and greatly enhancing inspection efficiency and plant safety resilience. Hoping Plant in Hualien is also scheduled to adopt the system in 2025.

Managing multiple drones in one cloud platform

Smart Quarry: Resilient, Low-carbon, and High-efficiency Operations

Annual Performance	Operating Cost Savings	Carbon emissions reduction (metric ton CO_2e)
Jurong Plant	**CNY6.12 million** (equivalent to NT$27.21million)	**1,542**
Yingde Plant	**CNY9.3 million** (equivalent to NT$41.35million)	**3,344**
Guigang Plant	**CNY2.48 million** (equivalent to NT$11.03million)	**1,017**
Longshan Plant	**CNY1.78 million** (equivalent to NT$7.91million)	**737.18**

Jurong Plant

First Unmanned Smart Quarry Transportation System in Mainland China

By applying optimal route algorithms, TCC's AI system adapts to real-time road conditions and optimizes charging schedules to enhance electric vehicle performance and energy efficiency. This technology's rollout began with the Jurong Plant's full adoption of unmanned electric mining trucks in 2022. In 2024, the Yingde Plant added 10 unmanned electric mining trucks, planning a full transition by 2025, while the Guigang Plant introduced an electric forklift, with three more electric mining trucks scheduled for 2025. Concurrently, the Longshan Plant added three electric mining trucks in 2024 and is actively promoting full fleet automation. The Hoping Plant plans to introduce electric mining trucks and a dedicated 5G private network in 2025, with its unmanned driving technology scheduled for commissioning in the second half of the year.

Emergency Control Station

AI and AutoML Supported Operational Control of Cement Process

CIMPOR has adopted the Alcemy intelligent system at its cement and concrete plants, integrating machine learning with sensor data. Now applied at Alhandra and Betão Liz sites in Portugal, the system predicts clinker quality, NOx emissions, free lime, kiln stability, and compressive strength (accuracy over 95%). It also improves heat efficiency, alternative fuel use, and grinding fineness for better product quality and energy efficiency.

Clinker and Cement 28-Day Strength Prediction: 49.06 (Normal), falling within the first 59.65% of the historical data range

Concrete Strength Prediction and Ready-Mix Process Model

Concrete's 28-day compressive strength is crucial for customer acceptance but varies with weather and moisture. CIMPOR now digitizes the entire ready-mix workflow by capturing sensor data from plants and mixer trucks, giving end-to-end quality monitoring. TCC's Sustainability R&D Center, RMC plants, and IT team have built an AI model that predicts 28-day strength in real time by combining plant, customer, and transport data, cutting resource waste. Next, the system will recommend mix parameters based on target strength, enabling intelligent control of concrete production.

AI Enhancement Project	Description
Carbon Emissions Monitoring and Reduction	AI tracks carbon emissions throughout the concrete production process and recommends low-carbon mix designs. For example, replacing Type I cement concrete with IL limestone concrete can lower emissions based on analyzed data.
Waste Recycling and Reuse	Through image recognition and data analysis, AI can monitor the quality of recycled materials, such as recycled aggregates and waste concrete, thereby improving reuse efficiency.

AI Governance

To ensure the safe and responsible use of AI across the Group, TCC has developed an internal AI governance policy based on multiple international frameworks.

The Company continues to strengthen oversight mechanisms to balance operational efficiency with stakeholder trust.

TCC AI Policy

The strategy of "Local Cultivation, Global Deployment" demonstrates resilient risk resistance capability.

"We don't pursue short-term profits but focus on steady planning for long-term value."
~
Chairman Nelson An-ping Chang

CIMPOR & OYAK CEMENT Overseas Cement Business

Since 2018, TCC's localization strategy has driven global expansion and risk diversification. The 2024 acquisitions of Portugal's **CIMPOR** and Türkiye's **OYAK CEMENT** expanded TCC's operational footprint to Europe, Asia, and Africa, positioning the company as a key low-carbon cement supplier in Europe.

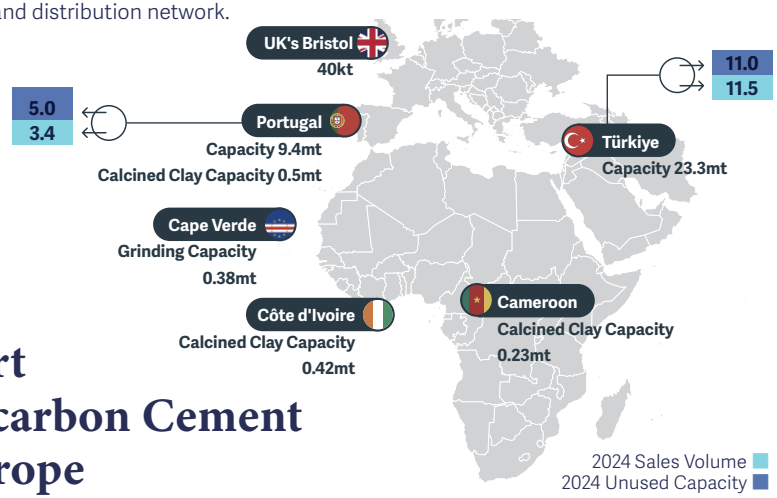
CIMPOR has coastal locations in Portugal, West Africa, and Central Africa that offer low logistics costs and export advantages. Leveraging its expertise in calcined clay and biomass fuel, CIMPOR is entering the EU low-carbon materials market and meeting growing cement demand in West/Central Africa by developing low-carbon cement tech using local clay, volcanic ash, and biomass.

OYAK CEMENT, with seven plants and proprietary ports across Türkiye at the intersection of Europe and Asia, is strategically positioned to serve the EU, Middle East, North Africa, and Black Sea regions. This also enables quick response to post-earthquake reconstruction in Türkiye and potential post-war demands in Syria and Ukraine.

With the EU's Carbon Border Adjustment Mechanism (CBAM) enforcement from 2026, low-carbon cement is a market entry requirement. EU standards allow up to 80% clinker substitution with blended materials, provided strength is maintained. As field pioneers, CIMPOR and OYAK CEMENT develop low-carbon solutions, integrating advanced technologies with local resources.

Bristol Port Storage Facility Expands CIMPOR's Export Market in the UK

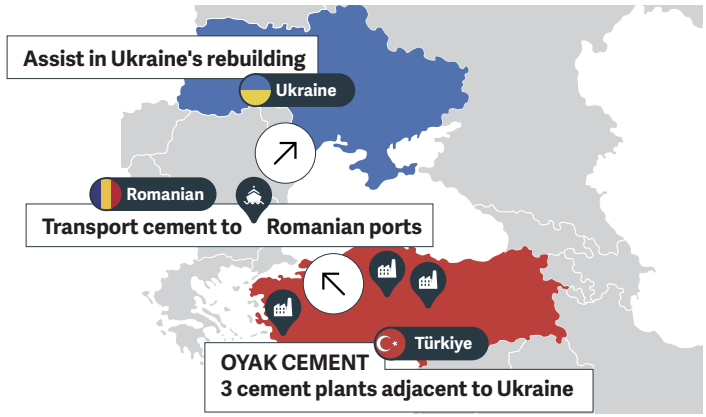
In November 2024, TCC, through its subsidiary CIMPOR, secured rights to the UK's Bristol Port, including its 40,000 metric tons of storage. This strategic acquisition supports the UK's 30% cement import demand and boosts plant utilization in Portugal and West Africa. The dedicated port strategy enhances TCC's pricing control and strengthens its Europe-Africa production and distribution network.



Export Low-carbon Cement to Europe

OYAK CEMENT's Black Sea Hub Effectively Supports Reconstruction Needs

OYAK CEMENT operates three cement plants on Türkiye's southern Black Sea coast, near Romania and Ukraine. One-day shipping to the northern coast enhances this strategic position. With the pending Türkiye–Ukraine free trade agreement, trade may grow from $6 billion to $10 billion. As Turkish builders are active in Ukraine, TCC is well-positioned to support post-war reconstruction.



OYAK CEMENT Aslan Plant Türkiye's Oldest Cement Plant

Alternative Fuel Pre-treatment Center

Aslan Plant, Türkiye's first cement factory, was founded in 1910. Its complex includes a production factory, quarry, and port facilities, located on the Gulf of Izmit in the Sea of Marmara. This strategic position serves as a hub between the Black Sea and the Mediterranean, ensuring flexible transportation. The Aslan Plant is equipped with a waste heat recovery system and an alternative fuel pre-treatment center, which not only reduce carbon emissions during production but also surpass industry standards in alternative fuel utilization.

CIMPOR Alhandra Plant

CIMPOR Alhandra Plant as an Innovation Base for Low-carbon Cement

Established in 1894, the Alhandra plant is Portugal's oldest cement plant and now CIMPOR's largest production base. Its central lab is PS EN ISO/IEC 17025 certified and focuses on low-carbon construction material research. In 2025, a €155 million R&D center was launched to develop low-clinker cement, carbon capture, alternative fuels, circular concrete, and 3D printing. The plant is EMAS-certified and will complete energy efficiency upgrades by 2025, reflecting its shift toward sustainable operations.

Central Laboratory

CIMPOR's R&D Capabilities

X-Clinker
Low-carbon Clinker

X-Clinker adopts electrified processes technology. By 2024, a full electrified plant feasibility study was completed, with ongoing work with top research institutes. Patented in the US, Europe, and Brazil, with plans to launch near-carbon-neutral green products in the future.

- Compared to traditional Portland cement, it reduces CO_2 emissions from clinker by 48%
- Using construction waste as 100% of production raw materials can reach a 75% reduction in carbon emissions

X-Clinker Experiment

deOHclay
Calcined Clay

CIMPOR uses calcined clay to replace high-carbon clinker, with production underway in Ivory Coast and Cameroon and expansion planned in Ghana. It continues assessing clay potential across Europe and Africa and works with C5Lab and Spain's Instituto Eduardo Torroja to enhance performance and applications.

- Compared to traditional Portland cement, it reduces CO_2 emissions from clinker by 90%.

Natural Pozzolan
Replaces Clinker

'Cape Verde,' which means 'Green Cape' in Portuguese, possesses abundant natural pozzolan 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 metric ton, with zero carbon emissions per metric ton, of pozzolan.

CIMPOR Cameroon Clinker-free Cement Plant

CIMPOR Cameroon Clinker-free Cement Plant

Utilizing cocoa & cashew shells as biomass fuel

In 2024, CIMPOR launched the world's first innovative cement process plant in Cameroon, using low-carbon calcined clay and local biomass fuels like cocoa and cashew shells to replace clinker and coal, cutting carbon emissions by 40% compared to traditional cement plant.

" 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.

Driver Diversity and Inclusion

TCC's First Year of Globalization

A Multinational Corporation Spanning 11 Industries and 14 Countries

2024 marks TCC's first year of globalization. After seven years of low-carbon transformation, TCC expanded into 11 industries and 14 markets through acquisitions in Türkiye and Portugal, with staff from 46 countries. Its business now covers low-carbon materials, recycling, green energy, storage, and lithium batteries. Cross-border collaboration is routine. To address demographic changes, TCC promotes intergenerational teamwork and rehires senior talent for knowledge transfer and innovation.

Interdisciplinary Transfer for Talent Empowerment & International Teams for Professional Exchange

To enhance cross-industry synergies, TCC promotes international collaboration. The cement and energy storage business co-host Team Excellence Workshops to strengthen leadership amid technical and market challenges. Monthly English meetings integrate creative thinking and language training to build shared values. Quarterly internal transfers further support career growth and cross-domain innovation.

Corporate Alignment Workshop in Istanbul

Cross-national and Cross-business Integration Conference

In April 2025, TCC hosted a Corporate Alignment Workshop in Istanbul, as well as an employee conference for its Italian subsidiary, NHOA Energy, bringing together global cross-business unit leaders for in-person exchange. Through discussions on regional operations, products, ESG plans, and market strategies, the event fostered knowledge sharing, team alignment, and common goal-setting.

M-shaped Workforce

Cross-generational Empathy and Integration

To Establish Technical Support Teams

With a workforce spanning six generations, TCC values knowledge transfer, launching the "Specialist Team" to rehire retired employees with core technical skills. Through training and mentoring, this initiative transforms senior experience into a corporate asset and fills talent gaps. For specific projects, TCC also retains retired employees as internal senior advisors to offer young teams strategic and technical guidance, sparking innovation. Intergenerational communication is further fostered through Town Hall Meetings, employee camps, family days, road races, and regular retiree gatherings.

360-degree Career Planning

From entry-level to leadership positions, TCC provides comprehensive career development paths and all-round benefits

Internal Transfer Mechanism
Build cross-functional experience and expand global perspective

Carbon Academy
From GHG basics to EU EPD, strengthening carbon skills

Cross-domain Technical Exchange
Share expertise across subsidiaries, nurturing global professionals

MIT Insights
Access frontier knowledge via MIT partnership

Big Family of TCC for All-round Career Care Scheme

- TCC Carbon Academy
- Flexible Working Hours
- Employee Stock Option Program (ESOP)
- Maternity Bonus & Family Support Program
- Paid Family Care Leave
- Green Transport Promotion System
- Retiree Group Insurance & Health Checkup
- TCC PIONEERS

Sporting a beard, Nicolà Catalano, an engineer from Italy, is working for TCC subsidiary NHOA Energy and is stationed in Taiwan. This year, he joined the TCC Dragon Boat team. From training to competing in the championship, he not only gained a deeper understanding of the Chinese Dragon Boat Festival culture but also more profoundly experienced teamwork and integrated into the larger TCC family. More details are available in the TCC Sustainability E-newsletter.

MIT AI Forum

Insight & Strategy

The Impact Of Generative Ai On Industries

TCC hosted an MIT seminar on generative AI's role in reshaping content creation, data analysis, and business models. This empowered 3,084 employees(including senior executives) to leverage digital transformation, boosting innovation, efficiency, and reinforcing TCC's technological competitiveness.