02 TCC's Climate Chronicles/Key Performance

2023

FEB
- 2023 S&P Global Sustainability Yearbook Member Top 10%

MAY
- 2023 TCSA Taiwan Biodiversity Gold Award in the profit-seeking enterprise sector category

2022

DEC
- 2022 CDP Carbon Disclosure Questionnaire Rating A-, Water Disclosure Questionnaire Management Rating B
- MSCI ESG Rating A (upgraded for four consecutive years from 2019 - 2022)

NOV
- 2022 S&P Global CSA TOP 5 Global Building Materials Industry
- NHOA.TCC launched the "Energy Helper TCC Corporation Green Energy Trading Platform" to enter the green energy trading market.

SEP
- Atlante, under NHOA.TCC, sponsored by the EU Fund, plans to build 215 green energy-only charging stations in Europe.

JUL
- Sustainalytics, an ESG rating institution, ESG Industry Top-Rated Company in Building Materials Industry

FEB
- CDP Carbon Disclosure Questionnaire Supplier Engagement Rating (SER) Supplier Engagement Leader "A"

JUL
- NHOA.TCC launched the world's first charging station with UHPC energy storage cabinet used: TCC Tainan Yawan Station
- E-One Moli Energy Corp. under TCC got involved in electric vertical take-off and landing (eVTOL) aircraft with lithium ternary batteries entering the market of electric air transportation

AUG
- EP 100 Member, committing to 50% energy productivity improvement by 2040 compared with that of 2016

OCT
- COP15 Business for Nature Make it Mandatory signed

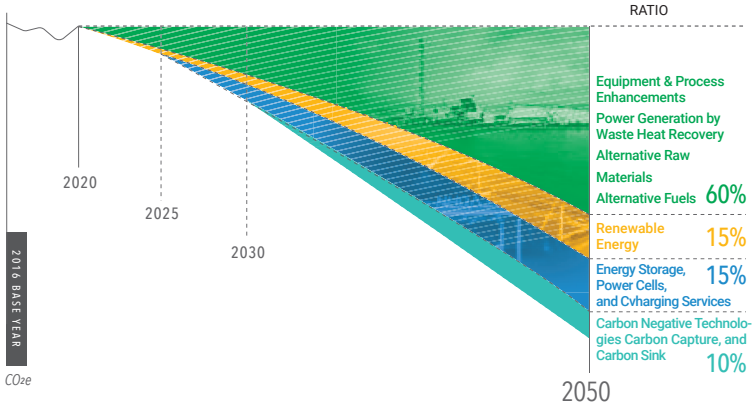
2022
- Founding partner of BCSD Nature Positive Initiative
- Member of TNFD Pilot Program
- First issuance of TCFD Report on Climate-Related Financial Disclosures, receiving BSI Level 5+ the highest rating

■ International Ratings ■ Initiatives and Recognitions
■ Low-Carbon Products/Energy Services

03 Speeding up Net-Zero Transformation

TCC's 2050 Net-Zero Transformation Roadmap

Since TCC announced the Group's seven carbon reduction strategies in 2021, it has structured the transformation roadmap from a quantitative viewpoint and traced it with AI carbon management platform to continue monitoring the implementation of carbon reduction and provide optimized action. TCC has incorporated multi-dimensional resources to move forward to the net-zero target by 2050.



Equipment & Process Enhancements Power Generation by Waste Heat Recovery Alternative Raw Materials Alternative Fuels	Renewable Energy	Energy Storage, Power Cells, and Charging Services	Carbon Negative Technologies Carbon Capture, and Carbon Sink

Note: Energy storage regulating grids can reduce the load of coal-fired power plant units and use diesel generators; extend equipment service life; and reduce overall carbon emissions. According to ENERGIES, take the scenario of Italy for 2030 for example, when the annual power supply from energy storage system reaches 10,000 GWh, the carbon footprints of electricity will be reduced by 53%.

TCC's Carbon Reduction Strategies

TCC promoted the sustainability blueprint for its three core businesses, i.e., low-carbon building materials, resource recycling, and green energy, and set seven carbon reduction strategies according to the Science Based Targets (SBT). In response to the climate risks and opportunities faced in the process of carbon reduction, TCC developed six climate actions (please refer to 2 Climate Actions for more information) and continued managing relevant indicators and non-financial performance indicators to mitigate potential impacts on operations and finance.

Equipment and Process Enhancements | As the first EP100 member among Taiwan's large manufacturing enterprises, TCC commits to a 50% energy productivity improvement by 2040 compared with that of 2016. TCC will continue to optimize its production process to improve energy use efficiency and reduce greenhouse gas emissions.

Power Generation by Waste Heat Recovery | All TCC's cement plants are equipped with power generation by waste heat recovery systems. To improve power generation efficiency and put SBT scientific carbon reduction plan into practice, TCC planned to invest in equipment modification, increasing the portion of power generated by waste heat recovery systems and reducing externally purchased electricity by 20-30%.

Alternative Raw Materials | Introducing an international class Co-processing, TCC forms the ecosphere of circular economy with companies like semiconductor fabs, steel factories, water treatment facilities, and public work companies. Exploiting its core advantages, TCC assists these companies to treat industrial wastes, turning wastes to resources, and reusing them as alternative raw materials for cement production to reduce carbon emissions. Ratio of alternative raw materials for cement increased to 23% in 2022.

Alternative Fuels | TCC has proactively developed alternative fuels that have a lower carbon content percentage or have heating value, including biofuel from agricultural residual materials like woodchips, waste woods, and rice husks, and Solid Recovered Fuel (SRF) from waste tires, waste textiles, and waste rubber products. They are used in the production process according to their characteristics to reduce the amount of coal used in the production process of cement. The thermal substitution rate of alternative fuel in Taiwan was 4%.

Renewable Energy | In response to greenhouse gas reduction and in accordance with SBT, TCC moves forward in both ways of self-consumption and self-development. Self-consumption includes cement plants, mines, RMC plants, and the Operation Headquarters. TCC comprehensively strengthened the roof structures and installed solar power panels to fulfill the renewable energy installation of 10% chartered capacity. As for self-development, TCC seeks the clean sources in Taiwan, including the power generation of the combined use of solar and onshore wind energy, fishery and electricity symbiosis, geothermal and ocean thermal energy conversion, all for the supply and fulfillment of companies' green power needs.

Energy Storage, Power Cells, and Charging Services | The energy storage system is the key to stabilizing green energy and regulating the grids in the energy transformation process. TCC developed the green energy, charging, and energy storage integrated charging products, and strengthened the Energy Management System(EMS), regulating the grids with energy storage to lower the load of coal-fired units and the use of diesel generators. This may extend the equipment's lifespan to reduce the overall carbon emissions.

Carbon-Negative Technologies - Carbon Capture and Carbon Sink | TCC has been working with ITRI since 2011 to make an upfront investment in the research of calcium-looping CO2 capture technology and the application of Haematococcus Pluvialis. With its experience in cement production, TCC has continued the carbon capture program, including planning the technology of the cement

calcining process from oxygen-enriched combustion to oxy-fuel combustion to capture CO2 and carrying out the scale-up experimental operation based on it to reduce carbon emissions in the production process. On the other hand, TCC has conducted R&D on the air-enriched combustion technology to improve carbon capture efficiency and reduce carbon and fuel at the same time. As for natural carbon sink, in addition to mine ecological restoration, TCC has also launched the "Ho-Ping Ark Ecological Program" to conduct long-term data monitoring of local soil and biodiversity.

Building All-round Low-carbon Cities with New Energies

In response to the demands for low-carbon energy, TCC proactively develops the green energy industry, investing in energy creation, energy storage, energy transmission, energy supply, and energy solution. From high-end battery cell products and charging services to development, construction, operation, and sales of green energy, TCC develops an all-round new energy business and is devoted to building a low-carbon life with new energy.

Energy Creation

Developing diverse renewable energy

TCC has invested in diverse renewable energy such as solar power, wind power, fishery and electricity symbiosis project, geothermal and ocean thermal energy conversion. TCC has developed the grid-connected power generation since 2018. TCC focuses currently on the development of solar power. It established Taiwan's first wind-solar hybrid plant in 2019 and Taiwan's first fishery and electricity symbiosis project site that was fully connected to the grid in Chiayi in October 2022, and TCC's Vakangan geothermal energy conversion project site in Taitung is under construction. For the development of renewable energy, TCC Group shall endeavor to explore diverse possibilities, and invest in the development of Taiwan's unique marine energy.

Energy Storage

Investing in smart energy storage business

In 2021, TCC acquired a European energy storage company and renamed it as NHOA. Combining European experience, NHOA.TCC provides a range of serves, from green energy, energy storage equipment, energy management systems (EMS), charging solutions, to integrated services for smart microgrids. It is proactively seeking solutions for the intermittency of renewable energy to make its application more stable and effective in Taiwan.

Energy Transmission

Developing high-power cells

TCC focuses on the development of high-power cells. Its battery cell products concentrate on the high-power demand. Its application covers emerging markets of air vehicles, high-end electric supercars, racing motorcycles, and micro-vehicles. It provides lithium batteries with safety and high power output in specific markets.

Energy Supply

Low-carbon lifestyle with energy storage integrated charging products

CC has expanded into the electric vehicle charging markets in Taiwan, Europe, and America, providing DC compound charging stations that are integrated with energy storage or green energy. The supply of mains electricity, green energy, and charging services is regulated via the energy management system (EMS), which allows TCC to develop low-carbon charging solutions.

Energy Solution

Supporting enterprise to obtain green energy

Energy Helper TCC Corporation launched the "Green Energy Trading Platform" in November 2022 to establish one-stop energy management services. It is combined with TCC's diversified types of renewable energy and provides priority access to renewable energy for small and medium-sized enterprises and electricity users with small demands in Taiwan.