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EARTH HELPER

2021

TCC SUSTAINABILITY REPORT

TOTAL CLIMATE COMMITMENT

TOTAL CARE COMMITMENT

Under the sunny sky
Here comes spring
Warm breeze saunters
Roused birds fly high
Flowers bloom
Signs of creatures coming back to life are all over.

EARTH HELPER

is a basic attitude toward life for each one of us
to share commonly the Earth Planet.

With the Sustainable Development Goal 17 of the United Nations (SDG 17) as its core agenda, TCC works to unite partners committed to sustainability across sectors, ushering in a new greener life by collective and concerted actions for common interests.

Only when each one of us stays alert to help with one's hands can a better future of the Earth be anticipated.

Check Page 85 for more information.

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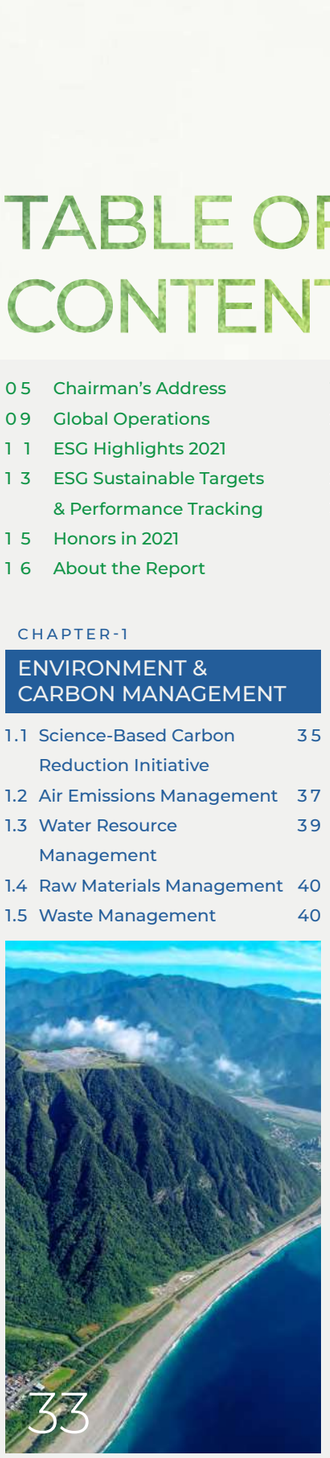
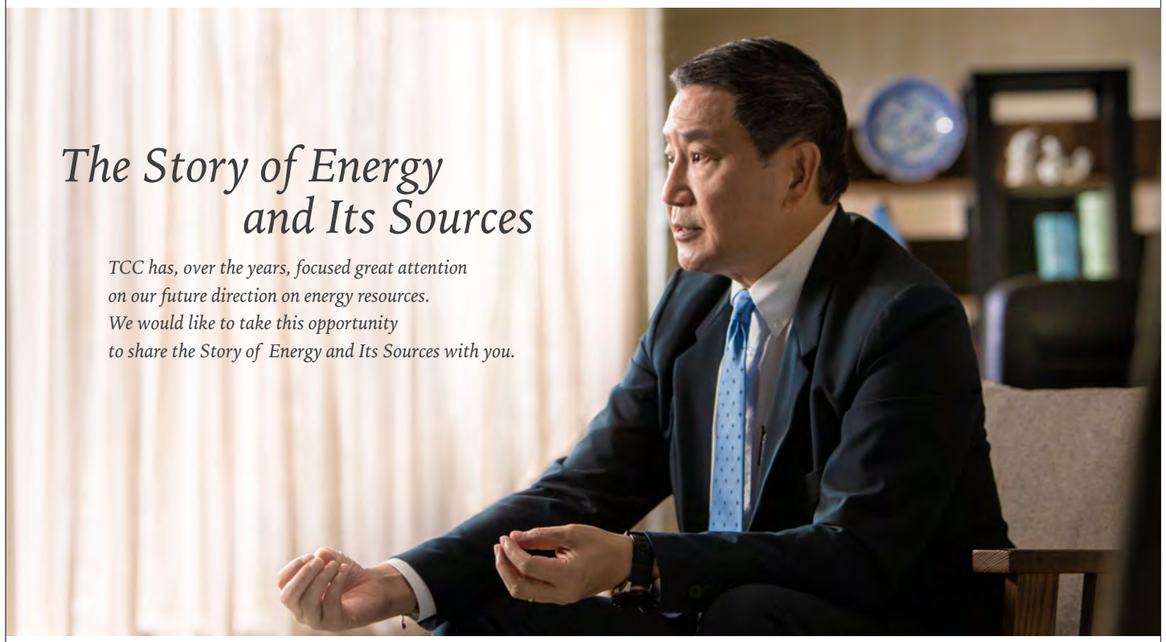




The Story of Energy and Its Sources

TCC has, over the years, focused great attention on our future direction on energy resources. We would like to take this opportunity to share the Story of Energy and Its Sources with you.

Mankind and energy have always had an intimate relationship since the Palaeolithic Era. Energy is a fundamental priority for the survival of civilization, and human attitudes towards the development and use of energy directly or indirectly determine the advancement of civilization.

All organisms, whether animals or plants, require energy to perform their life functions. From the very start, life is a process of acquiring and consuming energy resources to enable growth and activity. The metabolism of animals and the photosynthesis of plants require the conversion and circulation of energy sources to make these processes possible.

All living beings are linked to natural ecology, and humans are no exception. Before the creation of civilization as we know it, humans obtained and consumed energy resources in the same way as other organisms; constantly foraging to find and consume energy sources and then constantly repeating the cycle.

Humans evolved from the foraging stage to start to produce food in different seasons and to store food. When food sources became scarce, they began to share the stored food with others; that was the beginning of human civilization.

The same is true for energy resources, which should also be divided into three stages: production, storage, and sharing.

In the beginning, human beings first fed themselves to obtain the "manpower" for work, then fed animals to obtain the "animal power" for work, and then began to learn to harness energy sources available in the natural world. These natural energy capabilities could be found either in the form of climate and seasonal changes from land, ocean and the wind. Additionally energy could be stored in plants via photosynthesis, or buried in deep valleys and caves. Energy resources have been continuously discovered and excavated by humans for generations, and have become the driving force for the expansion of civilization.

One day in ancient times, a tiny fire was ignited. The birth of fire symbolized the birth of civilization. After the emergence of civilization, the relationship between human beings and energy has also changed rapidly: whether it was used for foraging, cooking, working, or transporting, the more power human beings required, the less the energy sources originally provided by the natural world could satisfy them.

Since the Industrial Revolution, human beings have been searching for more energy sources to power machines, allowing machine power to replace and enhance original manpower. At that time, the powers of the machine seemed to be inexhaustible. Not only was mass production possible, natural materials could also be refined and used by more people through forging, molding and other fabrication techniques.

But in an environment that is full of self-interested thinking where human beings seriously lack the will to control their own desires, human desires became the driving force behind the development of human civilization. However, our endless desires have resulted in a misguided relationship with Mother Nature. Our ancestors, in order to solve the desperate situation they were facing at the time, did not realize then that the new approaches toward energy and consumption they had come up with at the time might spawn new problems.

From firepower, coal, petroleum, to nuclear power...over several centuries, a giant hungry beast has been created to devour energy. Humans kept mining energy sources, cut down many trees, killed many whales, levelled many mountains for coal, and drained many oil wells. The behemoth became larger and larger, and so did its appetite.

Today, the behemoth is no longer just a locomotive or a production line, but an industrial zone or an entire city. Humans act like gods, mining the very core of all food and taking unpredictable risks, to develop all kinds of technologies such as atomic fusion and atomic fission. These technologies, capable of creating the world, can then generate an energy source that glows and heats like the stars.

In fact, all human civilization is basically on a path of no return, looking for and consuming scarce energy resources.

The energy supply between the sun and the Earth has maintained a delicate interaction from the beginning of time. It has maintained an ecological equilibrium for over 4 billion years, and according to the rhythm of nature, it has provided the energy needed for the survival of all living beings. While it has had its up and down cycles , these cycles have always been in moderation relative to the environment.

From a historical and cultural point of view, re-cycling is not a new concept, much less a special one. It exists in nature, in our culture, in our religions, in everyone's bodies and in all things.

Looking around, everything is recycled, and especially from the point of view of our atomic makeup. We have all been at one time a completely different life form, being, or matter. The atoms that make up us had also, in times past, made up other organisms, and they are still being changed every day.

As scientific research has postulated, it only requires half an hour of sunshine on Earth to provide enough energy to maintain current human needs for a whole year. But why has humanity again and again run into critical shortages of energy? Possibly because conversion efficiency was inadequate; possibly because we produced surplus production causing meaningless waste; too much access to cheap energy led to the excessive and inefficient use of energy capabilities in unnecessary places.

When the Earth's human population was still at an insignificant number, even wanton squandering was not able to wound Mother Earth as we are harming her today. But human civilization in the 21st Century has been readily changing the natural ecology. The 7.8 billion humans walking the Earth today, are no longer an inconsequential link in the circular system of an aging planet. Rather, every act and move they make all cause system shocks, demonstrating humanity's all too present impact. At the same time, it is necessary, relatively speaking, to restrain these irresponsible and abusive behaviours. Humans should not look down upon or abuse the energy sources and the potential power in their hands just because they understand them and think they master them. Only by honestly understanding the arrogance of human beings can we truly solve the problem.

The direction that TCC is currently working on is to explore and develop more efficient energy sources and conversion approaches that are closer in line with the natural ecological rhythm. In parallel, we seek to create more sustainable processes of storing and using energy sources in accordance with the rhythm of the natural world. We combine renewable resources and energy storage systems which recycle urban waste through cement kilns, creating a coexistence of the city and nature, the humanities and the environment. Just like in the cycle of nature, any substance has its place for reuse, and to ensure the future longevity of societies and civilization energy systems should also be designed likewise.

Behind these actions and these development strategies is the expectation of a new friendly relationship between human beings and energy resources.

Our goal is to reduce the load on the chain in every link, even bearing it on our own shoulders, so that future generations can continue to survive and ultimately thrive in an unburdened world.

Among the biological species living on this planet, the biggest difference which separates human beings from other species is that human beings realise that life is finite and the existence of all things has an end.

Life has a deadline, buildings will erode in the elements, and the seas will dry up. Because of this knowledge that there is an end, people have designed the concept of minutes and seconds. Human existence is thus closely tied to a race against the clock.

Survival is a constant consciousness of time, and crisis is the clock face leading to the Final Judgement, which approaches closer step by step. Only from the perspective of human beings do the phenomena of the Deluge and other natural disasters in ancient mythologies as well as today's realities of receding glaciers and rising sea water, have meaning on a timeline. This makes it possible to reach consensus on carbon reduction goals in 2030 and 2050 as verbalized in the step-by-step schedule of the Paris Agreement. This has created an urgency to search for sustainable energy sources and the restructuring and reorganization of human society under the anxiety of a time crunch, piecing together the complex problems we face today.

The history of energy sources has always been the history of the interaction between man and Mother Nature. In the presence of Mother Nature, only when we know how to be humble, can we put away our arrogance.

Just like a child seeing a rainbow for the first time, he is so excited to expand his imagination about the real world. Even as we grow older and understand the optical principles behind the rainbow, we should not forget the first experience when we experience the magic of the world in childhood. If we always try to keep an uncontaminated view and make it fit our imagination about energy sources, science and technology, can we create the reality of a sustainable existence for all mankind.

The more deeply nature is understood by humans, the more it will be appreciated as a miracle worthy of respect. Every ray of sunshine passes through countless raindrops; red, yellow, and blue light is refracted at different angles. Through them, we see rice paddies, red maple leaves, and the rich colours of forests and ocean waves.

Imagination for new energy sources, like the rainbow, is accompanied by our deep attention to nature as well as our awe, admiration, and a heart touched, allowing us to look forward together to a future life with radiant colours.

On Earth, there is one kind of creature here, and one type of organism there.
There are different lives everywhere.
They are all very similar to one another, all priceless.
Today, everywhere on Earth, they are all crying out for help.

So many small living beings need to be nourished by nature or need the helping hand of human beings.

TCC sees it, and we are doing it!

Did Noah's Ark carry so much life onboard?
It will remain a question unanswered.
Today, the human eye must see more clearly the sense of urgency needed for life to survive on earth.

Nelson An-ping Chang
Chairman
TCC

Global Operations

- Taiwan Cement Corp.
- TCC's Joint Venture
- New Energy

Netherlands
Taiwan Cement (Dutch) Holdings

Amsterdam Operation Headquarters

Italy
NHΩA

Portugal
Cimpor Portugal Holdings

Cameroon
Cimpor Cameroun Kribi

Côte d'Ivoire (Ivory Coast)
Cimpor Côte d'Ivoire Abidjan

Türkiye
OYAK Çimento

Canada
E-One Moli Energy (Canada)

TAIWAN

Operation Headquarters

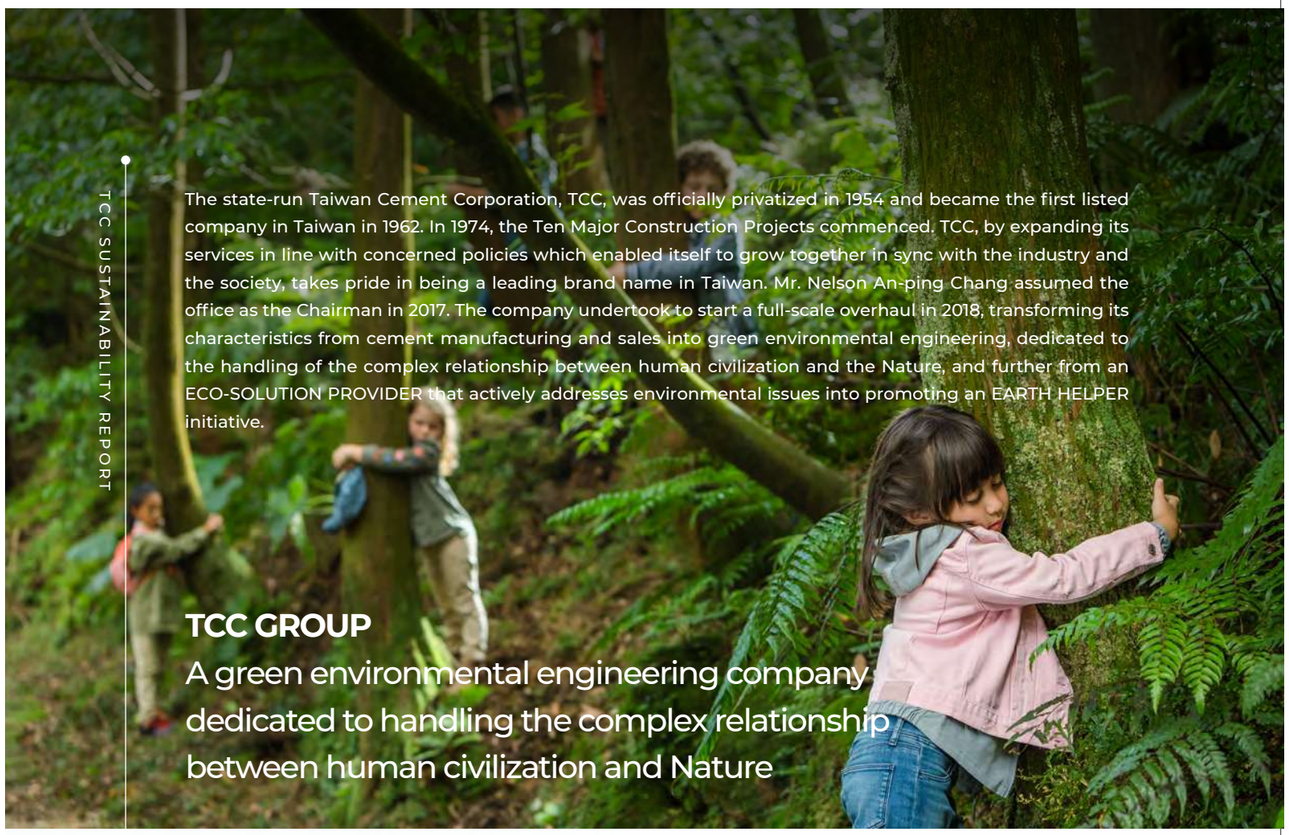
Mainland China

Cement Plant
① Liaoning ② Jurong ③ Yingde ④ Longshan
⑤ Shaoguan ⑥ Guigang ⑦ Huaihua
⑧ Jingzhou ⑨ Baoshan ⑩ Anning ⑪ Gangan
⑫ Kaili ⑬ Anshun ⑭ Guangan ⑮ Xuyong
⑯ Huaying ⑰ Chongqing ⑱ Dai County
⑲ Suao ⑳ Hoping ㉑ Hualien

Grinding Station
① Fuzhou ② Liuzhou ③ Naxi

RMC Plant
① Taipei ② Tucheng ③ Guishan ④ Taoyuan ⑤ Taoyuan 2 ⑥ Bade
⑦ Zhongli ⑧ Zhongli 2 ⑨ Hsinchu ⑩ Yilan ⑪ Taichung
⑫ Shengang ⑬ Dadu ⑭ Taiping ⑮ Caotun ⑯ Chiayi ⑰ Shanhua
⑱ Anping ⑲ Xinshi(operational till April 30, 2021) ⑳ Tainan
㉑ Luzhu ㉒ Kaohsiung ㉓ Nanzih ㉔ Siaogang ㉕ Hualien

New Energy
① Changbin Green Energy ② Chiayi Green Energy ③ E-One Moli Energy Corp.
④ Molie Quantum Energy ⑤ Changbin Energy Storage ⑥ Vakangan Geothermal
⑦ Hualien OTEC



The state-run Taiwan Cement Corporation, TCC, was officially privatized in 1954 and became the first listed company in Taiwan in 1962. In 1974, the Ten Major Construction Projects commenced. TCC, by expanding its services in line with concerned policies which enabled itself to grow together in sync with the industry and the society, takes pride in being a leading brand name in Taiwan. Mr. Nelson An-ping Chang assumed the office as the Chairman in 2017. The company undertook to start a full-scale overhaul in 2018, transforming its characteristics from cement manufacturing and sales into green environmental engineering, dedicated to the handling of the complex relationship between human civilization and the Nature, and further from an ECO-SOLUTION PROVIDER that actively addresses environmental issues into promoting an EARTH HELPER initiative.

TCC GROUP

A green environmental engineering company dedicated to handling the complex relationship between human civilization and Nature

Taiwan Cement Corporation (TCC)
stands for
two sustainability
commitments:
Total Climate Commitment & Total Care Commitment
for the mutual benefit
and harmony
with Earth and life.

Based on TCC's three core businesses of "low-carbon cement, resource recycling, green energy," Environment, Energy, and Ecology serve as the three axes for its sustainable development. The global warming of 1.5 °C in the Paris Agreement is set as the new horizon for the Earth to engage in green actions of sustainability. Through the core heat in the making of cement, TCC handles wastes and household garbage that other industries or cities find them hard to dispose, promoting as well the circular economy across industries. Raw materials/fuels cement used are replaced by recycled resources to reduce carbon footprints and develop green building materials. TCC's commitment to new energy enterprises, with the creation (renewable energy) & transmission (power cells) of energy, and smart energy storage combined, has involved itself in the process of energy transition and continue to develop carbon negative technologies so as to move forward to the goal of net-zero emissions by 2050.

Capital
NT$70 Billion

Market Value
NT$294 Billion

Ranked in the world
No. 12 [1]

In 2021
EPS NT$3.3

A cement production of
76.94 Million Metric Tons

[1] Source: ccement.com (2021/11/04)

ESG Highlights 2021

Taiwan CO_2 Emissions Intensity
-5.1%
t CO_2/Metric Ton of Cementitious Materials

Mainland China CO_2 Emissions Intensity
-3%
t CO_2/Metric Ton of Cementitious Materials

Base year: 2016

	Taiwan	Mainland China
NOx	-26%	-47%
SOx	-3%	-66%
TSP	-56%	-61%

Base year: 2016

Reused Cement (Alternative Materials Used) per Metric Ton
21.82%

Waste Recycling
Taiwan **1.141** Million Metric Tons
Mainland China **8.069** Million Metric Tons

ISO 46001 WATER EFFICIENCY MANAGEMENT
ISO 46001

Taiwan Water Usage Intensity
-38%
m³/Metric Ton of Cementitious Materials

Mainland China Water Usage Intensity
-9%
m³/Metric Ton of Cementitious Materials

Base year: 2016

Energy Storage
Global Energy Storage Capacity by 2024
2.9GWh

Energy Transmission
Advanced Lithium Battery Production Capacity by 2024
3.3GWh/year

Energy Creation
Renewable Energy Installed Capacity Accumulated until 2023
Over **190MW**

+86.64%
Waste Heat Recovery Efficiency
Compared to 2018

Female Mangers
+11.5%

Disabled Employees Hired
+13%

Employees with Indigenous Origin Hired
+5%

Indigenous Plant Species at Mining Areas (Hoping & Suao)
88%

0
Work-Related Fatality

31%
Retirees in the Medical, Accident, and Life Insurance Schemes

2017-2021
Childbirth Subsidies, Childbirth Bonuses & Maternity Allowance Over
NT$ 1 Million

Community Development Contributions
NT$ 1.02 Billion
2017-2021

Social Welfare Contributions
NT$328 Million

61.5%
Critical Tier 1 Suppliers GHG Inventory

Products Used on Green Building
11.2%

ISO 27001 INFORMATION SECURITY MANAGEMENT
ISO 27001

Chief Information Security Officer Appointed

ISO 37001 ANTI-BRIBERY MANAGEMENT
ISO 37001

Trainings on Ethical and Moral Standards Covering
100% Employees

ESG SUSTAINABLE | TARGETS | & | PERFORMANCE | TRACKING

Item		Achievement Status	2021
GHG Management – Taiwan		✓	0.806(-5.1%)
GHG Management – Mainland China			0.709(-3%)
GHG Management-Taiwan & Mainland China (Weighted)			0.722
*Base year 2016 | t CO_2/Metric Ton of Cementitious Materials			
Emissions Management -Taiwan	NOx	✓	1,105(-26%)
	SOx		19(-3%)
	TSP		36(-56%)
Emissions Management -Mainland China	NOx		313(-47%)
	SOx		32(-66%)
	TSP		18(-61%)
*Base year 2016 | Gram of Emission/Metric Ton of Clinker			
Water Management – Taiwan		✓	0.30(-38%)
Water Management – Mainland China			0.32(-9%)
*Base year 2016 | m^3/Metric Ton of Cementitious Materials			
Waste Recycling – Taiwan | 10K Metric Tons		✓	114
Waste Recycling – Mainland China | 10K Metric Tons			807
Renewable Energy – Taiwan/Mainland China | MW		✓	Over 190 *by the end of 2023
Carbon Capture | Metric Tons		—	Planning for the scale up verification of the carbon capture technology
Conservation of Endangered Plant Species | Taxa		✓	34,046 taxa
Mine Restoration Biodiversity ([2]BMP) %		✓	88% indigenous plant species restored
TCC Community Engagement ([3]CEM) NT$		✓	Ongoing investment of NT$8 mil.
Cement Academy (since 2012) NT$		✓	Ongoing investment of NT$6 mil.
Employee Training and Development NT$		✓	23,428,225
Supplier Management %		✓	61.5% of Critical Tier 1 Suppliers submitted GHG inventory

SUSTAINABLE DEVELOPMENT GOALS

SUSTAINABLE DEVELOPMENT GOALS

2025	2030	2050
SBT -11%	-31%	Carbon Neutral
-11%	-20%	Concrete Products
-50%	-70%	[1]BACT Minimum
-30%	[1]BACT Minimum	[1]BACT Minimum
-50%	[1]BACT Minimum	[1]BACT Minimum
-50%	-70%	[1]BACT Minimum
-60%	-70%	[1]BACT Minimum
-60%	[1]BACT Minimum	[1]BACT Minimum
-45%	-50%	
-25%	-30%	
125	157	250
1,000	1,250	1,500
Manage 570MW	Manage 700MW	Manage 1GW
—	100,000 metric tons/year	1.6 million metric tons/year
More than 35,000 taxa	More than 40,000 taxa	More than 45,000 taxa
	90% indigenous plant species restored	95%indigenous plant species restored
Accum. total investment of NT$40 million	Accum. total investment of NT$80 million	Accum. total investment of NT$240 million
Accum. total investment of NT$30 million	Accum. total investment of NT$60 million	Accum. total investment of NT$ 180 million
Accum. total investment of NT$125 million	Accum. total investment of NT$250 million	Accum. total investment of NT$750 million
100% conduct GHG inventory on 100% Critical Tier 1 suppliers by 2023	50% carbon reduction by Critical Tier 1 suppliers	50% carbon reduction by all suppliers

[1]BACT : BEST AVAILABLE CONTROL TECHNOLOGY
[2]BMP : BIODIVERSITY MANAGEMENT PLAN
[3]CEM : COMMUNITY ENGAGEMENT MANAGEMENT

HONORS IN 2021

INTERNATIONAL RATINGS

MSCI ESG RATINGS BBB
"BBB" in MSCI ESG Ratings Upgraded for three consecutive years 2019-2021

"Achiever" in Greater China Business Sustainability Index

FTSE4Good TIP Taiwan ESG Index

TIP Customized Taiwan Dividend Highlight Index

TIP Taiwan Environmental Sustainability Index

"B" in CDP Climate Change
Leadership Status "A-" in CDP Water
Leadership Status "A" in CDP Climate Change
Supplier Engagement Rating

Sustainalytics "ESG Top-Rated Company" for three consecutive years 2020-2022

S&P Global
S&P Global 2021 Sustainability Yearbook Member

Taiwan Ratings An S&P Global Company
twA+ in Taiwan Ratings

"AAA" in NTPU SEED ESG Rating

SUSTAINABILITY INITIATIVES

SCIENCE BASED TARGETS
The first cement company in Greater China completed SBT settings

The first company in the traditional industry in Taiwan to become a TCFD Supporter

Initiating Member of GCCA 2050 Climate Ambition Initiative
Jointly published 2050 Industry Roadmap for Net Zero Concrete

CLIMATE GROUP
EP100 Initiative

BUSINESS FOR NATURE
Member

TANZE 台灣淨零行動聯盟
Founding Member

SUSTAINABILITY RECOGNITIONS

2021 17th Global Views "First Prize" of Traditional Industry & Environmentally Friendly Project "Role Model" in Social Innovation Project

2022 18th Global Views "First Prize" of Traditional Industry & Environmental Friendly Project

2021 Taiwan Top 25 Best International Brand

RMC Product Traceability System recognized by 2021 AREA Green Leadership Award

2021 Common Wealth Excellence in Corporate Social Responsibility Top 12

Top 10 Manufacturing Paradigms, Circular Economy Leadership Award, Climate Leadership Award, Supply Chain Leadership Award, Growth through Innovation Award, Creativityin Communication Award, and People Development Award, totally 11 awards

HR Asia BEST COMPANIES TO WORK FOR IN ASIA 2021

TCC Suao Plant "Outstanding 2-star Award in the Circulation Group" in 2021 EPA Resource Circulation Outstanding Enterprises

Ta-Ho Maritime "Bronze Award" in 3rd National Enterprise Environmental Protection Award

2021 Low-carbon Product Rewards Merit Award by EPA Taiwan

Indigenous Residents in Taibai Mountains recognized as 2022 6th Taipei Golden Eagle Micro-Movie Festival "Annual Top 10 Sustainable Micro-Movie"

TCC Hoping Plant "2021 Energy-Saving Landmark Golden Award"

"Outstanding Enterprise Innovation Award" in 7th National Industrial Innovation Award
The only large manufacturer recognized in the Cultural Innovative and Recreation Group

GREEN CERTIFICATIONS

The first ISO 37001 Anti-bribery Management System certified company in Taiwan

Portland Cement Type I
The first Carbon Footprint Reduction Label
Taiwan EPA Gold-rated Green Mark

TCC RMC Product Traceability System verified by TCRI

Hoping Industrial Port Recognized by GPAS of APSN Recertified to PERS of EcoPorts

SOCIAL VALUE INTERNATIONAL
Social Value International certified TCC DAKA Social Impact Evaluation (SROI): NT$3.54 values created with every NT$1 invested

ISO 46001 WATER EFFICIENCY MANAGEMENT
TCC Hoping Plant & Suao Plant certified in the international water efficiency management
The first ISO 46001 certified cement company in the world

ABOUT THE REPORT

This is the 2021 TCC Sustainability Report (referred to as the "Report" hereinafter) of the Taiwan Cement Corporation (referred to as "TCC" or the "Company" hereinafter). Upholding the principle of openness, transparency, and good faith, it faithfully discloses TCC's efforts in the communication with stakeholders and its engagements in sustainability issues. With this Report, we endeavor to live out the business philosophy "taking from society and giving back to society" to elevate the quality of life in the future hand in hand with our stakeholders.

Reporting Period and Scope of Disclosure
The reporting period ranges from January 1 to December 31, 2021. Apart from the financial performance disclosed in the consolidated financial statement, the scope of disclosure mainly covers TCC's operation sites in Taiwan. The subsidiaries thereof are not in the scope of disclosure. Nevertheless, in light of the sustainable development of the Company, part of the sustainability performances by the subsidiaries are to be presented in the Report as well. In addition, in consideration of information comparability, the data over the past four years will be disclosed for certain performances. The Report is published annually.
Publication date of the previous issue: June 2021
Publication date of the current issue: June 2022
Publication date of the next issue: June 2023

Reference Guidelines
This Report was prepared in accordance with the "Comprehensive" of the GRI Sustainability Reporting Standards (GRI Standards) released by Global Reporting Initiative (GRI) as well as GRI's "Mining and Metals Sector Supplement" and the SASB Standards for construction materials 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. All 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 website.

Audit and Verification
Internal Audits: The disclosed data or materials herein are provided by the respective responsible units, verified by the Corporate Sustainable Development Committee, submitted to the executives of departments, and finally reviewed and approved by the Chairman.
External Verification: A limited assurance is provided by Deloitte & Touche in accordance with International Standard on Assurance Engagements 3000 (Revised) (ISAE 3000 Revised), Assurance Engagements other than Audits or Reviews of Historical Financial Information, issued by the International Auditing and Assurance Standards Board. Also, the verification was carried out by BSI Taiwan in accordance with the Core option of the GRI Standards and with the "Moderate" level of assurance, Type 1 assurance in the AA1000 Assurance Standard (AA1000AS). Please refer to the Appendix for relevant assurance/verification methodology and results.

Contact Information
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Website: https://www.taiwancement.com/en/index.html

TCC Official Website | TCC ESG Section | TCC Facebook | Instagram

NET ZERO

New Horizon of 1.5°C TCC Action

EARTH HELPER

"Runaway carbon emissions are the Great Flood of today's generation.

We are duty-bound to return intact the Earth

we borrowed from the next generation.

Decisive action is the only answer!

From now on, energy saving, storage,

and creation will be key to industries."

~Nelson An-ping Chang, Chairman

The latest IPCC report released by the United Nations revealed that the global warming in 2021 reached 1.1°C, above the pre-industrial level, which is 10 years earlier than the prior estimation. It may exceed 1.5°C (the red line for human survival) as early as 2030. Nearly half of the global population faces the catastrophic impacts of climate change.

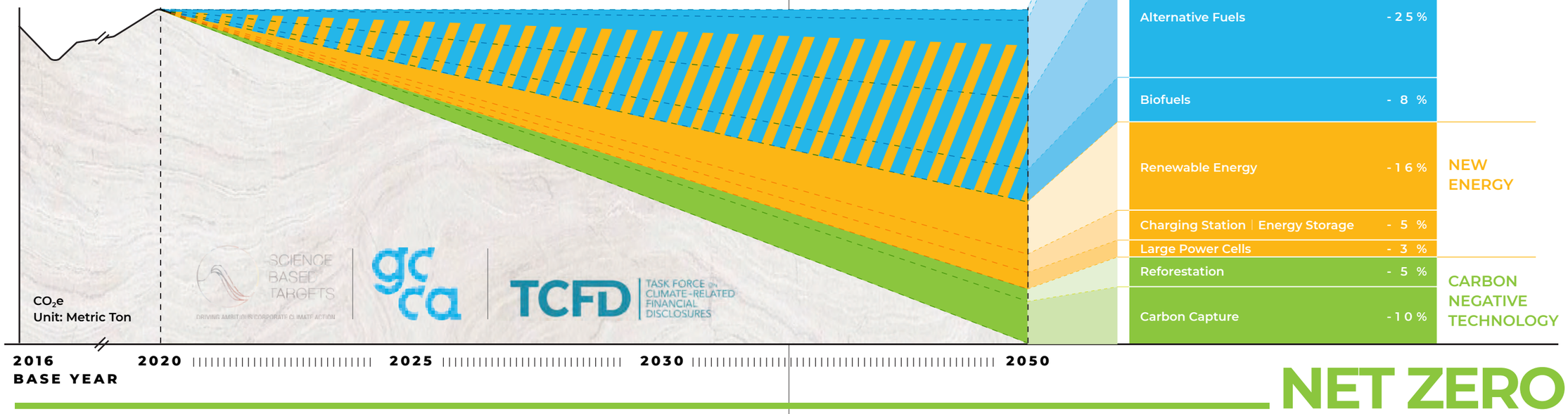
As a citizen of the Earth, TCC learns humility from Mother Nature in search of solutions for coexistence with the environment. We assess the global GHG emissions sources, deploy sustainability programs starting from our core businesses, address the points of conflict between humanity, industry, and the Earth, and then become an EARTH HELPER, while carrying out actions of climate mitigation and adaptation.

Ice sculptures with the imagery relates to climate change impacts were decorated at the "TCC Report towards the 100th Year – Commitment, Action, New Horizons" press conference to show the urgency of global warming against the fast-moving clock

The Three Core Businesses of TCC are: low-carbon cement and green building materials, resource recycling and green energy. On the basis of SBT, we promote seven strategies to reduce carbon emissions, i.e. enhancement of equipment & process, optimized waste heat recovery equipment, reduced purchased electricity and improved energy efficiency; promotion of cross-industrial circular economy, development of bioenergy and biofuels, waste recycling as alternative raw materials/fuels for reductions of waste, carbon and coal; carbon capture technology investment and business model; establishment of renewable energy and smart energy storage for new green energy, in order to advance toward the net-zero goal by 2050 from multiple directions.

TCC's Roadmap to 2050 Net Zero

Source: TCC 3Q21 Investors' Conference



Global Cement and Concrete Association

Chairman Chang joined GCCA High Level CEO Panel.

Three Core Businesses

- LOW-CARBON CEMENT
- RESOURCE RECYCLING
- GREEN ENERGY

Seven Strategies to Reduce Carbon Emissions

- Equipment & Process Enhance-ments
- Power Generation by Waste Heat Recovery
- Alternative Raw Materials
- Alternative Fuels
- Biofuels
- Renewable Energy
- Energy Storage Charging Station
- Power Cells
- Reforesta-tion
- Carbon Capture

Equipment & Process Enhancements | Power Generation by Waste Heat Recovery	- 3 %	
Alternative Raw Materials	- 25 %	CIRCULAR ECONOMY
Alternative Fuels	- 25 %	
Biofuels	- 8 %	
Renewable Energy	- 16 %	NEW ENERGY
Charging Station | Energy Storage	- 5 %	
Large Power Cells	- 3 %	
Reforestation	- 5 %	CARBON NEGATIVE TECHNOLOGY
Carbon Capture	- 10 %	

NHΩA

NEW HORIZONS AHEAD

TCC Inaugurates New Energy, New Lifestyle

"Energy is absolutely the key to the future development worldwide.
From energy creation to energy saving and energy storage,
TCC embraces the living of new energy and new ecology.
The mindset shall be shifted from conquering nature
into co-living, co-existing and co-thriving with nature."

~Nelson An-ping Chang, Chairman

On March 3, 2022, NHΩA.TCC inaugurated the first new generation charging station at TCC DAKA in Hualien, featuring the "New Energy, New Lifestyle" with green energy, energy storage, and charging services combined. On the very day of inauguration, the sun came out after days of spring rain. Chairman Chang opened the event with a poem he wrote: "Under the sunny sky, here comes spring; warm breeze saunters, roused birds fly high, flowers bloom, signs of creatures coming back to life are all over," to greet it for sustainable circularity and to embrace the green living.

NHΩA : The Symbol of a Wonderful Future

NHΩA drives its name of “Noah” from the biblical story Noah's Ark. Although the spelling is different, they pronounce the same way. 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, namely to live in harmony with the Earth and create a better future for the generation to come.

NHΩA

NHΩA Charging Station in Italy inaugurated

For the energy stored, if charged during the off-peak hours at night and discharges upon power supply stress during the day, at any charging stations of NHΩA.TCC, it steadily regulates the power usage practices on the grid around the clock, offering an optimized economic efficiency of electricity use.

“24K GREEN” the 1st Pure Green Powered Charging Equipment

The “24K GREEN” EV charging equipment is 100% powered by the three “DAKA Smart Flower” sun-tracking PV systems currently installed at TCC DAKA. 24K means "pure" and GREEN refers to green energy. Together, it is 24K GREEN. Combined with the energy storage system, the 100% green-powered charging station is available for all EV drivers. Looking forward, TCC plans to introduce Flower Turbines from Europe so as to create a total green energy charging space.

Important Timeline for TCC Energy Business

1998

E-One Moli Energy Corp. established for rechargeable Li-ion technology development and manufacturing under trademark MOLICEL

MOLICEL®

2018

Wholly-owned subsidiary established
TCC Green Energy Corp.
Active engagement in green energy development

TCCGE

2019

TCC Green Energy Corp.
Establishment of the 1st large wind & solar plant in Taiwan
Application for establishment of the 1st large fishery and electricity symbiosis project area in Taiwan

2020

E-One Moli Energy Corp.
Provision of state-of-the-art power cells for energy storage application
Sept. **TCC Energy Storage Technology Corp.** established

NHΩA.TCC

2021

Apr. The 1st megawatt level AFC in Changbin inaugurated by TCC Green Energy in collaboration with E-One Moli Energy
May Engie EPS, an Italian energy storage company listed in France, acquired by TCC, renamed as NHΩA, and incorporated with TCC Energy Storage Technology Corporation as NHΩA.TCC
Oct. Molie Quantum Energy Gigafactroy Kaohsiung Plant construction started
Dec. Strategic partnership with Phihong Technology

三元能源科技 MOLIE QUANTUM ENERGY

2022

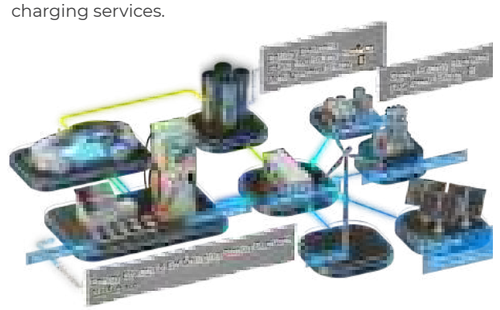
Mar. NHΩA.TCC charging station The first site opened at TCC DAKA in the east coast of Taiwan

The design of NHΩA.TCC’s charging station was inspired by the imagery of “light” energy. The impressionist style that flipped the tradition in the 19th century was employed. Using an abstract flow art painting and the audacious streamline lighting, it symbolizes an encounter of a Bright Future. Meanwhile, with the maxims quoted from five figures, Alexander the Great, Proust, Alan Turning, Saint-Exupéry, and Robert Frost, it ushers in different thinking and perspectives, transforming the charging station into a landscape that sheds light on life.

NHΩA 10x MASTER PLAN

The 3 Arrows of TCC New Energy

The inauguration of NHΩA.TCC charging station equips TCC Group with the engine for flight en route to carbon reduction for the Earth. The vision of TCC’s “mutual sharing and benefit” has been actively engaged. With the technologies presently available, there is still a gap before the cement industry to achieve carbon neutrality independently. With its new energy deployment, TCC strives to find natural, clean energy sources. The green energy, subject to intermittency, relies on a stable energy storage. Combined with the key advanced lithium battery product of TCC subsidiary, E-One Moli Energy Corp, the Automatic Frequency Control (AFC) Energy Storage System in Taiwan came online in 2021. Engie EPS, formerly a foreign company, was acquired and renamed into NHΩA for strengthening TCC’s design and manufacturing capabilities of Energy Management System (EMS) and Power Conditioning System (PCS). Hence, TCC possesses the state-of-the-art Battery Energy Storage System (BESS) technology, EV fast charger, smart grid, and 130 patents related to hydrogen energy. TCC invested in Phihong Technology, a power supply manufacturer, in the end of 2021, preparing for the EV and charging service markets in Taiwan, Europe, and the U.S. Also, it plans to establish the largest energy storage base in Taiwan at Heping in Hualien and Suao in Yilan. As such, TCC has become the sole energy conglomerate with the R&D and production capabilities for green energy, battery, energy storage, and EV fast charging services.



Renewable Energy (Energy Creation)

Installed capacity
estimated by the end of 2023
>190 MW
Including: Taiwan/Mainland China

Installed capacity for self-consumption
by the end of 2023
7,644 KW

Renewable electricity generation
>288 million kWh
of renewable electricity generated equivalent to more than 144,000 metric tons of CO_2 reduced

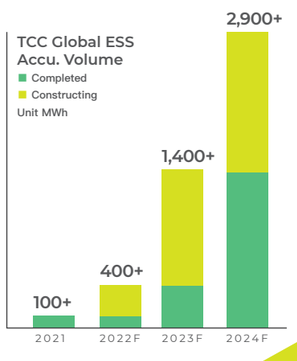
estimated by the end of 2023

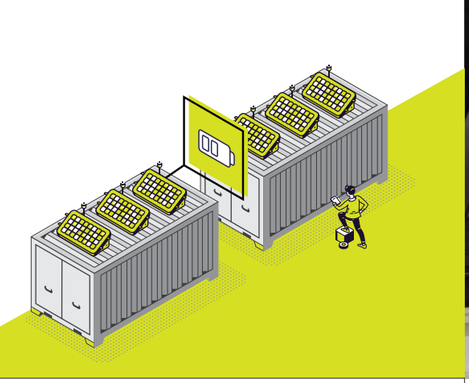
Smart Energy Storage

2021 5MW
Changbin AFC smart energy storage system

2022 NHΩA.TCC
New generation charging service inaugurated

2024 2.9GWh globally reached
Including: Taiwan/Mainland China/Europe





High Power Cells (Energy Transmission)

Power cell capacity in 2024
3.3GWh/year

E-One Moli Energy Corp. launched a spec leading cell with highest energy in global high power market
4.5Ah high capacity 100W high-rate discharge

Emerging new applications benefit from its fast-charging feature, such as aerospace industry, high-end electric sports cars, airborne vehicles, racing motorcycles, micro mobility vehicles, etc.
At present, it is working with the largest logistics company in the world to offer a steady power supply to ensure the compliance in vaccine transportation. Meanwhile, it is involved in the plan for the largest petroleum group in India to transform their gas stations into battery swapping stations.

RE100 Goal, TCC Group Self-consumption Power Production & Fulfillment of Enterprises' Renewable Electricity Demand

TCC Operation Headquarters Building obtained the Diamond-Level Green Building Certificate for Renovation in 2016, which was renewed in 2021. It was later on integrated with a PV system. In 2021, the self-generated renewable energy generated was 50,114 kWh, which is equivalent to 50 Taiwan Renewable Energy Certificates (T-RECs). From 2018 to 2022, 168 T-RECs have been awarded altogether. Pursuant to the spirit of the SBT, T-REC procurement is not used as a means to carbon reduction at present. Instead, TCC proceeds to undertake energy production for self-consumption and developing renewable energy projects. The spaces in the Group available for installation were inventoried, including the cement plants, mines, RMC plants, and Headquarters. The roof structures were comprehensively strengthened with PV panels installed. As for energy projects 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 conversion, all for the supply and fulfillment of companies' green power needs, benefiting each other en route to RE100.

Energy Production for Self-consumption	PV Installed Capacity (kWp)
TCC Headquarters (Lab included)	131.26
TCC Suao	1,562.58
TCC DAKA	11.10
TCC Hoping	4,417.61
TCC RMC Plants	736.3
Hoping Power Plant	785.43

Changbin AFC Smart Energy Storage

With a 5 MW installed capacity, TCC Green Energy Corp.'s AFC System at Changbin is the first large energy storage project in Taiwan, which was connected to the grid in April 2021. It stabilized the grid within 0.25 second during the island-wide power outages on May 13 & 17, 2021 and March 3, 2022.

Advanced Lithium Battery Plant in Kaohsiung

The production plant for high-end, high-capacity, and high-charge-discharge ternary batteries was established at Siaogang of Kaohsiung in 2021, which is expected to be inaugurated in 2023. The annual production shall reach 1.8 GWh, which approximately is the volume for 24,000 electric vehicles.

EV100 Target, Electrification of Company Cars and RMC Trucks

The major operation sites such as Operation Headquarters and TCC DAKA are installed with EV charging stations. Also, the company cars are being replaced. In the future, the electric RMC trucks shall be introduced.

NTHU Racing

TCC promotes vehicle electrification through a joint project between industry and academics. NTHU Racing is sponsored not only with advanced batteries also professional consultancy regard to module design and safety specifications so to lay the foundation for the EV racing talents in Taiwan.

COVID-19

New Normal TCC Drives Risk Mitigation and Adaptation

"The values of a human-oriented enterprise have made possible a team that is professional, enthusiastic, interdependent and willingly supportive."

~Nelson An-ping Chang, Chairman

The COVID-19 pandemic that lingered on into 2021 seemed largely kept at bay thanks to the progress of vaccination. Yet, due to the evolution of new virus variants as well as the post-pandemic social, economic, and environmental changes, companies need agile responses more than ever. With sustainable management in mind to keep business running, TCC has put together immediate risk mitigation measures and long-term risk adaptation strategies as its responses to the new normal of the pandemic.

Risk Mitigation Measures

In the face of the pandemic and the impacts it caused to take place anytime, TCC employed measures as follows to mitigate and respond to the risks to ensure employees' safety, and to assist the society to combat the pandemic with its core abilities.

Reporting and Response

The pandemic reporting system was set up at all plants to submit up-to-date development of COVID-19. Only with the plant reporting rate of 95% or above would the information be deemed as valid, whereupon TCC Headquarters could assess the resumed work status while dynamically planning for responsive strategies.

TCC compiles the up-to-date pandemic information, including the pandemic reports, industry overview, and official information of operation sites across regions for the Pandemic Response Command Center's reference in formulating and adjusting the contingency plans.

Epidemic Prevention and Response

Hybrid Work: Before the Level 3 epidemic was in effect, rapid test sites were set up all plants, while shifts of reduced work force attendance were in place at the Headquarters; the regular Town Hall Meeting and year-end banquet were organized online instead.

Paid Vaccination Leave: Paid vaccination leave was available to encourage employees to get vaccinated.

Full Subsidy for Quarantine: Employee's quarantine isolation due to work was subsidized with full paycheck, while the accommodation and diet were all supported by the Company or hotel options were available to their kins.

Family Care Program: In the event of interim school shutdown, the lounge area on the 7th floor at TCC Headquarters was opened for child day care needs; paid family care leave was further executed.

Emergency Relief Loan: To assist the pandemic-affected coworkers with living difficulties for a short term or potential disruption of their children schooling, TCC especially offered the Emergency Relief Loan with a ceiling of NT$300,000 to each case to help stabilize their own family.

Donation of NT$100 million for purchasing vaccines TCC contributed NT$100 million in support of Tzu Chi Foundation's vaccine procurement initiative for a wider access to the most-needed vaccine to ease the concern of the general public.

Collaboration for the vaccination and rapid test site in Heping Heping Rapid Test Site was set up at TCC DAKA for villagers, while supporting Hualien Government to achieve the Zero-COVID target. Aside from sponsoring the relevant medical expenses, TCC assigned employees to help with the venue set-up, traffic control, and order maintenance. TCC DAKA's cleaning task force was also on site to help with mass disinfection. In addition, to assist the villagers in remote areas to improve their vaccination rate, TCC DAKA set up vaccination site of its own. A total of 145 doses of Pfizer–BioNTech Vaccines were administered.

Vaccine cold chain tracking E-One Moli Energy Corp. provided high power cells and worked with the largest logistics company worldwide to track the logistics of vaccines, ensuring the timeliness and effectiveness in shipping.

Key batteries for medical-grade respirators E-One Moli Energy Corp. supplied the key batteries for medical grade respirators to ensure that supply of medical equipment is sufficient.

Risk Adaptation Strategies

During the pandemic, TCC paid extra attention to the mental health of employees. Through provision of physical/spiritual courses, travel subsidies, and joint coupons for hospitality purposes, it helped support them and encouraged them with ways of stress-relief. Furthermore, up to 125 health packages of organic vegetables and fruits were given to the plants for their nutritional supplement and immunity boost.

In addition, as affected by the pandemic, various training courses were also changed to be available online. The online learning platform "TCC Lyceum" was hence launched. Employees can get access to a wide diverse of contents, from Business English, to PE classes, environmental management practices, and ESG trends.

Hybrid Agility of Work

During the pandemic, TCC promoted the Work From Home (WFH) system. In promoting the system, it identified employees' potential needs for hybrid work. Therefore, TCC launched "Hybrid Agility of Work Plan." Benefits like "Paid Family Care Leave," "WFH model," and "Cross-time-zone Shift" were at each employee's option for work flexibility. Employees can take care of their families while pursuing their career development and, growing together with the Company.

Timely Supply of Personal Protective Equipment to Overseas Employees

To take care of overseas employees and actively implement epidemic prevention measures, TCC couriered 100,000 masks to the plants in Côte d'Ivoire (Ivory Coast) and Cameroon respectively in December 2021. Aside from caring for the employees at the plants, the communication between the regions and communities the plants belong to was also greatly strengthened. Local managers at the two plants donated part of the received supplies to the designated beneficiaries, such as the medical institutions in their cities and neighboring villages, to help them in their efforts to fight the COVID-19.

TCC Material Issues on Identification

Assessment Process for Stakeholders and Material Issues

STEP 1 Identifying Stakeholders

MEASURE

Heads of various departments in the Company fill in the stakeholder identification questionnaire to determine the importance of stakeholders to the Company and identify key stakeholders.

QUANTIFIED PERFORMANCES

10 categories of stakeholders identified

STEP 2 Determining Areas of Concern

MEASURE

Based on the results of stakeholder identification, the opinions and areas of concern of the stakeholders are obtained via questionnaires or interviews, so as to analyze the levels of concern with the respective issues.

QUANTIFIED PERFORMANCES

225 valid questionnaires / 1 offline seminar

STEP 3 Evaluating Impacts on Business Operation

MEASURE

The management of the Company conduct evaluations of the impact levels and risks of various sustainability issues on the business operation to determine the levels of impact of these issues on the Company.

QUANTIFIED PERFORMANCES

Opinions of 5 executives / resolution of Corporate Sustainable Development Committee

STEP 4 Establishing Material Issues

MEASURE

Based on the concerns of stakeholders and their impacts on the Company, the outcomes of issue assessments are mapped out in a material issue matrix as a reference to determine the significance thereof.

QUANTIFIED PERFORMANCES

13 material issues identified

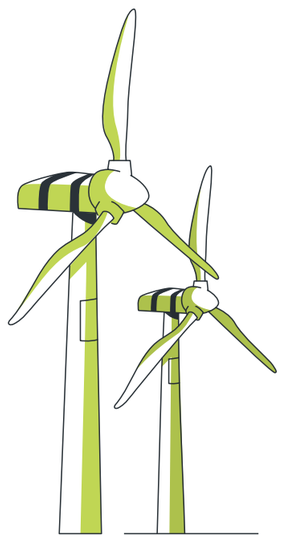
STEP 5 Analyzing Issues

MEASURE

The results of material issue identification are examined and compared to the material issues of the previous year to ensure compliance with the sustainability context and comprehensiveness.

QUANTIFIED PERFORMANCES

A 100% conformity of the issues to the sustainability and comprehensiveness requirements



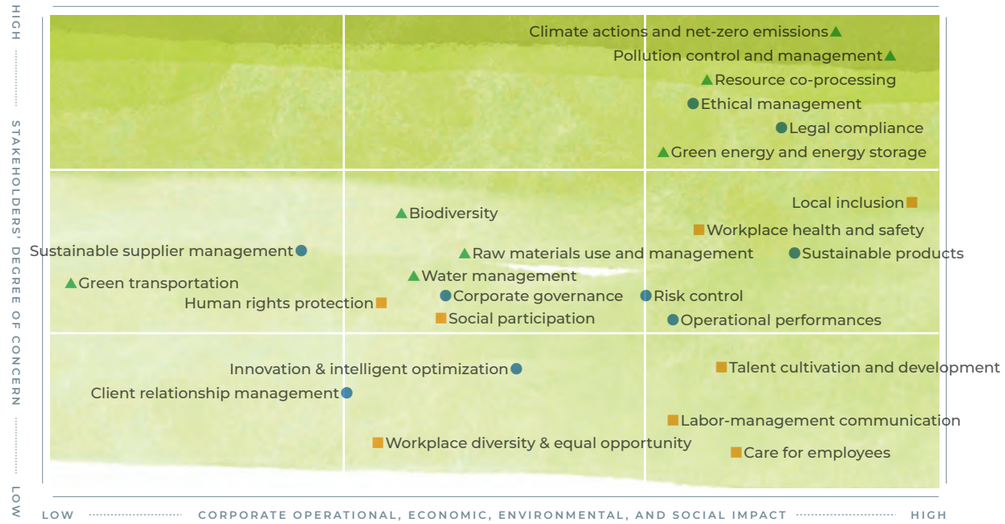
Sustainability Dialogues with Stakeholders

Pursuant to the AA1000 Stakeholder Engagement Standard (SES), TCC employs the five principles, i.e. Responsibility, Influence, Tension, Diverse Perspectives, and Dependency in the identification and the ordering of stakeholder significance as follows: government agencies, clients, employees, local communities, shareholders/investors, environmental groups/NGOs, the media, industry associations/industrial and academic entities, suppliers/contractors, and sustainability associations.

Identification of Sustainability Issues

In consideration of the international trends of sustainable development, ESG assessment principles (MSCI, DJSI, and CDP), ESG standards (GRI Standards and SASB Standards), industry characteristics, and benchmark corporate practices, TCC compiles a list of sustainability issues covering those of corporate governance, economy, environment, and society. In 2021, a total of 225 valid questionnaires taken by stakeholders were collected, with which 5 executives of the Company assessed their levels of impact on the Company from the respective issues, financially and non-financially, in the short- / mid- / long-term, producing a list of concerned issues of stakeholders and a list of issues with operational impact. The Corporate Sustainable Development Committee convened meeting. Based on the outcomes of questionnaire analysis, combined with experiences of stakeholder engagement and the recent trends of sustainable development, the issues include climate actions and net-zero emissions; pollution control and management; legal compliance; resource co-processing; ethical management; local inclusion; green energy and energy storage; sustainable products; workplace health and safety; risk control; operational performances; and talent cultivation and development. In addition, considering that biodiversity is the focused sustainability trend, it is proactively listed as the material issue for TCC in 2021. Hence, a total of 13 material issues were identified for TCC in 2021.

Matrix of Material Issues



GOVERNANCE TOPICS

Ethical management · Operational performances · Risk control · Legal compliance · Client relationship management · Innovation & intelligent optimization · Sustainable products · Sustainable supplier management · Corporate governance

ENVIRONMENTAL TOPICS

Climate actions and net-zero emissions · Resource co-processing · Green energy and energy storage · Raw materials use and management · Pollution control and management · Water management · Biodiversity · Green transportation

SOCIAL TOPICS

Human rights protection · Workplace diversity & equal opportunity · Workplace health and safety · Social participation · Talent cultivation and development · Labor-management communication · Care for employees · Local Inclusion

CHAPTER 01

Environment & Carbon Management

6 CLEAN WATER AND SANITATION
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
13 CLIMATE ACTION
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
17 PARTNERSHIPS FOR THE GOALS

3-in-1 Port, Power, Cement Plant of Hoping, Hualien

"Two hundred years ago, cement as a building material responded to the needs of human infrastructure to make life safer with quality. Two hundred years later since then, cement industry bears the brunt of an imminent obligation of carbon reduction."

YEAR 2021

GHG Emissions

Cement Plants Carbon Emission Intensity
-5.1%
0.806
tCO₂/ Metric Ton of Cementitious Materials
Base year 2016

RMC Plants Total Emissions
-8.48%
8,383
Metric Tons

Operation Headquarters Total Emissions
-8%
2,065
Metric Tons

Compared to 2020

Water Resource

Cement Plants Water Usage Intensity
-38%
0.3
m³/ Metric Ton of Cementitious
Base year 2016

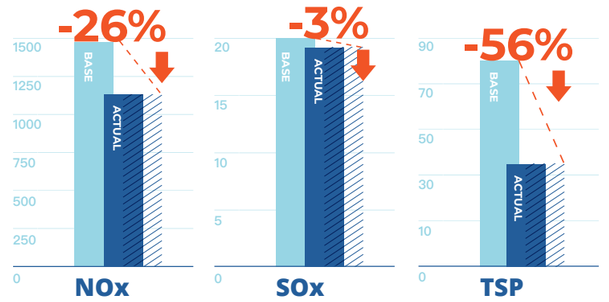
RMC Plants Water Usage
1,019.76
Million Liters

Operation Headquarters Water Usage
-15.17%
12.69 Million Liters

Compared to 2020

Air Pollution Control

Emission Intensity



PROCESS
0
WASTE

Base year 2016

TCC Environmental Management Policy

Upholding the goal of **"zero waste, zero pollution, and zero emission,"** TCC introduced certifications of international standards, including ISO 14001 Environmental Management, ISO 50001 Energy Management, ISO 14064 GHG Emissions Inventory, ISO 14067 Product Carbon Footprint, ISO 14046 Water Footprint Verification, ISO 46001 Water Efficiency Management System, and BS 8001 Circular Economy, to improve its product, energy, water resource, and waste management performances. With standards above the regulatory levels, TCC assesses eco-friendly and energy efficiency improvement solutions for processes. In addition, TCC requires its business partners like suppliers, contractors, subcontractors, and joint ventures to attach importance to their management of environmental impacts in the processes of production, manufacturing, transportation and services. As such, TCC joins hands with the industrial supply chain to create values of corporate sustainability.

Please visit our corporate website for TCC Environmental Protection Policy

Internal Carbon Pricing

Internal carbon pricing (ICP) is further promoted to deepen TCC's carbon management. TCC introduced the price of emissions as its internal cost according to emissions, serving as the reference basis for capital investment, operation transition strategy, and critical decision-making. The current ICP is derived with reference to regulations in areas of operation. The ICP shall be dynamically adjusted continuously in the future to effectively implement our targets for a net-zero emissions.

1.1 Science-Based Carbon Reduction Initiative

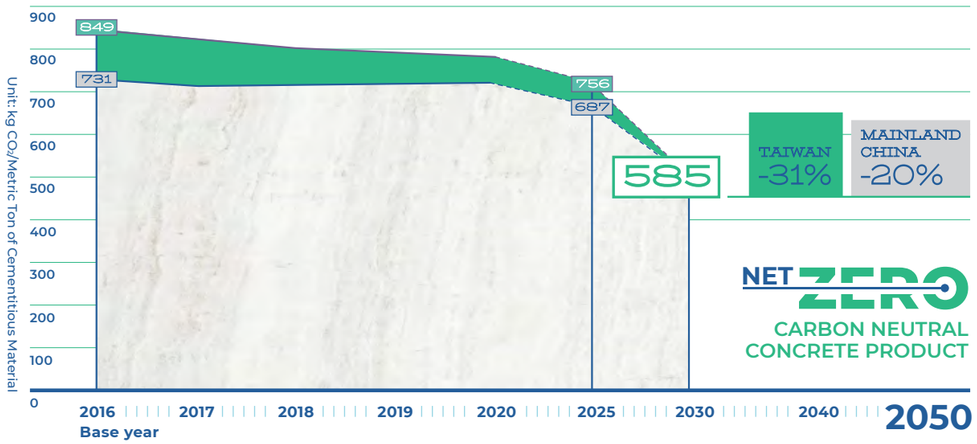
TCC kicked off its Science Based Targets (SBTs) initiative in 2019 and became the first cement company in the Greater China region with its science-based targets validated in June 2020. Also, in echoing the SDG 17 of Partnership for the Goals, it has been actively involved in the Global Cement and Concrete Association (GCCA) since 2020. It achieved an industrial partnership in 2021 and claimed to cut carbon emissions by 25% by 2030. Meanwhile, together with the leading cement companies worldwide, it commits to the goal of carbon neutrality by 2050. In addition to the SBTs, as a founding member to Taiwan Alliance for Net Zero Emission (TANZE), TCC responded to the Net Zero X 2030/2050 initiative by committing itself to the targets of a net-zero emissions in Operation Headquarters and offices by 2030, and in production sites by 2050. Based on the targets above, Operation Headquarters and RMC plants aligned themselves with the SBTs. In December 2021, ISO 14064 GHG Emissions Inventory was introduced as the basis for the net-zero emissions. It is expected to be certified by July 2022.

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

gcca

TANZE 台灣淨零行動聯盟 Taiwan Alliance for Net Zero Emission

Carbon Neutrality by 2050



AI Carbon Reduction Management Plan

With an Artificial Intelligence (AI) smart system, first of its kind in the industry, TCC proactively promotes reducing carbon both in operation management and manufacturing processes. With the engineering and information systems combined, the exclusively designed AI smart technology is integrating specific algorithms to carry out three steps, i.e. "current status analysis," "decision-making optimization" and "coordinated execution." Based on the characteristics of respective plants, optimized process ratio and carbon reduction plans have been proposed to accurately execute and manage carbon reduction targets across various stages and track the progresses.

The annual performance appraisal and quarterly bonus for the executives and employees are further tied to TCC Carbon Reduction Management Plan to ensure the achievement of the energy-saving and emission-cutting projects, environmental emissions management indicators and GHG management targets.

Target Setting
2016-2025
Taiwan-based operations
11% carbon reduction

Resource Research & Collcetion
Benefit Analysis
Supply
Use restrictions
Costs
Carbon reduction

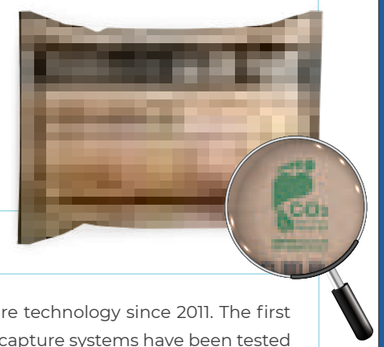
Optimal Carbon Reduction Plan
Calculation of alternative raw materials/fuels usage based on attributes of each plant

Carbon Emission Calculation & Progress Tracking
Coal, electricity
Carbonate decompositions
Yields
Modification for actual carbon reduction and progress tracking for plants

Establishing the Standard for the Cement Industry in Taiwan

The 1st Carbon Footprint Label & Carbon Reduction Label

Carbon footprint is defined as the greenhouse gases of an activity or product directly and indirectly generated from its whole life cycle, including raw material procurement, manufacturing, distribution and sales, use, and disposal or recycling in the end. To effectively capture the GHG emissions from its products, TCC launched the product carbon footprint project in 2019. In 2020, TCC proactively applied to the Environmental Protection Administration Taiwan (EPA Taiwan) for formulating the Product Category Rules (PCRs) for cement products and obtained the Carbon Footprint Label from EPA Taiwan. In 2021, the carbon footprint of bagged cement by the Suao and Hoping Plant was verified as a reduction of 11% and the carbon footprint from the Hoping Plant by 5.5% respectively, both way above the 3% reduction standard for the Carbon Reduction Label issued by the EPA Taiwan. TCC thus became the first cement company with products labeled with the "green footprint" in Taiwan.



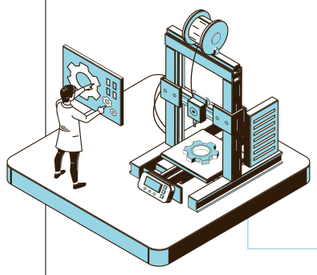
CO_2 Capture Technology

TCC has been actively investing in the development of carbon capture technology since 2011. The first generation 1.9 MWt and the next-generation 500 KWt pilot plant CO_2 capture systems have been tested onsite with a solid operational basis. They shall be applied to the #1K production line at the Hoping Plant for the plan of scale-up process with pure oxygen calcination (designed for an annual capture amount of 100,000 metric tons of CO_2) in order to accelerate the progress for commercial operation. The technology has been recognized by the R&D 100 Award, which was also referred to as The Oscars of Invention *by The Chicago Tribune*.

R&D 100 AWARDS

Ultra-High Performance Concrete (UHPC)

UHPC is the most innovative cement engineering material for the last 3 decades, with a brand-new formula collaboratively developed by TCC Research & Development Department and Taiwan Construction Research Institute (TCRI). Compared to the conventional concrete, UHPC comes with an ultra-high durability and high mechanically-compressive strength, which brought about a huge leap for the engineering material properties. Normally, buildings have a life span of 50-70 years. The UHPC as a building material can extend it to 100-120 years, which reduces building reconstruction and avoids construction wastes generated in the interest of CO_2 reduction target. Meanwhile, with its properties of fire and explosion resistance, a patented energy storage cabinet was developed.



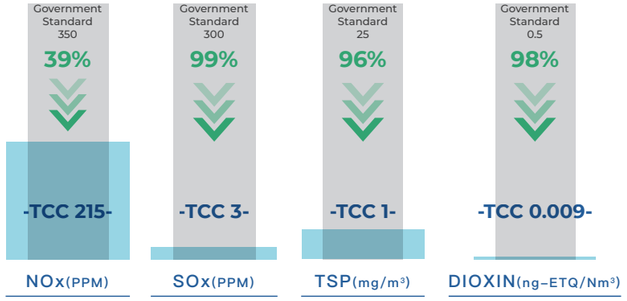
Low-carbon 3D Printing Technology

TCC invested in the low-carbon 3D printing technology and material development. It developed a concrete material that can be applied in the 3D printing, which is a huge breakthrough for the cement-based 3D printing material domestically. TCC shall continue to work with the industry and academics at home and abroad to deepen joint efforts and contribute to the realization of low-carbon construction technology.

1.2 Air Emissions Management

TCC rigorously manages its air emissions in processes. With standards stricter than the regulatory standards, air emissions are systematically monitored via equipment renovation, enclosed conveyor belts and the relevant NOx control technologies. The emission concentration levels of NOx, SOx, TSP, and dioxin in 2021 were far below the government's standards.

Air Emissions Way Below Regulation Standards



Regulated Standard for NOx, SOx, TSP and Dioxin is emission intensity

Air Emissions Management Measures

Gaseous Pollutants

Selective Non-Catalytic Reduction (SNCR) denitrification equipment planned

Low-sulfur, sub-bituminous coals used

Low NOx burners adopted

Multi-stage combustion equipment planned

Particulate Pollutants

Optimization of bag dust precipitators & improvement of dust collecting efficiency of filter bags

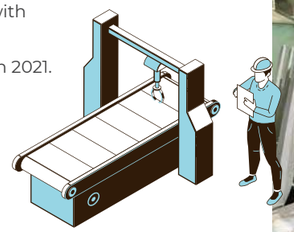
Airtightness improvement of the corridor belt conveyor systems to reduce dust escape

Ongoing optimization of the electrostatic-bag dust precipitators in the kiln systems, with the emission intensity of particulate pollutants reduced by 56% compared to the 2016 level and by 21% to the 2020 level

Continuous Emission Monitoring Systems (CEMS) Installed

With the CEMS of stacks, TCC ceaselessly monitors the emissions of flue gases 24/7 to verify the performance of the pollution control equipment for flue gases. Meanwhile, air quality monitoring stations were set up at Heping Village and Aohua Village for a continuous monitoring of the cement plant, so that appropriate measures can be taken to cope with any anomaly or emergency.

In addition, TCC conducts air quality monitoring by a third party on particulates, SOx, NOx, heavy metals (e.g. lead, cadmium, and mercury), and dioxin on a quarterly basis. Also, an environmental impact assessment is conducted for schools in the neighborhood every 6 months. All the monitored items were all in conformity with the regulatory requirements in 2021.



A Budget of NT$160 Million Allocated for Packaging Equipment Renovation

TCC has invested a total of NT$160 million to replace the packaging equipment at the Suao Plant, Taichung Distribution Branch and Gushan Distribution Branch to reduce the dust emissions in the packaging process. Also, the energy consumption is reduced, and the efficiency increased, to effectively meet clients' demand in the quality of packaged cement products and their expectation for a highly efficient loading and delivery.

Alternative Maritime Power (AMP) System

TCC invested NT$162 million to install AMP systems so that ships can suspend engines when halting, reducing diesel usage and avoiding air pollutants emissions synergistically. AMP in the port of Hoping was completed and operational in November 2020. AMP in the Taichung Distribution Branch is expected to be completed in 2022. The installation in Gushan Distribution Branch will begin in June 2022, to be completed by the end of November. AMP construction in TAHO AFRICA is expected for May 2022.

Taichung Distribution Branch

1.3 Water Resource Management

Upholding the principle of "not a drop wasted," TCC puts water resource at the core of its sustainable development.

Cement Plants in Taiwan Water Usage Intensity Target by 2030

-50%

m^3/Metric Ton of Cementitious Materials

Base year 2016

Cement Plants

Water resource management

TCC cement plants developed the shaft reclaimed water system; increased pipelines, extraction pumps, and water tanks; and repaired the old pipelines. The membrane bioreactor (MBR) processing system has been under construction since 2021 which is expected to complete by June 2022. Hence, the wastewater processing efficiency shall be improved with more water reclaimed for the use in cement plants.

HOPING MINE **The shaft reclaimed water system has cumulatively reclaimed 6,989 metric tons of water since its completion in May 2021**

SUAO PLANT **Effluent reclamation and reuse project: 70,280 metric tons water saved**

Cooling water reclamation project - New pipeline addition and old pipeline renovation: 157,332 metric tons water saved

Yongle domestic water pipeline modification project: 12,240 metric tons water saved

Wastewater management

The primary sources are the waste cooling water from the cement production process and the domestic sewage of employees. TCC conducts internal self-monitoring quarterly, which is in conformity with the relevant standards. Also, external bodies such as the local Environmental Protection Bureau will collect samples on site and inspect if the water quality at the outfalls is identical with the effluent standards on a quarterly basis, so as to ensure that the wastewater discharged will not lead to irreversible harm to the water body, ecology, or human body.

At the Hoping plant, a total of 28,710 m^3 of sewage was processed to the level within the regulatory standards of Hoping Industrial Park before discharged to the wastewater treatment plant of Hoping Industrial Park for further treatment, thereby to be discharged into the Pacific Ocean. At Suao Plant, the processed water and rainwater runoff are converged to the sedimentary pond for treatment to the level within relevant standards before discharged to Baimi River via the outfall. The total water discharged via the outfall in 2021 was 340,280 m^3.

RMC Plants

Rainwater and processed water reclamation and recycling treatment equipment are installed across TCC's 25 RMC plants. All plants are installed with truck washing bays and sedimentary ponds. The sand separation system separates sewage from granulates. Rainwater and wastewater are directed to the tertiary sedimentary pond for solid-liquid separation. The water after sedimentation will be recycled back to the process for use. The reclaimed rainwater is used in cleaning, mixer washing, and RMC truck washing. There are sand reclamation system and wastewater reclamation system installed for recycling in order to achieve the goal of zero discharge.

With the certification to ISO 46001 Water Efficiency Management System in 2021, TCC is the first certified cement company in the world that strengthens its water resource management and continuously optimizes its water efficiency. It is estimated that a total of 52,456 m^3 of water is saved per year.

WATER EFFICIENCY MANAGEMENT ISO 46001

1.4 Raw Materials Management

TCC proactively reduces mining and procurement of natural materials and studies the use of waste resources as recycled materials. Through the development of low-carbon cement and improvement of alternative fuel usage, we reduce the consumption of natural resources in the manufacturing process.

In response to the loosening of limit og the CNS 61 Standard to allow the total content of admixtures in cement raised from 5% originally to 10%, TCC has corresponding plans for the mix proportion of cement products and equipment configuration, increasing the usage of recycled materials.

Without sacrificing the manufacturing quality, TCC's cement plants continue to increase the usage of admixtures to reduce the clinker content in cement for carbon reduction. The feeding equipment is being added to the Suao Plant while an additional fly ash batching system is under planning at Hoping Plant, raising the addition amount of blast furnace slag and fly ash respectively.

Raw Materials Consumption in 2021

Category	Raw Material	Consumption (Metric Tons)
Non-recycled Raw Materials	Limestone	7,375,100
	Silica Sand	13,389
	Imported Low-alkali Sand	105,503
Recycled Raw Materials	Reducing Slag	72,483
	Calcium Fluoride Sludge	15,229
	Incinerated Recycled Pellets	3,486
	Construction Waste Dirt	265,803
	Alternative Clay	1,011,038
	Desulfurization Gypsum	297,293
	Coal Ash	457,868
	MgO-based Desulfurized Inorganic Sludge	4,028
	Inorganic Sludge	9,529
	Waste Compression Molding	678
	Water Purifying Plant Sludge	182
	Waste Ceramics	129
	Air-cooled Blast Furnace Slag	442
	Water-quenched Blast Furnace Slag	304
Total Amount of Raw Materials		**9,632,484**
Percentage of Recycled Raw Materials (Recycled Raw Materials/Total Amount of Raw Materials)		**22%**

1.5 Waste Management

The wastes at TCC plants include the domestic wastes generated from employee activities, waste lubricating oils from maintenance, waste refractory bricks, etc., which are all recycled and turned into harmless reusable resources through high temperature in the cement kilns. Therefore, there is zero waste generated at the plants. In 2021, a total of 1,532.54 metric tons of valuable industrial wastes at the plants like waste iron are recovered by qualified third-party clearing agencies on a regular basis. There is no hazardous waste generated at the RMC plants. Most are domestic wastes and general industrial wastes (e.g. inorganic sludge). The total waste generated is 1,064.43 metric tons, of which the domestic waste accounts for 145.78 metric tons with 918.65 metric tons general industrial waste. All the wastes are commissioned to qualified agencies for disposal. Also, there are 259.27 metric tons of waste iron from the replaced parts, which are sold to recyclers for recycling.

The main source of wastes generated from Operation Headquarters is domestic waste. Management regulations are in place for the waste sorting and recycling. Regular clearing services are commissioned by qualified third-party recyclers who are required to present related evidence for tracking purposes. Based on the clearing manifests, 27.313 metric tons of domestic waste were generated in 2021.

Treatment of Wastes in 2021

Unit Metric Tons

Disposed Method	Category	Cement Plant	RMC Plant	Operation Headquarters
Resource Recycling	Domestic Waste (Category H/D)	-	145.78	27.31
	Industrial Waste (Inorganic sludge)	-	918.65	-
Sold to Recyclers for Reuse	Valuable Metals (Waste Iron incl.)	1,532.54	259.27	-
Total		**1,532.54**	**1,323.70**	**27.31**

Note 1: TCC cement kiln process can reach up to 1,300 °C, capable of recovering wastes as harmless reusable resources to be neutralized for reuse
Note 2: All wastes at TCC are not hazardous wastes that are conducted with off-site disposal. 1,091.74 metric tons of them are incinerated (waste heat recovery not incl.) with the other 1,791.81 metric tons recycled for reuse

CHAPTER 02

Resource Recycling and Circular Economy

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
13 CLIMATE ACTION
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
17 PARTNERSHIPS FOR THE GOALS

TCC DAKA Renewable Resource Recycling Center - A&D Awards 2021 - Gold Award

"TCC has always been a true believer and a positive exponent of the circular economy. The circular economy prescribes to transform wastes into valuable resources while avoiding implications associated with resource scarcity."

YEAR 2021

Resource Recycling

Reused Cement 21.82%

Alternative Raw Materials 22%

Alternative Fuels 11%

Carbon Reduction 72,841 Metric Tons

Industrial Waste TCC Assisted to Treat

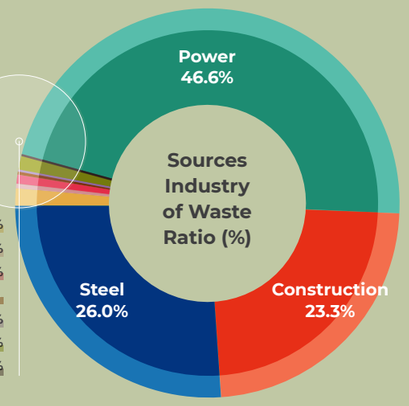
+11%

1.141 Million Metric Tons

Equivalent to the total amount of industrial waste in Taiwan

5.5%

Semiconductor 1.3%
Chemical Textile 0.4%
Paper 0.8%
Waste Incinerator 0.3%
Semiconductor Assembly 0.06%
Environmental Service 1.18%
Waste Utility 0.016%



Energy Efficiency Improvement

EP100

In response to energy efficiency initiative

Compared to 2020

Cement Plants
↑1.3% Energy Consumption
3.097 GJ/Metric Ton of Cementitious Materials

RMC Plants
↑10% Energy Consumption
0.0134 GJ/m³ of Concrete

Operation Headquarters
↑5% Energy Consumption
12,054 GJ

Power Generation by Waste Heat Recovery

Recovery Efficiency
+86.64%

Electricity Purchased
-31%

Carbon Reduction Equivalent to
5.86 Million Trees

Compared to 2018

2.1 Low-carbon Production Cycling

The Word Business Council for Sustainable Development (WBCSD) pointed out that the cement industry with co-processing combined, is the most scientific, safe, and effective way to dispose wastes, just as the renewable circulation in nature.

TCC utilizes the strength unique to the cement sector into the model of circular production. Through the 3Ts, i.e. high temperature of 1,300°C, high turbulence, and high retention time, of the cement kiln, dioxin that an incinerator cannot process is broken down, and most wastes are processed following the principle of "neutralization and waste recovery," so that resources, materials, and wastes may return to the industrial chain for an ongoing cycling, significantly reducing consumption of energy and resources as well as production of wastes. As a result, we realize the corporate philosophy of "there is no waste in nature, the end of waste must be the beginning of another resource."

AI-driven Resource Recycling

With the AI technology and specific algorithm combined, as the first in the industry, TCC has built the three-step intelligent system of circular economy: "research in wastes," "AI-optimized ratio of alternative raw materials/fuels," and "green product development for substantial carbon reduction."

STEP 1 Research in Wastes

Starting from the sources of wastes, research is conducted in terms of their categories and contents. Their origins and processes are investigated. Also, samples are retrieved from the places of origin, which are examined and analyzed at TCC Research & Development Department which is equipped with sophisticated instruments, including the X-ray Fluorescence Spectrometer (XRF), X Ray Diffractometer (XRD), Atomic Absorption (AA) Spectrometer, automatic Cl-ion titrator, automatic calorimeter and mercury analyzer. Therefore, analyses on the contents of wastes can be conducted in terms of their chemical and physical properties in order to verify if the wastes' properties and relevant documentation are in compliance with the government's standards.

Isothermal calorimeter *AA spectrometer* *Mercury analyzer* *XRD* *XRF* *Automatic Cl-ion titrator*

STEP 2 AI-optimized Ratio of Alternative Raw Materials/Fuels

With the quality of waste materials in line with the relevant standards, the qualified wastes undergo the co-processing. The complicated ingredient calculation is automated. Taking the heating value and moisture content of fuels, among others, into consideration, the replacement rate for coal is calculated to offer recommendations on optimized waste utilization and carbon reduction.

STEP 3 Green Product Development for Substantial Carbon Reduction

Through the AI computation, recommendations on optimized ratio of recycling resource are provided to reduce the carbon footprint in our products. Also, the products were certified to EPA's Carbon Footprint Label as early as 2021, which demonstrates that TCC products are qualified as cement of lower carbon emissions. In addition, TCC products used for green building construction can extend the service life or be recovered and returned to the industrial chain of building materials to achieve the goal of a circular economy.

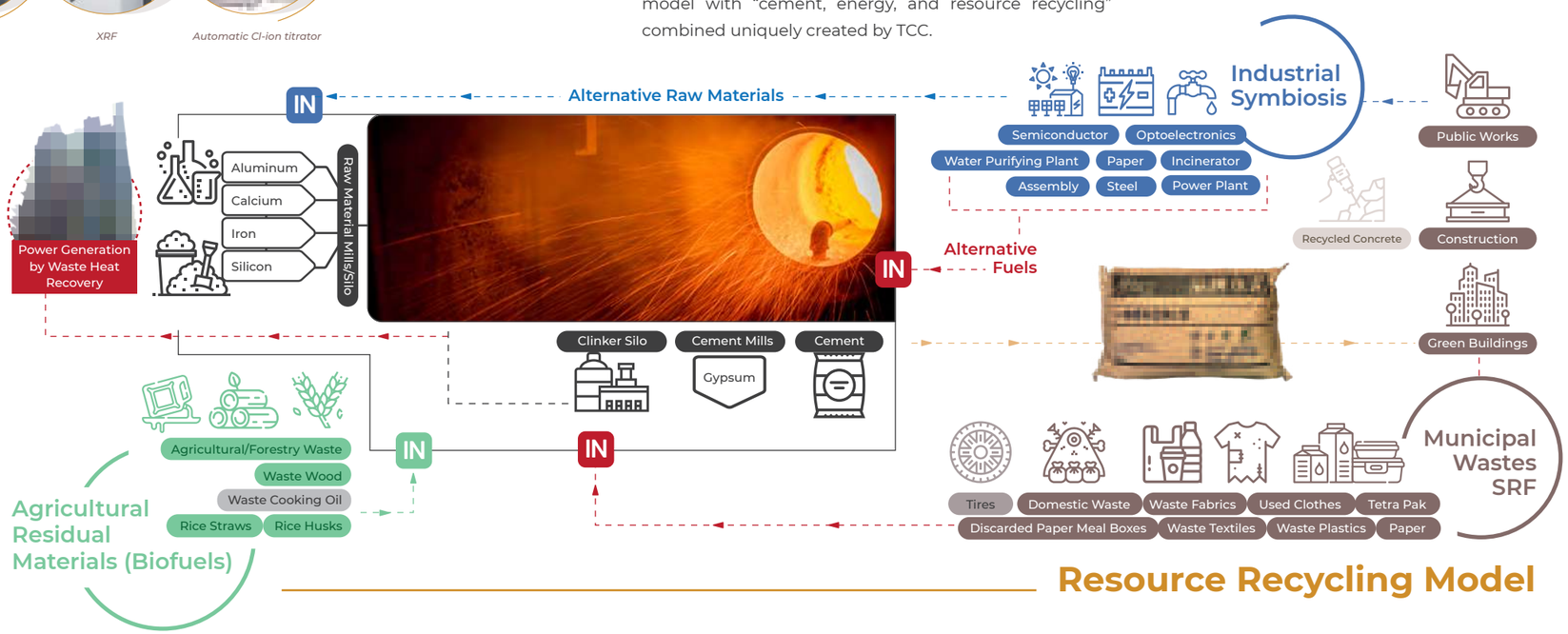
BS 8001

Certified to the Highest Level of BS 8001 Circular Economy

The circular economy model of TCC's kilns was certified to the highest level of BS 8001, both in 2018 and 2020. As such, it conforms to the six principles of Innovation, Stewardship, Collaboration, Value Optimization, Transparency and Systems Thinking, effectively and materially implementing the circular economy.

Zero Waste Circular Production Park, First in the World

Inaugurated in 2001, with the conception of "zero waste, low carbon, and eco-friendly" at the beginning of its design, the Hoping Plant, Hoping Industrial Port, and Hoping Power Plant were planned for cross-industrial resource circulation from raw material mining, processing, and energy to product output. Limestone, the ingredient in cement, is provided to the Hoping Power Plant for eco-friendly desulfurization, reducing the air emissions. The coal ash and desulfurization gypsum generated from the power plant go to the cement plant as cement ingredients. Then, the cement products are transported via the low-carbon shipping to the cement terminals in the western ports. As a result, it is a "3-in-1" circular production model with "cement, energy, and resource recycling" combined uniquely created by TCC.



Resource Recycling Model

2.2 Energy Saving and Bioenergy Development

Eco-friendly jersey of Heping Gukut Soccer Team

TCC has incorporated ISO 50001 energy management system into its business strategies. To further raise energy efficiency, EP100 target is under planning and plans to fulfill its commitment to the initiative by 2022.In addition, TCC proactively promotes energy-saving solutions to continually improve energy efficiency.

Companies have been relying on fossil fuels like petroleum, coal and natural gas to generate energy. Nevertheless, TCC realized that reducing the use of energy from fossil fuels is the key to realizing a net-zero carbon emissions. Through the two strategies, i.e. active development of sources of bioenergy and solid recovered fuel (SRF) for less use of fossil fuels as well as plans of waste heat recovery equipment transformation to raise power generation efficiency to reduce procured electricity.

Energy-saving Solutions & Results on Plants in 2021

Plant	Energy-saving Solution	Total Energy Saved (Unit kWh)	Cost Saved (Unit NT$)
Hoping Plant	AQC Boiler tube replacement project	17,125,073	38,017,662
	Raw mill turbine frequency conversion modulation and modification	814,590	1,809,390
	Replacement of the shaft system lighting with LEDs	35,069	77,854
	Technological transformation of raw mill's triple flap valve	3,822,793	8,486,602
Suao Plant	Technological transformation of raw mill's triple flap valve	1,072,580	2,306,047
	Replacement of bricklaying air compressors	482	1,037
	Lights changed to central-controlled	91,008	195,667
	Replacement of the kiln system lights with LEDs	130,053	279,614
	Cement silo air compressor replacement	17,375	37,355
Taichung/ Kaohsiung Plant	Replacement energy saving LED lighting	5,760 13,315	19,000 40,000

Power Generation by Waste Heat Recovery

TCC's cement plants are 100% equipped with a waste heat recovery system. Also, the flash distillation technology is introduced to increase the efficiency in heat recovery. In 2021, TCC planned to invest NT$406 million in the technological transformation of the system, implementing the single-kiln low-temperature waste heat power generation technology (with an average net generation of 5,800 to 6,000 kWh per year). It is expected to raise the net power generated per metric ton of clinker from 13 kWh to 29 kWh and elevate the power generation efficiency by over 100%. Thus, we may save up to 25 million kWh of purchased electricity per year. The power generated from waste heat recovery in 2021 reached 0.138257 billion kWh in 2021, equivalent to a 31% reduction of the purchased electricity in 2021.

Bioenergy Development Projects

Biofuel	Coal Reduced	Research Direction
Wood Chips	-33%	Study of the moisture content reduction in wood chips; alternative fuel feasibility assessment
Rice Husks/Rice Straws	-33%	Feasibility assessment on agricultural residual materials used as alternative fuels
Waste wood	-33%	Assistance to the EPA in processing illegally-disposed waste wood and assessment of it as part of the alternative fuels
Leucaena leucocephala	Under assessment	"Regional efforts of invasive alien plant control" targeting tough species of Leucaena leucocephala, which is rich in heating value and can be removed and used as part of the alternative fuels
Waste cooking oil	Under assessment	Assessment of waste cooking oil in the food industry used as alternative fuels after reprocessing

Solid Recovered Fuels (SRF)	Coal Reduced	Research Direction
Waste Fabrics/Waste Textiles/Waste Plastics	-40%	Feasibility assessment of discarded clothing and waste fabrics used as materials for SRF
Discarded Paper Meal Boxes/ Tetra Pak	-50%	Feasibility assessment of using the SRFs made from discarded paper meal boxes and Tetra Pak as alternative fuels

Wood chips | Rice husks | Rice straws | Waste wood | Waste fabrics waste textiles | Discarded paper meal boxes & Tetra Pak

Introduction to Bioenergy

Bioenergy is an energy generated from the transformation of biomass. The sources of biomass are diverse. Any plant-based/animal-based organism, agricultural/forestry materials, biomass waste, and municipal waste can generate energy with low carbon emissions through a proper process. Bioenergy can be divided as liquid (e.g. bioethanol and biodiesel), gas (e.g. biogas), and solid (e.g. agricultural/forestry materials, industrial wastes, municipal wastes, etc.), in which the solid ones can be further divided by the source as alternative fuel and SRF. The examples for the former are agricultural/forestry materials, like wood pellets and palm shells, while the ones for the latter are flammable substances like paper, plastic, or fiber.

Biofuels like wood pellets, palm shells, and other agricultural/forestry materials are free from chemical pollution, so they remain clean as raw materials with properties of low pollution and emissions and a wide range of applications. To explore more possibilities of biofuel applications, TCC established the Agricultural Residual Materials Center that actively inquiries into the agricultural residual materials generated from the major agricultural counties in Taiwan, so as to uncover more possibilities for using residual materials for bioenergy.

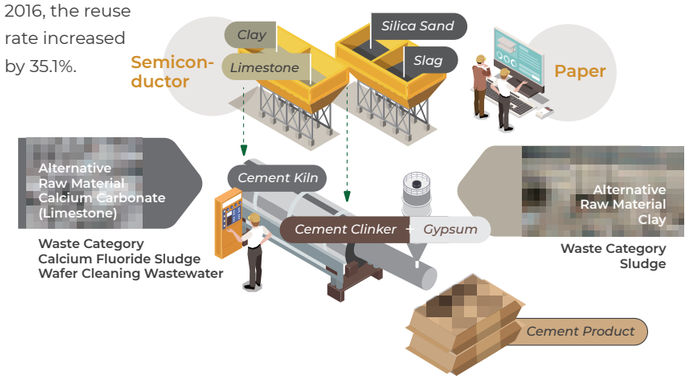
Development of Agricultural Residual Materials Center

2.3 City Waste Purifier

TCC is committed to the model of circular production. Leveraging its industrial characteristics and core competences, it works with the industries, governments, cities, and the broader society to foster a circular economy sphere.

Resolving the Issue of Wastes from Ten Industries

TCC assists ten industries, i.e. power utility, construction, iron and steel, semiconductor manufacturing, semiconductor assembly, chemical fiber, pulp and paper, waste incineration, environmental services, and water utility, in handling wastes that are difficult to dispose by themselves and turning them into alternative cement raw materials and fuels. In 2021, TCC assisted various companies in treating 1.141 million metric tons of wastes in total. According to the latest statistics of the annual waste generated compiled by EPA Taiwan, it is equivalent to 5.5% of the total wastes in Taiwan. After conversion, it is equivalent to a reuse amount of 218.2 kgs per metric ton of cement, reducing carbon emissions by 72,841.1 metric tons. Compared to the reuse amount of 177.1 kgs per metric ton of cement in 2016, the reuse rate increased by 35.1%.



Industrial Waste Treatment by TCC in 2021 *(in metric ton)*

	Source (Industry)	Alternative Type	Total
Reducing Slag	EAF Steel	Alternative Raw Material	72,483.4
Calcium Fluoride Sludge	Semiconductor		15,229.0
Incinerated Recycled Pellets	Waste Incinerator		3,486.1
Construction Waste Dirt	Construction		265,802.7
Desulfurization Gypsum	Coal-fired Power Plant	Alternative Adjunct	297,293.3
Coal Ash	Coal-fired Power Plant	Alternative Raw Material	457,868.0
MgO-based Desulfurized Inorganic Sludge	Petrochemical		4,027.5
Inorganic Sludge	Pulp and Paper		9,529.0
Waste Compression Molding	Semiconductor Assembly		677.8
Water Purifying Plant Sludge	Water Utility		182.3
Waste Ceramic	Steel		184.6
Air-cooled Blast Furnace Slag	Steel		442.0
Water-quenched Blast Furnace Slag	Steel	Alternative Clinker	303.8
Wood Chips	Environmental Service	Alternative Fuel	12,699.1
SRF	Environmental Service		787.6
Husks (Grains)	Farmers' Association/ Rice Factory		21.4
Total			1,141,017.6

Resolving Municipal Waste Issue

TCC established TCC DAKA Renewable Resource Recycling Center, using rotary kilns and gasifiers to dispose the domestic wastes in Hualien. With 200 metric tons of waste treated per day in the future, it is the first co-processing demo site that using cement kiln to dispose domestic wastes.

The Center shall be a multipurposed, transparent, and open venue, designed with waste treatment, environmental education, and tourism combined. The general public can witness the advanced waste disposal technology that is clean, eco-friendly, and odor-free. As such, TCC's spirit in promoting the sustainable development and mutual benefit for industry and city is integrated into its endeavor to find the possibilities for an ecology-industry symbiosis.


TCC DAKA Happy Farm

Resolving Food Waste Issue

TCC DAKA established the Food Waste Reuse Center in February 2021. The food waste generated from the Heping Village and TCC DAKA go through the food waste fermentation facility and become soil amendments for villagers in the neighborhood to use on crops or in gardening. Soil is a source of carbon sink that cannot be ignored. However, there is one-third of soils degrading globally. Turning organic waste like food waste into soil amendments not only properly uses the organic substances to replace the energy-consuming chemical fertilizer for nutrients to return to soil, but also improves soil properties. A total of 12,205 kgs of food waste was recycled to generated 1,572 kgs of soil amendments, in which 958 kgs was used by villagers and the plant itself. TCC deftly guides people to learn better about wastes and put the ideas of sorting and recycling as well as circularity into actions.

TCC International Development

"In 1415, a fleet set sail southbound with a fair wind from Lisbon, Portugal, for unchartered waters ever known to humans."

"This expedition however kicked off unexpectedly the Age of Exploration, which shed light on the Dark Continent and embarked on the journey to globalization."

Nelson An-ping Chang, Chairman

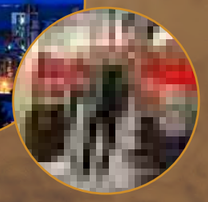
In 2018, TCC launched its Age of Exploration. Its cement business stepped out of Asia for the first time, expanding into the Middle East, Europe, and Africa. Together with OYAK, the largest cement company in Türkiye, it established a joint venture Cimpor Global Holdings in the Netherlands. TCC European Operation Headquarters, Taiwan Cement (Dutch) Holdings B.V., was set up in Amsterdam. At this moment, the joint venture has expanded its territory into Türkiye, Portugal, as well as Côte d'Ivoire (Ivory Coast) and Cameroon in Africa. The European Union Emission Trading Scheme (EU ETS) entered the phase 4, with the free emission allowance significantly reduced and lowered year by year. In response to the change in the EU emission cap policy, the JV proactively engages in the development of low-carbon cement to effectively elevate the resilience of its corpo - rate competitiveness.

Marching into the Turkish Cement Market with OYAK

OYAK owns 7 major cement plants with an annual clinker production capacity of 12 million metric tons. TCC joined hands with OYAK to march into the European market for a synergy derived from the strategic partnership. In the European market, in response to the EU ETS and to reduce its reliance on imported fuels, JV accelerated the raising of the thermal substitution rate (TSR) of the alternative fuels. At the Aslan Plant in Türkiye, the pretreatment and feed systems of alternative fuels were installed. Using the preheat system and replacing the traditional coals with alternative fuels, it significantly reduced the consumption of coal and effectively cut the costs. In 2021, it achieved a steady alternative fuel usage of 55%.

OYAK Çimento

Chairman Chang visited Cement Museum in Alhandra Plant



Cimpor Portugal Holdings

Developing Portuguese Cement Market

In the second half of 2019, Cimpor Global Holdings officially acquired Cimpor Portugal. Cimpor Portugal has 3 cement plants with an annual clinker production capacity of nearly 5 million metric tons and a market share close to 55%. Cimpor Group possesses professional laboratories and teams. In line with the properties of the respective plant's combustion system, it actively searches for suitable alternative fuels. Also, it collaborates with suppliers for pretreatment of alternative fuels, simplifying part of the cement manufacturing process. Among the 3 plants of Cimpor Portugal, Alhandra Plant, with the largest production capacity, has the most outstanding performance in the thermal substitution rate of alternative fuels that reaches up to 50%. Also, it planned to undertake a system renew project in 2022 to reach the target of 80%. Souselas Plant, No. 2 in terms of production capacity, would upgrade its alternative fuel system in 2022. The substitution rate would double from current 30% to 65%.

European Operation Center

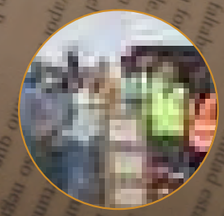
Amsterdam Operation Headquarters

Cimpor Côte d'Ivoire Abidjan

Engineering Affairs and Research & Development Department to Côte d'Ivoire survey

Expansion in Africa to Bring forth the New Production Model

Africa is just right across the strait of Gibraltar. After acquiring the business in Portugal, Cimpor Global set its eyes on the African Continent for expansion. The Abidjan Plant was established in Côte d'Ivoire (Ivory Coast) in the Western Africa with an annual production capacity of 800,000 metric tons. In 2021, it went further by establishing a new Kribi Plant in Cameroon, which is expected to complete in 2022 with an annual production capacity of 800,000 metric tons. The plant in Côte d'Ivoire (Ivory Coast) employs the traditional rotary kiln and coolers as its primary production equipment, which is more tolerant in terms of feed granularity and moisture content in raw materials. The production line for calcined clay and cement are all installed to the plant. The raw materials in proximity to the plant are used for calcination. The highly active product it manufactures can significantly reduce the clinker ratio in cement manufacturing. Meanwhile, through lower temperature required in the clay calcination process, it significantly reduces the heat consumption required and effectively cuts carbon emissions. The total carbon emissions are cut by 70% compared to that from the traditional clinker production. At the plant in Cameroon, a whole new production process is adopted, using the calcination technology with preheater at the core. It comes with the benefit of being able to flexibly adjust the process parameters and improve heat exchange efficiency, giving birth to the state-of-the-art eco-friendly cement produc - tion line.



Cimpor Cameroun Kribi

Overcome geographical constraints and language barriers, 100,000 medical masks successfully delivered to medical institutions and communities near the plant

CHAPTER 03

Corporate Governance & Risk Management

5 GENDER EQUALITY
8 DECENT WORK AND ECONOMIC GROWTH
13 CLIMATE ACTION
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
17 PARTNERSHIPS FOR THE GOALS

Hoping Industrial EcoPort

Mother Nature is the main entity we reside in, with an aim to promote social interests, where our management goals are integrated fully with social interests.

YEAR 2021

Board of Directors

Board Seats **-21%**
Reduce to 15 from 19

1/3 Board Seats are INDEPENDENT DIRECTORS
Increase from 21% to 33%

ESG

-related courses
122Hours

Independent Directors are FEMALE
60%

Ethical Management

134 Hours of Trainings on Ethical and Moral Standards

100% Covering Employees

ANTI-BRIBERY MANAGEMENT ISO 37001

INFORMATION SECURITY MANAGEMENT ISO 27001

Digital Governance

Chief Information Security Officer Appointed

Supply Chain Sustainability

Online Suppliers Convention
Critical Suppliers Participating
70%

Critical Tier 1 Suppliers

61.5%	100%	65.1%
GHG Inventory	Inspection of Suppliers	On-site Inspection

(Document Review & On-site Inspection)

100%
High Risk Suppliers Blocked New Suppliers that Signed the Supplier Code of Conduct

Green Procurement
+10% | **NT$860Million**

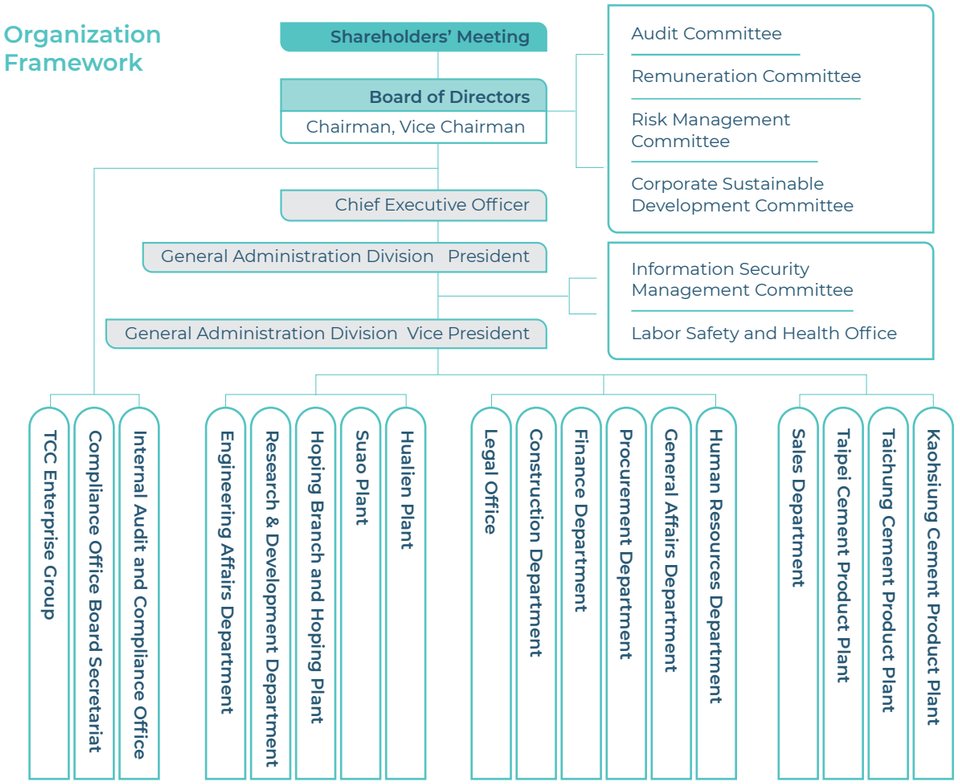
Local Procurement
+35% | **NT$17.6Billion**

Compare to 2020

3.1 Board of Directors

The TCC Board of Directors oversees four Functional Committee while General Administration Division supervises the Information Security Management Committee and the Occupational Safety and Health Management Office.

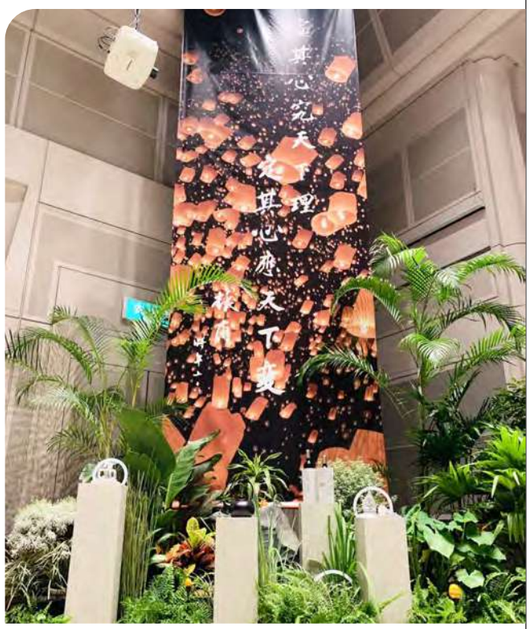
Organization Framework



Note 1: The Taipei, Taichung, and Kaohsiung RMC Plants, including 20 branches and 3 distribution stations
Note 2: The Hualien Plant includes a RMC plant
Note 3: The Corporate Sustainable Development Committee has been upgraded as a functional committee since July 2021

The tenureship of the members of the Board of Directors at TCC is 3 years. The incumbent members of (the 24th) Board of Directors were elected on July 5, 2021. The seats were cut from 19 seats to 15 seats with a reduction of 21%, among whom 12 seats are replete with practical cement-related experiences. There are 5 seats of Independent Directors with the percentage in the overall seats of the Board of Directors raised from 21% to 33%, among whom 4 Directors have the expertise in accounting or laws. 27% of Board members are female. The percentage of female Independent Directors has reached 60%.

The average attendance of the 24th Board of Directors in 2021 is 96.19%, or 100% by counting in the presence by proxy. Important resolutions adopted by the TCC Board of Directors are released and disclosed faithfully on the Market Observation Post System in a timely manner. In deliberation of matters concerning a Director or the legal entity he/she represents, the Director shall abstain from voting for conflict of interest.



Profiles and Committees of the Members on the Incumbent (24th) Board of Directors

Title	Name	Time on the Board (Year)	Core Diversity Items			Functional Committee				
			Gender	Age						
				31-50	51 or above					
Chairman	An-ping (Nelson) Chang	28	M		●					●
Director	Jong-Peir Li	4	M		●					●
Director	Kang-Lung (Jason) Chang	10	M		●					
Director	Kenneth C.M. Lo	10	M		●					
Director	Por-Yuan Wang	13	M		●					
Director	Kung-Yi Koo	5	M	●						
Director	Chi-Te Chen	37	M		●					
Director	Chi-Chia Hsieh	19	M		●					
Director	Chien Wen	4	M		●					
Director	Chun-Ying Liu	4	F	●						
Independent Director	Yu-Cheng Chiao	10	M		●	●		●		
Independent Director	Victor Wang	9	M		●	●		●	●	●
Independent Director	Lynette Ling-Tai Chou	4	F		●	●		●	●	
Independent Director	Mei-Hwa Lin	Newly Elected	F		●	●		●		
Independent Director	Shiou-Ling Lin	Newly Elected	F		●	●		●	●	

■Audit Committee ■Remuneration Committee
■Risk Management Committee ■Corporate Sustainable Development Committee

Note 4: Both Directors Mei-Hwa Lin and Shiou-Ling Lin are new Independent Directors in the 24th Board of Directors with a tenure from 5 July 2021 to 4 July 2024
Note 5: All members on the 24th Board of Directors at TCC are citizens of the Republic of China (Taiwan)

Functional Committees

Committee	Audit	Remuneration	Risk Management	Corporate Sustainable Development
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	Formulation and review of policies concerning the performance assessments of the Directors and managers as well as their compensation; evaluation and stipulation of the compensation for the Directors and managers on a regular basis	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	A decision-making and supervisory body over the Company's relevant efforts in the sustainable development, including Governance (G), Environmental (E), and Social (S), to strengthen the Company's management system, contribute to the environmental conservation, and exercise its social responsibilities for the Board of Directors to fulfill its responsibilities in the protection of the interests of the Company as well as its employees, shareholders, and stakeholders
Attendance (presence in person) (%)	90	90	100	100
Attendance (presence by proxy included)(%)	100	100	100	100
Charter of Committee				

Note 6: The tenures of the new Audit Committee started from July 5, 2021, while the remainder from July 15, 2021

External Evaluation of the Board of Directors – Excellent

"Rules of Performance Evaluation of Board of Directors" has been stipulated at TCC to evaluate the Board of Directors and the Functional Committees on a regular basis. The areas covered in the evaluation include the involvement in the corporate operation, improvement of the decision-making quality of the Board, composition and structure of the Board, election of Board Members and their continuing knowledge development, and internal controls. KPMG Advisory Services Co., Ltd. was commissioned by TCC to conduct the Evaluation with report submitted on February 26, 2021.

The result of the overall evaluation was excellent.

Please visit our corporate website for details of the evaluation report www

Corporate Governance Evaluation

TCC values corporate governance performance, achieving a brilliant result of 6%-20% in the eighth Corporate Governance Evaluation. The issues for improvement are constantly brought up on the monthly senior manager meetings for the personnel in charge to plan and execute corrective actions for relevant indicators accordingly. In addition, the targets for improvement are connected with the performances of the responsible unit managers so as to step up the growth of corporate governance performance.

Please visit our corporate website for more information on corporate governance www

Succession Plan for Top Management

TCC emphasizes improvement of the Board of Directors' functions. Diversity requirements in line with the operation, business model, and developmental needs include the following two aspects when creating a candidate pool of Directors:

Basic criteria and values
gender, age, nationality, culture, etc. as well as the understanding of the Company's potential in business diversification aside from an in-depth knowledge of the core businesses of TCC

Professional knowledge and skills
diversity in the professional backgrounds (e.g., legal, accounting, industry, finance, marketing or technology, etc.), expertise techniques and industrial experiences of the potential candidates of Directors

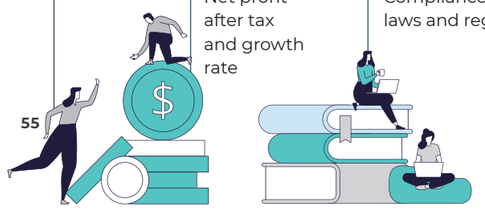
ESG Professional Development Program for the Board of Directors

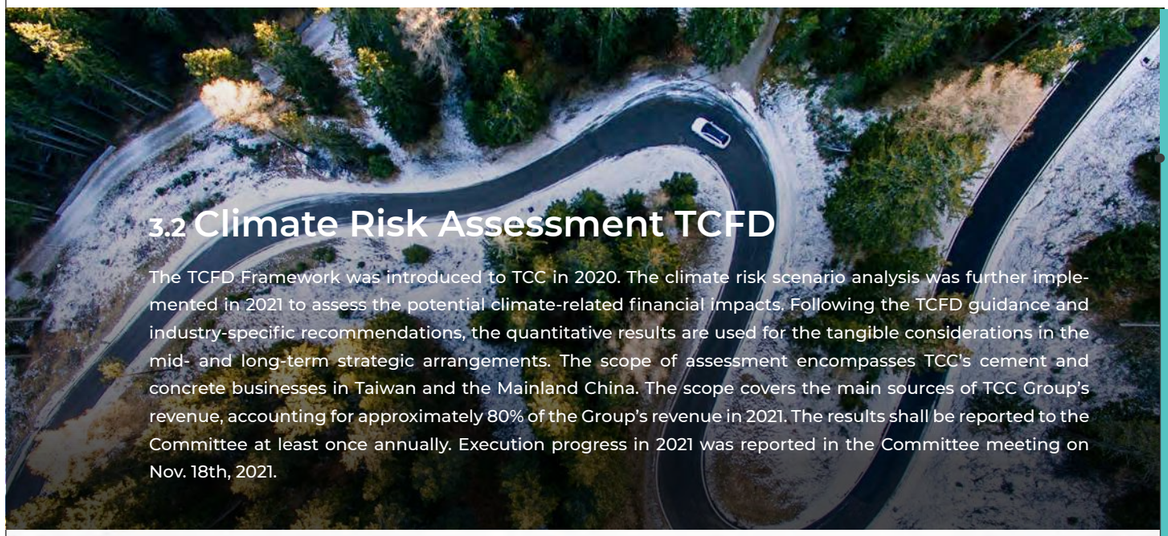
TCC arranges development programs for Directors and Independent Directors catering to their expertise. In 2021, the Program centered around issues of sustainability, including the climate-related risk management and ESG courses. The total hours of the ESG-related courses were 79 hours, and those of the risk management courses 36 hours. Together with other governance-related courses, the total hours of professional development for the members on the Board of Directors in 2021 were 122 hours.

Remuneration Policy

The President's performance as well as the related wage and remuneration policy, mechanisms, standards, and structure are evaluated by the Remuneration Committee based on the contributions thereof to the Company's operation before submitted to the Board of Directors for approval. Apart from the linkage to performances, the evaluation scope for wage and remuneration also encompasses the non-financial performances, such as corporate governance, green finance, social care, and environmental sustainability. The targets are as follows:

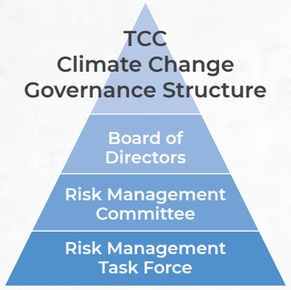
Earnings-related Performance Indicators	Risk Indicators	Talent Cultivation Indicators	Strategy Indicators
Net profit after tax and growth rate	Compliance with laws and regulations	Cultivating talent; raising the competency and quality of employees; fostering an international perspective	Development of circular economy to achieve targets of circular sustainability





3.2 Climate Risk Assessment TCFD

The TCFD Framework was introduced to TCC in 2020. The climate risk scenario analysis was further implemented in 2021 to assess the potential climate-related financial impacts. Following the TCFD guidance and industry-specific recommendations, the quantitative results are used for the tangible considerations in the mid- and long-term strategic arrangements. The scope of assessment encompasses TCC's cement and concrete businesses in Taiwan and the Mainland China. The scope covers the main sources of TCC Group's revenue, accounting for approximately 80% of the Group's revenue in 2021. The results shall be reported to the Committee at least once annually. Execution progress in 2021 was reported in the Committee meeting on Nov. 18th, 2021.



Board of Directors
The highest decision-making body in risk management, responsible for supervision, approval of risk management policies and important systems as well as tracking of execution and performance target attainment

Risk Management Committee
Answering directly to the Board, it calls meetings at least once a year, responsible for supervising climate-related issues, determining climate-related risks and opportunities, and reviewing and integrating climate risk management reports on a regular basis

Risk Management Task Force
Formed by senior executives of departments, responsible for evaluation and analysis of climate-risks and opportunities and execution of strategies and actions

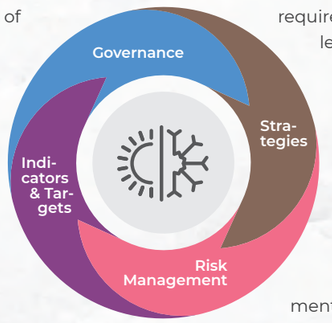
Governance

Management Mechanisms
Climate change performance indicators are set in connection with the appraisal of carbon management action and performance of personnel in execution; energy-saving and carbon reduction progresses are reviewed monthly and incorporated in the quarterly bonus assessment

Indicators & Targets

Emissions and Targets for GHG Scope 1, 2, and 3
GHG emissions management follows international standards and commitment to carbon neutrality for concrete by 2050

Other Climate-related Management Indicators and Targets
Stipulation of management indicators and targets for energy use, renewable energy, alternative raw materials/fuels, and water resource usage as well as obtainment of certifications of products with low impact to the environment, including the Green Mark of Taiwan and Low Carbon Product Certification of Mainland China



Risk Management

Assessment and Management Flow
Risk Management Task Force identifies material risks and opportunities at least once a year through collection of risk factors and impacts and likelihood assessment of TCC operations, and plan for mitigation and adaptation strategies

Holistic System Integration Involving Risk
Climate change risks have been incorporated in the overall risk management process

Strategies

Short-/Mid-/Long-term Risks and Opportunities
Pursuant to TCC internal management requirement, the short-term is defined as less than 3 years, the mid-term 3 to 5 years, and the long-term over 5 years. Following TCFD guidelines, TCC identifies 7 critical climate risks and 6 opportunities derived

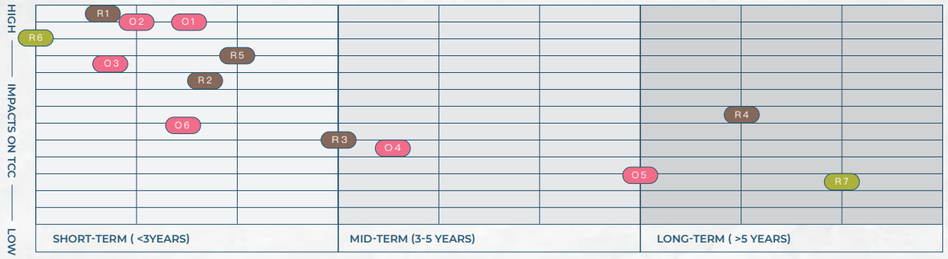
Potential Impacts and Financial Planning
The potential financial impacts from risks and opportunities are identified via qualitative assessment with ongoing capital investment in equipment renovation, low-carbon product development, and renewable energy business development

Scenario Analysis

Transition Risk
Based on the Well-below 2°C & NDC Scenarios, the impacts to the Company's operating costs are evaluated under the Stated Policies Scenario (SPS) and Sustainable Development Scenario (SDS) for the stipulation of carbon reduction pathway and strategies

Physical Risks
Based on RCP 8.5 (high-emissions) scenario, impacts to costs in equipment repairment at the operation sites and transportation arising from extreme weather events (increased typhoon or drought severity) are evaluated for review and improvement of the emergency response mechanisms

Climate Risks & Opportunities Matrix



OPPORTUNITIES

- O1 Smart low-carbon production and waste co-processing
- O2 Involvement in the carbon trading/renewable energy/energy storage markets
- O3 Differentiation for competitiveness elevation
- O4 Expansion into the new energy business
- O5 Application of carbon capture technologies
- O6 Securing inventors' willingness for long-term investment

TRANSITION RISK

- R1 Costs in the low-carbon technologies, equipment and management
- R2 Carbon cap and trade, carbon fee, and carbon tax systems
- R3 Regulations and procurement of renewable energy
- R4 Decommission of Hoping Power Plant
- R5 Impacts to Corporate Image

PHYSICAL RISK

- R6 Increased costs in transportation and equipment maintenance arising from heavy rainfall/severe typhoon/flood
- R7 Increased transportation costs arising from drought

Identification Process for Emerging Risks of Climate Change

01- Collection of Risk Factors	02- Assessment of Impacts on TCC	03- Risk Factor Analysis	04- Response Strategies
★ 17 critical risks with higher relevance to the cement industry ★ 10 derivative opportunities with higher relevance to the cement industry	★ 7 interdepartmental meetings ★ 5 questionnaires for assessments	★ 7 critical risks ★ 6 derivative opportunities	★ 14 response strategies
★ International reports of science and technology ★ Local regulatory trends ★ Disclosures relevant to the industry	★ Interdepartmental investigation ★ Operational impact assessment ★ Input of external experts	★ Impacts on TCC ★ Time of occurrence	★ Setting of mid to long-term SBTs ★ Life cycle environmental footprint management ★ New business development

Climate Change Risks and Opportunities & Response Strategies

Transition Risks/ Opportunities Derived

Risks to TCC	Opportunities Derived	Financial Impacts	TCC's Responses Strategies
Costs in the low-carbon technologies, equipment, and management	Smart low-carbon production and waste co-processing	Capital expenditures	SBTs setting for carbon neutrality in the long run
		Operating costs	Introduction of 7 strategies: alternative raw materials/fuels, process improvement, power generation by waste heat recovery, carbon capture, renewable energy, and reforestation
Carbon cap and carbon trading, carbon fee, and carbon tax systems	Involvement in the carbon-trading/renewable energy/energy storage markets		Construction of Renewable Resource Recycling Center and waste co-processing engineering to increase the use of alternative raw materials and biofuels
	Differentiation for competitiveness elevation		Carbon intensity performance included in the appraisal
Regulations and procurement of renewable energy	Expansion into the new energy business	Capital expenditures	Investment in businesses of clean energy and energy storage; actively developing new energies like solar energy, biomass energy, and geothermal energy
Decommission of Hoping Power Plant	Application of carbon capture technologies	Operating costs	Ongoing development of carbon-capture technology for scalability and economic values in the long run
		Revenue	Generating set efficiency improvement project planned at the power plant, which will replace two sets of LP turbines by 2022 and 2024 in succession
			A plan for a transition to a low emission power plant using biomass fuels of wood chips at 50% or above with a target of elevating the ratio of synthetic gas used
Impact to corporate image	Securing inventors' willingness for long-term investment	Investment and capital raising and solicitation	Establishing a dedicated ESG department
			Regular communication with institutional investors and the press on the results achieved

Physical Risks/ Opportunities Derived

Risks to TCC	Opportunities Derived	Financial Impacts	TCC's Responses Strategies
Increased costs in transportation and equipment maintenance arising from heavy rainfall/severe typhoon/-flood	Operational resilience enhancement	Operating costs	Assessment of physical risks across manufacturing sites with WRI scientific models
		Operating costs	Real-time monitoring of rainfall, water levels, water information and establishment of an emergency coordination mechanism for production and sales
Increased transportation costs arising from drought			Leveraging the real-time monitoring of water information of Water Resources Agency to plan for countermeasures to water shortage
			War Room Dashboard management: optimized inventory and flexible arrangement of transportation

Scenario Analysis

Pursuant to TCFD supplementary guidelines and recommendations for the Materials and Building Group, TCC conducts scenario analysis and assessment on the two risk factors, i.e. carbon pricing & carbon emissions management and extreme weather events. After integrating the aforementioned results of scenario analysis, the strategic considerations for resilience are incorporated to proactively adjust the plans for mitigation and adaptation.

Risk Category	Scenario Selected	
TRANSITION GHG Regulation and Carbon Pricing Policy	**IEA SDS** – Sustainable Development Scenario[7]	**IEA SPS** – Stated Policies Scenario[8]
	Assessment Description	
	With the warming level controlled at <2°C and approximately 2.7°C below, the impacts to operation arising from emissions-related expenditures potentially incurred in 5-10 years from the corresponding carbon price trends and carbon management regulations in the operation sites are assessed respectively.	

Risk Category	Scenario Selected
PHYSICAL Risks with Drought & Typhoon	**IPCC RCP8.5**[9]
	Assessment Description
	In the event of ineffective warming management, with the highest warming level considered, the potential impacts to operation by the mid-century arising from increased costs in alternative transportation and equipment maintenance due to intensified droughts and increased number of typhoons brought by extreme weather events are assessed.

Note 7: With reference to the reports by International Energy Agency (IEA) in 2020 (ETP & WEO), the SDS and SPS scenarios represent the emissions pathways and carbon pricing trends of a warming level managed at 1.8℃ by the end of century and of a warming level at about 2.7℃ by the end of the century with the carbon emissions managed in line with the Nationally Determined Contribution (NDC), respectively
Note 8: With reference to the Sixth Assessment Report (AR6) by the Intergovernmental Panel on Climate Change (IPCC) in 2021, the RCP8.5 scenario presents the impact pathway of global warming by 4.4℃ due to the increase of radiative forcing by 8.5 W/m² by the end of the century compared to the 1750 level
Note 9: The assessment was conducted for mid-century since the focus of physical risks of natural disasters are mainly changes in the long-term

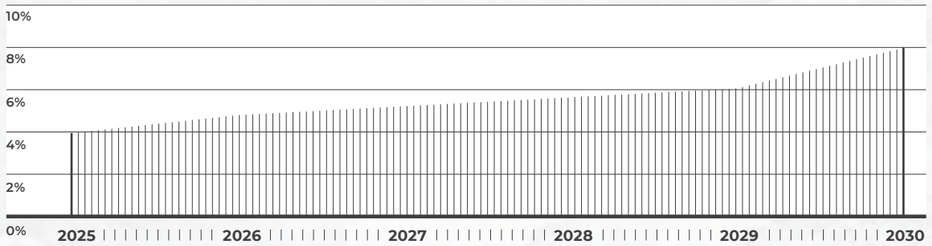
Transition Risk GHG Regulations & Carbon Pricing Policy

The main cement production sites of TCC are located in Taiwan and the Mainland China. We need to consider the assessment of the future cement production change and the SBTs for carbon emissions reduction, the carbon fee system in Taiwan and Mainland China's incorporation of the cement industry in its national carbon trade system taken into account, together with the carbon prices estimated for the SDS and SPS scenarios. The potential financial impacts from the costs thus incurred from carbon emissions regulations are analyzed. It is estimated that the costs increased in the SDS and SPS scenarios shall account for 8.1% and 3.1% of the annual revenue from cement respectively by 2030.

Facing such risks with low-carbon transition, TCC plans to continue to increase the use of alternative materials/fuels as well as the hybrid resilience strategies like carbon capture and renewable energy, improve the potential of reduction in operation, and incorporate the carbon emission intensity into the KPIs of plants so as to elevate the reliability in the attainment of internal carbon reduction targets.

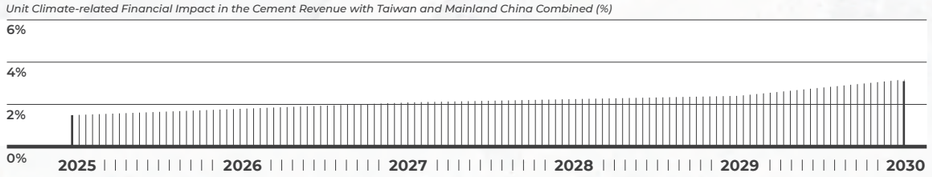
Financial Impact Evaluation of Carbon Emissions Regulations (SDS Scenario)

Unit Climate-related Financial Impact in the Cement Revenue with Taiwan and Mainland China Combined (%)



Financial Impact Evaluation of Carbon Emissions Regulations (SPS Scenario)

Unit Climate-related Financial Impact in the Cement Revenue with Taiwan and Mainland China Combined (%)



Physical Risks Risks from Drought or Typhoon

Through internal discussions, inventories, and assessments, TCC identified extreme weather events (including typhoons, heavy rainfalls, and droughts) that may bring about "damage to plant equipment" or "impact to delivery and transport" to the Company's operation. The former may incur financial impacts such as equipment repair expenditures, income losses from production disruptions, and increase of insurance premiums. The latter may cause financial expenses like spending in alternative transportation and costs of delayed delivery. TCC comprehensively assessed if there had been expenditures incurred by climate factors in the past and the availability of relevant funds.

Focusing on the financial impacts from the increased costs in alternative transportation arising from droughts, and in equipment repair of typhoon disasters, TCC conducted the scenario analysis.

In terms of the risk from drought, the southern region of Mainland China is a key cement production base of TCC. The period from the end of winter to the start of spring is the dry season traditionally. During this period, road transport is employed in the lieu of rivers has to be employed in lieu of river transport for cement delivery due to the low water level, which leads to an increase in transportation cost. As the impact of climate change exacerbates, the scale and frequency of drought may possibly rise in the future, which will further complicate our operation. Based on the research data of Academia Sinica, in the worst-case scenario of RCP8.5, the dry seasons in the areas of the Yingde Plant and Longshan Plant are expected to see a 54% increase by mid century, extended from an average of 2.67 months currently to 4.11 months. Based on the historical alternative transport costs, it is projected to see a potential financial implications ranging from NT$40 million to NT$45 million. As for the risk from typhoon, TCC inventoried the average number of typhoons that had led to physical damage to the Suao Plant, Hoping Plant, and Hualien Plant historically and the relevant costs involved in repairment. Combined with the reference to the change in the increased number of severe typhoons by mid century in the RCP8.5 scenario from the Taiwan Climate Change Projection Information and Adaptation Knowledge Platform(TCCIP), it is estimated that the annual expenditure on maintenance may rise to approximately NT$12 million as a result.

3.3 Digital Governance

TCC is committed to the protection of the confidentiality, integrity, and availability of critical information system and data of the Group. The information security management mechanism was comprehensively introduced and the Information Security Management Committee has been operational. A Director well experienced in information security was appointed to oversee it. TCC has been certified to the ISO 27001 Information Security Management System. Also, in conformity with the standard, it carries out operation of PDCA Cycle. In 2022, a Chief Information Security Officer (CISO) was appointed.

Information Security Incident Handling Mechanism

The information security reporting and handling process has been stipulated clearly at TCC. Pursuant to the Flow Chart for Notification of Information Security Incidents, an incident is analyzed as to whether it is a system misjudgment. Should an incident be verified, a corresponding response will be activated in line with the information security incident level from 1 to 4. Monitoring, reporting, and improvement will follow after the incident is addressed to avoid any reoccurrence.

Promotion of Intelligent Property Management System

TCC strengthens its intelligent property management system to manage intelligent properties, such as the trademarks, patents, copyrights, and trade secrets of TCC. Works including inventory of the existing trademarks and patents as well as the establishment of the confidential data security zone, and so on, have been completed in 2021.

01 Recovery Simulation
Completion of the annual simulation; a regular back-up of data to ensure operation continuity

02 Data Security Checks
Completion of the annual checks; ongoing improvement of the security capabilities in networks, information systems, and personal computers

03 Weakness Inspections
Completion of 2 inspections of the year with no anomaly detected

04 Education and Trainings
A total of 110 visits and 1,067 hours in the education and trainings regarding information security with e-learning program being planned

3.4 Ethical Management

TCC values corporate integrity and ethics. With an attitude of zero tolerance for corruption and bribery, Code of Ethical Conduct, Ethical Corporate Management Best Practice Principles, as well as Anti-Corruption and Anti-Bribery Policy have been specifically stipulated to establish an explicit system of anti-corruption and anti-bribery, and the corresponding assessment items are included in the employee performance appraisal. In 2021, TCC became the first domestic enterprise that obtained the certification of ISO 37001 Anti-bribery Management Systems. Among the Operation Headquarters as well as the Taipei Plant, Taichung Plant, Kaohsiung Plant, Hoping Plant, and Suao Plant thereunder, the Operation Headquarters was the first to be certified. Also, necessary anti-corruption and anti-bribery assessments and reviews for its employees and suppliers were conducted in line with the internal process for approval. At the Operation Headquarters, pursuant to the requirements of ISO 37001, the employees and suppliers are 100% assessed and investigated in terms of amount and frequency of transaction.

In addition, the audit was concluded with no significant risk of corruption detected. There was no anti-competitive, anti-trust, or monopoly practices observed in 2021.

New recruits

part-time and casual employees included

are required to sign on "Code of Integrity and Ethics Statement" while starting work; within 90 days thereafter the one-on-one elaboration on Company's anti-corruption and anti-bribery policies shall be completed with records to ensure his/her clear understanding of the regulations and avoid any misconduct. A 100% signing rate of all new recruits was achieved in 2021

All-round Ethical Management Education & Trainings

Directors

receive the Company's anti-corruption and anti-bribery education and training course materials via mail or hardcopy at least once a year and are required to sign on the "Letter of Commitment for Compliance with Ethical Management, Anti-corruption, and Anti-Bribery". ALL Directors have received relevant education and trainings and signed on the Letter of Commitment in 2021

Active employees

part-time and casual employees included

are required to participate in the anti-corruption and anti-bribery training courses with records at least once a year to regularly refresh the knowledge with a clear understanding of related regulations and the possible risks and outcomes of any violations. A total of 134 hours of anti-corruption education and trainings took place in 2021

Suppliers

are communicated regarding the spirit of ethical management by means of mail, Suppliers Convention, etc., and all suppliers are required to sign on the Supplier Code of Conduct, in which items related to ethical management are included

Contractors

trainings are conducted while entering TCC's sites; courses are scheduled to be completed by the end of June 2022, and the trainings for outsourcers (e.g., the security guards) by the end of July

Reporting System & Whistleblower Protection Mechanism

"Reporting Mechanism for Violation of Code of Conduct" has been stipulated at TCC that covers the reporting channels for Company's violations, the handling procedures, checkpoints, etc. to protect the legal rights of whistleblowers and relevant parties. The Conduct was amended in March 2021 to detail matters concerning the confidentiality in the investigation process and the whistleblower protection mechanism in order to protect whistleblowers from severance, dismissal, salary reduction, or other mishandling as well as the emergency protection measures the Company may adopt upon any potential risk of violation against a whistleblower arising from reporting thereby. The independent reporting mailbox and hotline are instituted for reporting by individuals in and out of Company.

Reporting by email:
mp.buster@taiwancement.com

In November 2021, the Audit Committee was listed as the additional reporting channel. In any misconduct involving the senior management, the whistleblower may choose to report to the Audit Committee directly. There was no case involving violation of ethical management in 2021.

Reporting by email:
tccwhistle@taiwancement.com

Legal Compliance

Unit
Legal Office
Demanding departments and subsidiaries thereof to regularly report progresses of litigations and legal disputes to ensure an understanding and necessary actions

Planning of external consultations and cooperation services

Unit
Human Resources Department
Organizing internal trainings to raise employees' awareness of legal compliance

Planning relevant trainings with external consultants

Unit
Internal Audit and Compliance Office
Implementation of internal audit and prevention of corporate operational risks

Unit
All Departments and Subsidiaries
Compliance with relevant laws and regulations, e.g. compliance with marketing and labeling regulations in terms of product sales

Two incidents of environmental, social, or economic penalties occurred to TCC in 2021 with a total amount of NT$18,000 fined and without any significant penalty[10]. Also, relevant nonconformities have been corrected.

Regulatory Violation Type | Environmental

Violation Description
Violation of Paragraph 1, Article 36 of the Waste Disposal Act by the RMC plant

Corrective Measures
To capture reporting details and avoid reporting overdue or error, Waste Recycling Operation Manual has been amended for the alignment of reporting and review processes

The dedicated personnel of health and safety to log in to check and review the reporting

Violation Description
Violation of Paragraph 1, Article 22 of Water Pollution Control Act for failure in submitting documentation pertaining to (wastewater) sewage treatment from the Gushan RMC Plant

Corrective Measures
A fine paid and the wastewater treatment permit written off at the recommendation by the Environmental Protection Bureau in response to cease its production

Internal Audits

Pursuant to the annual auditing plan, the Internal Audit and Compliance Office carries out internal audit operations, including calling pre-audit meetings, executing audits, compiling recommendations for internal audits, calling closing meetings, and submission of audit reports. The audit reports will be submitted to the Audit Committee for review upon the Chairman's approval. Then, notices will be issued to the units inspected to demand corrective measures in specified periods.

Note 10: An incident of significant penalty is defined as an incident with a penalty amount of 10,000 USD or above on TCC

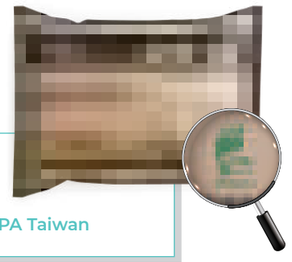
Corrective measures will be compiled for Chairman and the Audit Committee's approval. The Office prioritizes audit items based on the focused item the Board of Directors and the Audit Committee focused on terms of prior experiences and future trends. The Office has tightened its audits on all business units to examine nonconformities and to measure their effect of operations and has conducted assessment and verification of the ESG aspects. In 2021, TCC strengthened its online audits. Also, big data was employed to remotely monitor any anomaly in the internal controls in real-time. Audits of accounts and open transactions have been improved.

Audit Focuses in 2021

Audit Item	Audit Focus & Description
Sales and Collection Cycle	Verification of delivery quality and financial receivables
Acquisition and Payment Cycle	Verification of zero waste and timely completion for acceptance and use
Payroll and Personnel Cycle	Education and training implementation & care for employees
Employee Safety	Safety of machinery, vehicles, equipment operations and on-site personnel
Physical Environment Management	Compliance in air emissions/wastewater discharge and waste disposal
Ethical Management and Anti-bribery	Project audit and supplier review

3.5 Responsible Production

TCC insists on quality, endeavors to develop eco-friendly products, strengthens its management mechanism, institutes self-inspection systems, and has proposed six quality assurance and obtained six certifications.



Carbon Footprint Reduction Label certification from EPA Taiwan

Six Raw Materials Inspections

Cement, sand and gravel, slag, fly ash, chemicals, and mixing water, passed the tests by TAF laboratories like those of TCC, SGS, etc.

Six Third-party Certifications

Cement specimen compressive strength report / Good Ready-Mixed Concrete (GRMC) Label / ISO 9001 / ISO 14001 / ISO 45001 / TCRI product traceability certification

First Product Traceability System in the Industry

The first "product traceability system" was created in 2019, so that clients may inquire into raw material ingredients like cement, sand and gravel, slag, fly ash, chemicals, and mixing water via TCC CRM system.

The AI smart algorithm was introduced in 2021 to perform the concrete quality variation analysis for product strength. Also, we work with TCRI in third-party certification in terms of quality and processes. The certification for concrete product traceability was obtained from TCRI in July.

TCC concerns itself with environmental balanced development, encouraging its RMC clients to apply for green building certifications. TCC aims to achieve the target of revenue from its concrete used on green buildings accounting for 5% or more in the overall revenue from concrete by 2025, and 6% or more by 2030. The percentage in 2021 was 11.2% with a 60% increase compared to that of 2020.

Promotion of Sustainable Construction

Good Ready-Mixed Concrete (GRMC)Label Certification

To offer its clients safe and stable products, it continues to be certified to the Good Ready-Mixed Concrete (GRMC) label. To further its quality assurance capability and expedite new product development, TCC has allocated an additional budget of more than NT$100 million to establish TAF-certified professional concrete laboratory, which is expected to complete by the end of 2022.

Client Communication

TCC offers customized products and services, on-site cement applications, ready-mixed concrete formula adjustment, and assistance in resolution of issues at the construction sites. The client service groups arrange the monthly client services schedule to proactively care for clients' use of products in the duration. Meanwhile, to allow the public to learn about ready-mixed concrete, TCC shot a film to introduce the production at the plants, which is presented along with the testimonies from TCRI and the clients. The film drew over a thousand of visits within 3 months since its release on the social media and participated in the 6th Taipei Golden Eagle Micro-movie Festival.

Cement Compressive Strengths (MPa)

Cement Type	28 Days	7 Days	3 Days
Type I Cement	23.6	31.2	41.4
Low-alkali Cement (Type I)	23.8	31.5	41.7
Low-alkali Cement (Type II)	22.5	29.9	39.5

Note 11: TCC's 3-day, 7-day, and 28-day product strength all exceed the CNS standards.

Satisfaction Survey

TCC conducts the client satisfaction survey annually. 96.67% of the clients taking the satisfaction survey in 2021 reported scores of satisfaction.

Satisfaction Survey Results in 2021

	2018	2019	2020	2021
Corporate Reputation	90.11%	92.31%	93.26%	93.11%
Cement Brand	89.89%	91.21%	93.04%	92.22%
Cement Quality Stability	87.59%	89.89%	93.26%	90.44%
Convenience of Concrete Distribution	78.62%	83.08%	86.74%	85.33%
Service Affinity	85.98%	88.79%	90.87%	88.22%
Client Complaint Response Time	84.14%	87.91%	88.26%	87.11%
After-sales Service	82.30%	87.47%	89.57%	87.56%
Total	**82.71%**	**88.63%**	**90.60%**	**89.03%**
Overall Satisfaction with Products Offered	83.91%	87.03%	89.57%	88.44%
Overall Satisfaction with Services Offered	82.99%	86.15%	88.91%	88.00%
Clients Rating "Satisfied" in the Satisfaction Survey (%)	91.38%	96.7%	95.11%	96.67%
Clients Responding to the Satisfaction Survey (%)	99.91%	99.97%	99.90%	99.98%

Note 12: The denominator of the product satisfaction is the number of questionnaires recovered multiplying by the full score (5), and the numerator thereof is the total of the scores responded by the clients
Note 13: "Satisfied" is defined as 4 points or above
Note 14: The denominator for the Clients Responding to the Satisfaction Survey (%) is the annual sales of the domestic clients (sales from the clients under other cement companies or their affiliates, sales form TCC's one-off deals and small purchases of 100 metric tons or less excluded), and the numerator thereof is the aggregated annual sales from clients in the questionnaires recovered

3.6 Sustainable Supply Chains

TCC adopts two strategies, namely "sustainable supplier management" and "local and green procurement". TCC creates the model of mutual support and benefit that is safe and eco-friendly by working hand in hand with its suppliers.

"Plant Supplier Evaluation Regulations" and "TCC Supplier Sustainability Questionnaire" were formulated at TCC to regularly conduct evaluations of the existing suppliers by means of review, inspection, and tracking of corrective practices each year. The Procurement Department joined forces with members from departments of quality assurance, manufacturing, and finance to form a cross-functional assessment team, or institutions are commissioned for investigations in addition.

The main areas for assessment include performances on quality, services, organization, finance, and sustainability. The assessment items for the sustainability performance include areas of labor, health and safety, environment, ethics, and management systems. In 2021, TCC strengthened its sustainable supplier management and added new supply chain carbon management targets. It aims to achieve a 100% carbon inventory of Critical Tier 1 Suppliers by 2023 and a 50% of Critical Tier 1 Suppliers carbon reduction by 2030.

Looking forward, TCC shall continue to better its communication with suppliers on sustainability issues and align itself with international standards in the spirit of sustainable procurement.

First Online Suppliers Convention

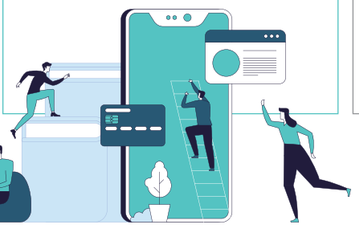
In 2021, the 2nd TCC Suppliers Convention was held via video conferencing, inviting a total of 332 suppliers from Taiwan and the Mainland China to participate. Five outstanding suppliers were recognized in the convention. Chairman Chang specifically informed the partner suppliers that we have to work together to implement the goal of carbon neutrality by 2050. Also, suppliers were required to inventory their carbon footprint and proactively implement measures of carbon reduction.

ESG New Supplier Evaluation System

On the basis of "Plant Supplier Evaluation Regulations" and "TCC Supplier Sustainability Evaluation Forms," we probe into suppliers' governance in terms of labor, health and safety, environment, ethics, and management system through document reviews and on-site inspections. With 15 points as the benchmark (up to full score of 30 points), a supplier will be in line with the basic requirement of sustainability before listed as one of the TCC suppliers

Existing Supplier Risk Management System

Suppliers are required to sign on Letter of Undertaking for Health, Safety, and Environment (HSE). Risk assessment regarding ESG on the existing suppliers is conducted regularly. Based on the results of assessment, the suppliers' levels of sustainability risks are determined in terms of the likelihood of threat, impact level, and vulnerability, so as to prioritize the risks to be addressed. Those identified as high risk will be subjected to a three-year optimized ESG review, with periodic on-site inspection, follow-up or counselling



System of Incentive and Penalties

Suppliers with excellent performance are listed as priority suppliers for procurement and are publicly recognized. High-risk suppliers who fail to improve in the specified period will result in termination of contract with TCC. In 2021, a partner sand and gravel quarry discharged sewage that polluted the barrier reefs in the open waters, which was verified as true by TCC. The contractual relationship was thus terminated on the ground of its violation against the TCC Supplier Corporate Social Responsibility Code of Conduct – Environmental

Establishment of a Supplier Tier and Category System

TCC gauge its suppliers by tier and category for an effective management and inventories step-by-step to monitor the overall status throughout the supply chain. At present, TCC assigns its suppliers into six categories on the basis of products and services provided, i.e. raw materials, outsourcing and subcontracting, equipment and parts, construction (including goods and services), transport, and explosives.

Furthermore, according to the characteristics of these six categories of suppliers, TCC set criteria for tiers to identify critical suppliers. Critical Tier 1 Supplier is defined as a supplier that is critical to the quality and delivery of the Company's product manufacturing, or that reaches a certain procurement amount or ratio, which is a critical supplier required to be managed and evaluated. As of the end of 2021, there were 982 Tier 1 Suppliers, in which the Critical Tier 1 Suppliers were 96, accounting for 87.87% of the procurement amount.

Supply Chain Procurement Amount in 2021

(Unit NT$)

Six Categories	Amount
Raw Materials	10,593,156,648
Outsourcing & Subcontracting	286,730,672
Equipment & Parts	6,722,175,332
Transport	1,492,506,713
Construction	1,324,160,382
Explosives	44,459,063
Total	**20,463,188,810**

AI-powered Procurement Portal

TCC introduced the AI technology for its supply chain. The self-developed "Procurement Portal" conducts supplier selection, electronic bidding, and risk management of material quality. Hence, the smart manufacturing is expanded to the upstream of the industry, accelerating the next upgrade for the industry. Meanwhile, suppliers are able to access information in real-time via the platform for a bilateral communication.

Green Procurement

TCC has formulated the "Green Procurement Policy" to evaluate necessity before any procurement. Products and services in line with green procurement are prioritized in purchasing. Pursuant to the laws and regulations in force at the operation sites, including but not limited to low energy consumption, low pollution, use of recycled materials, recyclability, etc. The green procurement was prioritized with acceptable price spread in TCC Procurement Management Regulation. The green procurement amount in 2021 increased by 10.11% compared to the previous year.

Green Procurement in 2021 *(Unit: NT$)*

Year	Raw Materials	Non-Raw Materials	Total
2021	829,311,828	39,576,726	**868,888,554**

Please visit our corporate website for details of Green Procurement Policy www

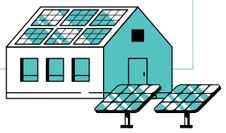
Smart Warehouse

The smart warehouse at the TCC Hoping Plant was inaugurated in July 2020 with PV panels to generate power for self-consumption. Zero paper and carbon footprint throughout the process were evident. The warehousing is guided by the intelligent lighting control, cutting working hours by 87% and elevating the reception operation efficiency by 7 times.

Energy
42,000kWh
was generated by the PV system

Equivalent to
21.084 metric tons
of carbon reduced

By the end of 2021



3.7 Sustainability Associations

TCC supports and participates in the initiatives relevant to the issues of climate change, circular economy, and new technology R&D. Also, it proactively engages with various associations on the issues of sustainability. For instance, it presented on

Local Procurement

Through supply chain localization, suppliers' service efficiencies are elevated; delivery time is shortened; transport distance and carbon emissions of raw materials are reduced. Also, opportunities of local employment are increased to promote social and economic development. The local procurement amount at TCC in 2021 increased by 34.57% compared to the previous year.

Local Procurement in 2021 *(Unit: NT$)*

Year	Raw Materials	Non-Raw Materials	Total
2021	8,277,519,329	9,327,470,013	**17,604,989,342**

Please visit our corporate website for details of Procurement Policy www

GCCA as well as formulated the carbon neutrality route for the cement industry together with its fellow workers worldwide. In addition, TCC has been actively involved in the seminars organized by industrial associations and the domestic public hearings on laws and regulations concerning sustainability. For example, it partook in the annual conference of Taiwan Concrete Institute (TCI) and published 7 papers; presented in the national standards conference on cement convened by the Bureau of Standards, Metrology, and Inspection (BSMI), MOEA, at which BSMI raised to the total content of admixtures in cement from a limit of 5% originally to 10%, so that the low-carbon cement may be realized step by step in conformity with the regulations in Taiwan. In addition, TCC proactively shares its experiences in safety management. It worked with Taiwan Cement Manufacturers' Association and Occupational Safety and Health Administration to draft the "Formulating Safety Partnership Implementation Plan." The public sector was invited to the plants for mentorship, and mutual demonstration and observation were conducted among the fellow workers in the cement industry. Also, experience exchanges were carried out with regard to the safety issues on cement transportation. Aside from the original target of producing the Guidelines for Safety and Heath at Work for the Cement Industry in Taiwan, TCC added a new target of amendment to the RMC Plant Labor Safety Operation Manual to raise the safety awareness of workers in the cement industry.

International Initiative |

Global Cement and Concrete Association (GCCA)

Achievements

TCC aligns itself with the global community via GCCA, conversing on and formulating the possible routes to carbon neutrality together with international benchmarking companies and scholars. It attended over 30 sessions of online seminars for dialogues pertaining to:

- High Level CEO Panel
- Concrete Future – Roadmap to Net Zero
- Amendment to the 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete in response to COP26
- SBTi – SBTi Promotion Progress
- Task Group – Professional project discussion, technical R&D, and sharing on carbon reduction
- GNR – Data and discussion on carbon emissions from the cement industry
- Green Procurement – Discussion on green procurement

Membership in Domestic Associations

Associations	Board of Directors Supervisors	Professional Committee	Membership
Taiwan Cement Manufacturers' Association	●	●	●
Taiwan Ready-Mixed Concrete Industry Association	●	●	●
Taiwan Marble Association	●		●
Chinese Institute of Mining & Metallurgical Engineers			●
Taiwan Concrete Institute	●	●	●
Chinese National Federation of Industries	●		●
Taiwan Accreditation Foundation			●
The Institute of Internal Auditors –Chinese Taiwan			●
Taiwan Carbon Capture Storage and Utilization Association	●		●
Audit Bureau of Circulations			●
Biotechnology-Application Industry-Academia Research Alliance (Bio-App)			●
CNS Certification Mark Association	●		●
Taiwan Institute for Sustainable Energy			●
Center for Corporate Sustainability	●		●
CSRone			●
Chinese National Association of Industry and Commerce, Taiwan	●		●
Taiwan Corporate Governance Association			●
Chinese International Economic Cooperation Association	●		●
Cross-Strait CEO Summit	●		●
Monte Jade Science and Technology Association of Taiwan	●		●
Taiwan Stock Affairs Association	●		●
The Third Wednesday Club			●
Chinese Arbitration Association, Taipei			●
Taiwan Institute of Directors			●
Taiwan Society for Circular Economy	●		●
Association of Taiwan Net Zero Emissions	●		●
Taiwan Business Council for Sustainable Development	●	●	●

CHAPTER 04

Employees & Benefits

3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
8 DECENT WORK AND ECONOMIC GROWTH
10 REDUCED INEQUALITIES

2021 TCC Light Up Christmas Event

"For a sustainable earth, humanity is the priority. Human happiness is the highest standard of all values."

YEAR 2021

Talent & Development

Employee Education & Trainings Annual Budget
+14%

Total Hours
80,357.8
for non-fixed term contract employees
Compared to 2020

MA Program Introduced to the MIT Industrial Liaison Project

Intern Scholarship up to NTD 60,000

ESOP *Started in 2019*

Employee Coverage
100%

Participation Rate
97.05%

Diversified Workforce

Female in Management
+11.5%

Employees with Disabilities
+13%

Employees of Indigenous Origin
+5%

Employee Care

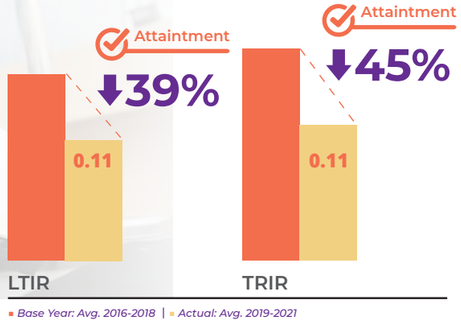
Childbirth & Maternity Allowance Over NTD 1 Million
2017-2021

Retirees enjoy 3 Insurance Schemes Claimed Amount
NTD 740,000
2021/7-2021/12

31% Participation Rate

Health & Safety Efforts and Goals

Occupational Deaths of Employees



▪ *Base Year: Avg. 2016-2018* | ▪ *Actual: Avg. 2019-2021*

4.1 Talent Cultivation & Development

Talent is the keystone for a sustainable corporate operation. Facing the issue of talent shortage, we launched the talent recruitment program from insight schools. TCC offers smooth means to job promotion; plans for interprofessional inclusion; arranges employees to learn in depth the progresses and developments of low-carbon cement, green energy, and resource recycling businesses as well as improves their abilities in cross-departmental coordination and communication through internship and training visits across plants. Also, English courses are arranged for employees, and opportunities for internship abroad are available via expatriation.

Expanded Recruitment of Talents in Electrical Engineering, Energy Storage, and Battery

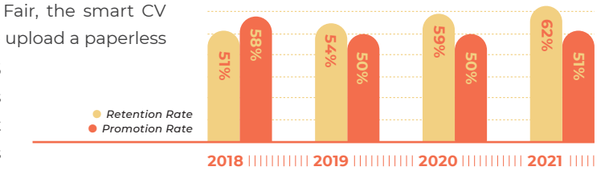
To align itself with the trend of green energy and technologies internationally, E-One Moli Energy Corp., NHΩA.TCC, and TCC Green Energy Corporation have been actively recruiting talents in the areas of chemical engineering, electrical engineering, mechanical engineering, geology, AI, green energy, and environmental protection. Together with the "Advanced Li-ion Battery Laboratory" of Molie Quantum Energy Corp., a TCC subsidiary, it is expected to recruit up to a thousand talents throughout the TCC Group.

Supported by the diversified recruitment programs, TCC attracts talents with diverse backgrounds. Through the video interview, it has increased the number of job seekers reached. The advanced Li-ion battery plant held totally 3 sessions of pre-registered online interview in 2021. Furthermore, on the NTU Job Fair, the smart CV scan platform was available at TCC to upload a paperless CV instantly. In the meantime, 45 in-person interview opportunities were available as well to offer brilliant talents on campus the direct means to interview.

Massachusetts Institute of Technology (MIT) – Industrial Liaison Project

At the TCC MA Program, members are enrolled in the MIT Industrial Liaison Project to stay abreast of new knowledge of technologies in the world through seminars, lectures, and courses online that cover contents relevant to digital transformation, big data, AI and IoT, etc. Supervisors of different functions match talents with professors for dialogues on sustainability topics. Relevant research projects are conducted on a regular basis. Also, combined with exchanges abroad on topics, project-based studies and hands-on workshops are co-sponsored. Meanwhile, the trainees are regularly arranged to be "MA" volunteers to the charity projects of the Group. To date, the cumulative number of talents incubated is 424 people. A total of 217 trainees were successfully graduated as members of management. There are 134 MAs at present, among whom 1 person was promoted as senior manager; 7 people were promoted as managers; and 81 people serve as supervisors of different positions. The MA retention rate in 2021 rose to 62%, and the promotion rate saw a steady climb to 51%.

MA Program Performance over the Years



College of Engineering, NTU – TCC Office

In 2021, President Jong-Peir Li of TCC was invited as the special guest to the closing ceremony of GIS Taiwan at NTU to share the industrial trend on the theme of the year "Reset the Mindset." Based on the aspects of smart management of carbon emissions, renewable energy development, and waste recycling, President Li offered room for contemplation with regard to Reset the Mindset for environmental issues. From business school to College of Engineering and College of Medicine, there were 250 students attending the session for President Li's speech in English. TCC has been working with the College of Engineering in establishing the industry-academia collaboration office since 2018 to encourage ideas of circular economy that are in line with business needs and creativity from students. A total of 135 students from 11 departments/graduate institutes participated. To encourage students in master's and doctoral programs to focus on research and innovation, TCC Circular Economy Camp was organized and thesis grant was created. The applicants came from 8 different departments/graduate institutes. In 2020-2021, 66 students passed the review for grants.

National Chung Hsing University – Hsing Academy Corporate Mentor Project

TCC worked with the National Chung Hsing University for "Hsing Academy – Corporate Mentor Project." Through corporate visit and trainings, students visit and learn about the mine restoration, the operational model of circular economy, and so on. In 2021, combined with "The Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan," a total of 24 students were involved. Apart from guided tour to the exhibition, a variety of contents were arranged, including a guided tour to the Operation Headquarters, alumni sharing, AR kinetic game experience, and corporate lectures.

Senior High Schools & Vocational Schools in Hualien – Work Study Program

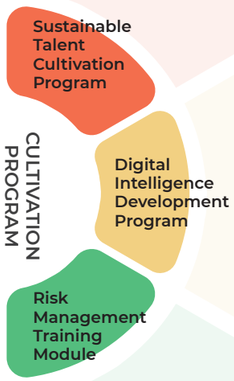
In light of the talent shortage for engineering in Taiwan, TCC aims to collaborate with the senior high schools and vocational schools in Hualien for work study program. As a result, it shall assist the schools in the eastern Taiwan to train professionals in electromechanical engineering. Furthermore, it endeavors to cultivate the young students in the village nearby the plant to become emerging talents for green energy and energy storage. Any student with a certain academic performance will be hired upon graduation. TCC also plans to introduce vocational programs, such as training for chef certificate, learnings of western pastry baking, and hands-on wood-work development, at the Heping Village to usher in diversified learning opportunities for individuals in the tribe to acquire a skill.

Corporate Internship & Campus Program

TCC has been emphasized the issue of student development on campus. Aside from involvement in the recruitment on campus in universities and colleges, corporate briefings, corporate visits, among others, it also promotes corporate internship. Students may apply for the internship program at TCC. Those who with outstanding performance may secure the chance for retainer and a scholarship up to NT$60,000. A total of 15 brilliant students from 7 schools at home and abroad applied for the program this year. In the duration of internship, the interns not only have the chance to receive professional trainings and participate in projects but also enjoy a decent benefits package above those generally available in the industry.

TCC formulated three programs for cultivation and development, including sustainable talent cultivation program , digital intelligence development program, and risk management training module . Following the three facets “Awareness, Analysis, and Address” and in line with the job requirements, AI and digital technologies, risk management, legal compliance, and work safety are introduced. In cooperation with TCC Lyceum, an e-learning platform, the programs set out to improve employees comprehensively via professional trainings; advanced courses; English proficiency, information security, and occupational safety education, cultivating international competitiveness.

During the hardest-hit hours of COVID-19 in 2021, an array of professional, functional, and general courses were designed for distant learning on the e-learning platform. After the down grade of the pandemic, in-person lectures, courses, and workshops were organized. The total training hours of the year at TCC reached 80,357.8 hours with education and training budgets amounted to NT$23,428,225. The trainees from subsidiaries and affiliated enterprises totaled 1,091 with 2,773 hours of training hours in total.



Form of Education/Training
→ Press conference
→ Quarterly Town Hall Meetings
→ Organization of internship lectures or workshops

Talent Development (Training) Metrics
→ 1,833 visits to courses of ESG series 2.0 across the Group in 2021
→ Recognitions from HR Asia 2021 Best Companies To Work For In Asia Award and TCSA People Development Award

Form of Education/Training
→ Courses for Zoom/Teams and VPN hands-on practice and authentication available
→ Organization of seminars, study groups, and workshops

Talent Development (Training) Metrics
→ 241 hours of smart technologies education and trainings in 2021

Form of Education/Training
→ Lectures organized
→ Prevention exercises and cybersecurity tests conducted on a regular basis

Talent Development (Training) Metrics
→ 1,067 hours of information security trainings in 2021
→ 2,674 hours of labor safety and environmental risk prevention trainings

Performance Appraisal

TCC employed the four levels of Response, Learning, Behavior, and Results proposed by Donald L. Kirkpatrick to assess the performance of talent development. The percentage of employees actually appraised in 2021 were 100%, with new recruits onboard for less than 3 months during the probationary period excluded. In addition, through quantitative working targets and qualitative functional behaviors, the overall operation profit of the Company is comprehensively tied with the individual performance of employees to award performance bonus in line with individual performance result in order to encourage hard-working as well as outstanding employees.

Results of All External Management Training Courses Organized by the Operation Headquarters

Response	
Average course satisfaction rate	**95.2%**
Average lecturer satisfaction rate	**94.9%**
Learning	
Professional certificates retraining rate at the plants	**98.1%**
Completion rate of the training courses of the year	**94.7%**
Employee attendance rate	**99.07%**


Team building workshop of NHΩA.TCC

To effectively protect its employees' rights and exercise its obligation in taking care of its employees, the labor union has been established across all TCC plants in Taiwan and collective bargaining agreements were signed. The coverage rate of collective bargaining agreements is 100%. In response to regulatory changes from time to time, it proactively adjusts the terms in the agreements in favor of the labor. The employees join the labor union according to the charter of the union on a voluntary basis. The percentage of TCC employees joining the labor union in 2021 accounted for 97.09% of the total number of the personnel. As for the labor terms for the rest 2.91% that did not join the labor union, they follow the work rules.

Best Companies To Work For In Asia Award

TCC won the HR Asia Best Companies To Work For In Asia Award in 2021. The Awards, organized by HR Asia, a prestigious international HR magazine, invites experts and scholars in relevant areas for winner selection. TCC stood out in “corporate culture and value,” “employee's self-satisfaction” and “team consensus” with the scores in each aspect higher than the average scores of all participating manufacturers by 18-27%.

4.2 Remuneration & Benefits System

TCC refers to the salary survey report of the industry standard to examine the employees' salary level and formulate its reward system in line with times, which is a standard to adjust salaries and promote talents based on performances and optimize its remuneration system. Based on the corporate operation performance and the overall salary competitiveness, it engages structural or performance-based salary adjustment plans. The adjustment in recent years ranged from 3-5% in average, while individual adjustment, in line with the work performance and market competitiveness as a whole, may be up to 8% for high-performance employees.

As for outstanding employees, the treasury stock plan is available. In addition, the performance appraisal is tied with the short, mid, and long-term sustainable development goals of TCC. Competitive salary levels and generous bonuses are offered to retain and incentivize talents, and profits of operation are shared with its employees.

Number of Full-Time, Non-Managerial Employees and Their Total Salary, Mean Salary and Median Salary

Item	2020	2021	Difference
Non-Managerial Employees			
– Total Number of Full-Time(People)	1,068	1,092	+24
– Total Salary of Full-Time(NT$1,000)	1,169,106	1,181,332	+12,226
– Mean Salary of Full-Time(NT$1,000)	1,095	1,082	-13
– Median Salary of Full-Time(NT$1,000)	946	958	+12

Overall Remuneration Structure

Competitive remunerations overall are offered at TCC, including the base salary, fixed allowance, variable compensation (quarterly bonus, performance bonus, bonuses, etc.) and Employee Stock Option Program (ESOP).

Variable Compensation

Performance bonus

The performance appraisal is conducted on the basis of individual working performance of the year, which can be divided as assessment of the quantitative working targets and qualitative functional behaviors; meanwhile, indicators pertaining to risks and sustainability management are taken into consideration to comprehensively tie the appraisal results with the Company's governance, overall operation, and sustainable development (e.g. work safety, eco-friendly sewage discharge, quality, information security indicators, etc.)

Quarterly bonus

Aside from measurement of quarterly EPS and key metrics, various indicators (of work safety, eco-friendly sewage discharge, carbon reduction, quality, etc.) are integrated as well. To fulfill the commitment to a carbon neutrality by 2050, carbon emission intensity targets have been set for the plants in Taiwan in 2021, and the progresses made by each plant will be taken into account for the respective quarterly bonus.

Employee Stock Option Program (ESOP)

- All the employees at TCC are 100% eligible for ESOP. The Company and individual employee will contribute to the contribution fund deposited in the exclusive trust account by a 1:1 ratio on a monthly basis so as to retain talent and assist employees in accumulating wealth.

- The 36.6% of employees with outstanding performance are entitled to Treasury Shares Program. Also, performance indicators to appraisal are tied the sustainable development goals. Examples of the indicators to appraisal include the performance on the strategic development execution of carbon capture, microalgae cultivation, and renewable energy development.

Non-salary Benefits

The Employee Welfare Committee has been established at TCC to provide various benefits and subsidies. Also, through regularly-held meetings, it is able to timely acquire opinions and feedbacks from employees and plan for protection of employees' rights. TCC set up "TCC Accommodations" at the Xinyi District of Taipei. With a montly cost of NT$600, it is available for employees' children with expenses for water, electricity, and Wi-Fi network covered. Based on the practical needs of employees (NT$800-1,200), employees and their children are assisted in their work and study in the northern Taiwan. In addition, a variety of activities are organized, including Family Day, Year-End Party, company trip, as well as club and volunteering activities, etc. A total of 4,131 people claimed the various employee benefits and subsidies in 2021.

2-track Retirement Benefits & 3-Insurance Schemes

Retired employees attended TCC Promotion Ceremony

TCC offers Two-track Retirement Benefits System. The Company contributes to the contribution fund in the ratio of 1:1. The employees eligible for retirement at the age of 60 can even contribute further to accumulate their pension fund at a faster pace. For the retired employees, retirement banquets are organized regularly at TCC for the veteran and next-generation employees to mingle and thrive together. Also, retirees are encouraged to chip in with the group medical insurance. Health checkup is available once every three years. With protection under three insurances, i.e. medical, accident, and life insurances, 31% (417 retirees joined the group insurance at TCC, with a total of 480 individuals groupwise) of the retired employees are covered by the three-insurance schemes. The insurance claims amounted NT$740,000 in 2021 (TCC Group included).

Additional Contribution to ESOP

For employees in the ESOP, they may apply for an additional contribution to their ESOP plan in June and December of each year. Meanwhile, the Company will contribute a 10% to the pension fund, facilitating its personnel in planning their life after retirement. A total of 452 individuals have chipped in with the plan with the total contributed amount of NT$1,078,000, accounting for 40% of the total participants. The ESOP participation in 2021 was up to 97.05% (expatriate Taiwanese employees included).

New Uniform; New Energy

Themed with "Seeds for New Energy," TCC employs the fireflies glimmering at night, complemented by the fluorescent green that symbolizes fireflies and green energy, to design and present the new employee uniforms to showcase the new outlook of TCC vitality. In addition, the fabric used for the uniforms are the functional fabrics from an Italian brand that are windproof, water repellent, elastic and breathable, as well as comfortable to wear. With features of lightweight, elasticity, and durability, the uniforms' functionality is significantly improved.

To cope with the trend of low birth rate, TCC encourages childbirth and launched the parenting support plan. The childbirth allowance has been provided as of 2017. The maternity bonus has been available since 2021. With an amount of NT$330,000 disbursed in the same year, over a million NTD cumulatively has been disbursed thus far. Aside from disbursement of maternity bonus, TCC also works with nurseries to reduce the cumbersome burden on its employees in finding a childcare facility.

Maternity Subsidy & Bonus

4.3 Care for Employee Safety

TCC has always been attaching importance to the safety issue of employees' working environment. With the long-term aim of "zero occupational injury" for employees and contractors, TCC formulated the Occupational Safety and Health Management System and established the Labor Safety and Health Office (LSH Office hereinafter) in charge of matters pertaining to labor health and safety. Also, all the cement plants, RMC plants, and Operation Headquarters have been certified to ISO 45001 occupational health and safety management systems in order to protect the safety of its employees in a systematic manner. In addition, to enhance the internal awareness of occupational safety, all seed personnel of different units receive trainings for internal auditors in accordance with the ISO requirements.

Occupational Safety and Health Management System

TCC has stipulated the Occupational Safety and Health Management System. The Labor Safety and Health Office is obliged to call an Occupational Safety and Health Committee meeting quarterly to track results of work execution, review current status, and engage ongoing efforts for improvement. The safety management regulations in force include "Occupational Safety and Health Management Regulations," "Occupational Safety and Health Management Plan," "Occupational Safety and Health Code of Practice," "Human Factor Hazard Prevention Program," and "Prevention Plan for Ailments Induced by Unusual Workload." Furthermore, Occupational Safety Monthly Report has been issued since 2021 as a reporting mechanism.

In addition, TCC joined Taiwan Cement Manufacturers' Association and drafted "Formulating Safety Partnership Implementation Plan" with Occupational Safety and Health Administration, Ministry of Labor to elevate the safety awareness of the workers in the cement industry.

Safety Management of Contractors

To further implement its occupational safety policies and goals and strengthen its management of contractors, TCC has stipulated "Contractor OSH and Environmental Management Rules and Punishment Guidelines." Also, contractors are required to abide by the regulations relevant to labor safety and health. Before entering a plant, contractors are required to complete OSH education and training and fill out the Workplace Environmental Hazards Notice and the Workplace Environmental Hazards Advice to ensure that contractors understand the relevant OSH regulations. Meanwhile, contractors are required to sign the Letter of Undertaking for Health, Safety, and Environment (HSE) to pledge that their workers will abide by the OSH rules when working at TCC plants.

- Data of work-related injuries
- Description of nonconformities in safety & health audits and of the improvements
- Description of violations by contractors, as well as the handling and results
- Content of safety and health education and trainings

Hazard Identification and Risk Assessment Process

01 Identification of all hazard sources

02 Identification of hazards and consequences

03 Check of the existing protective facilities

04 Identification of harzard risks and risk classification and management

05 Adoption of control measures to reduce risks

06 Confirmation of the residual risks after adoption of control measures

Incident Investigation Process

Incident Occurance

A report is to be submitted to the LSH Office and the superiors immediately after the occurrence of material occupational disaster. Also, the contractor is to report to the supervising unit via phone in 30 minutes and inform the firefighting department and medical services for backup in line with relevant regulations, such as to inform the local labor inspection institution within 8 hours after a material occupational disaster.

Incident Cause Investigation

The LSH Office is to set up "Occupational Disaster Investigation and Handling Taskforce" after a material occupational disaster. Supervisor of the respective unit or designated personnel serves as the convenor. Together with department supervisors, it goes immediately to the site for investigation and inspection. After compiling the "Incident Prevention Report" to the President, a material occupational disaster investigation report review meeting is called within a week. The LSH Office supervisor serves as convenor to invite managers of departments and labor representatives to the meeting. The LSH Office shall brief on the process and handling of the material occupational disaster.

Incident Review and Improvements

Based on the improvement items on the investigation report submitted by "Occupational Disaster Investigation and Handling Taskforce", all units are to track and manage the progress of improvement until completion thereof while to review for improvement comprehensively to prevent a recurrence of similar incident.

Photos of the scene of the material occupational disaster should be taken. Together with the investigation report, the materials are submitted to the LSH Office as case study materials for education and training to prevent recurrence of similar incident.

Health and Safety Education and Training

In alignment with the government's regulations in force each year, TCC organizes courses of labor, labor safety, disaster prevention, etc. Also, new training and retraining for certificates related to first aid personnel, hypoxia operations, hazardous equipment, or occupational safety and health business supervisor are arranged in accordance with the laws. In addition, through inventory of the potential factors of safety hazard in the working environment, TCC conducts safety promotions and fire drills as well as partakes in the various disaster prevention

briefings and certificate trainings organized by the government, including air pollution prevention and control seminar, trainings for fire prevention manager, and seminar for diagnosis and case studies of pneumoconiosis. 197 individuals received education and trainings in terms of environmental safety and health with training hours up to 1,385 hours in total. No occupational disease was reported in 2021.

Employee Health Checkup and Management

TCC regularly provides employee health checkups with the special checkup items like noise, dust, and ionizing radiation tests. The checkup fees are absorbed by TCC. In addition, the Operation Headquarters regularly tracks the health conditions of employees and adjusts the nature of works in line with individual health condition to protect their health and safety.

Employee Health Promotion Activities

TCC encourages employees to cultivate good exercise habits, and provides subsidies up to NT$80,000 annually for relevant clubs to hire professional coaches for instructions and for personnel with similar interests to establish and join clubs. In 2021, Women Power Championship and Beer Belly Killer Championship were organized to cultivate employees' awareness for health promotion via group activities and competitions.

"On-site health service" has been available since 2020. Contracted medical staff provide health services on-site in accordance with the laws. The Hoping Plant recruited 1 dedicated nurse to enhance and care for the health of workers on the plant and reduce the risks of occupational disasters. Also, TCC implements health promotion measures, including organizing health lectures and relevant education and trainings. A cumulative 930 individuals received the services since the organization in 2020. Four plans, including ergonomics, excessive loads, workplace violence, and maternal health protection, are implemented. The health conditions of employees are rated via health checkups and questionnaire survey. Health-related recommendations are offered to the employees with mid-to-high health risks.

Health Promotion Programs on the Plants

Hoping Plant
- Health lectures
- Education and trainings for operations
- Education and trainings for work overload or musculoskeletal injuries
- Community medical station

Suao Plant
- In-service education for occupational safety and health
- On-site health services provided by contracted medical staff monthly
- Personnel health checkup by commissioned medical institution

Operation Headquarters
- Monthly provision of on-site services
- Influenza vaccination for all employees

Occupational Safety and Health Committee

	Operation Headquarters	Cement Plants	RMC Plants
Chairperson	1	2	3
Number of Executives and Professionals	5	21	28
Number of Labor Representatives	3	15	17
Percentage of Labor Representatives	33%	39%	35%

4.4 Human Rights Protection

To foster a human-centered, healthy workplace environment, in line with international conventions like United Nations Global Compact, UN Universal Declaration of Human Rights, and ILO Declaration of Fundamental Principles and Rights at Work and the local labor regulations in the areas where TCC operates around the world, TCC promulgated human rights policies to safeguard the legal rights of employees. All paid personnel are treated equally with respect. The scope of coverage encompasses contract workers and interns. Also, relevant information is disclosed on the corporate website, the internal bulletin board, and the ESG Report. Meanwhile, critical policies such as Human Rights Policy, Statement of Integrity and Ethical Conduct, and Sexual Harassment Prevention Policy are included in the Group's mandatory courses for annual education and trainings. Each year, all personnel in the Group are required to read carefully the policy documents for them to have full knowledge regarding the Company's protection and commitment to the rights of employees. The online reading rate achieved 100% in 2021. A total of 2,899 readings have been achieved with 483.17 hours of total training hours (10 minutes of reading time per document).

To further encourage suppliers to jointly implement sustainable development policies like environmental protection, human rights protection, and resource circulation, Supplier Code of Conduct has been amended with human rights requirements incorporated. All new partner suppliers are required to sign the document. The Critical Tier-1 Suppliers are obliged to sign on the document from time to time. It is expected to achieve 100% signing rate by 2022 so as to expand the ESG spirit across its corporate partners.

In addition, TCC attaches importance to social, environmental and corporate governance, committed to the protection of employee rights and proactively fostering a friendly workplace that is healthy and supportive. Online care platform and employee feedback e-mail box have been set up. In the event of any issues encountered in workplace, such as issues of epidemic prevention, workplace health and safety, gender equality, systems and work hours, as well as employee care, employees can always submit their comments to the Company, which will be processed in confidentiality by dedicated staff in order to offer the most secured protection available to its employees. The dedicated regulations and grievance channels for sexual harassment prevention at workplace have been set up. Courses on sexual harassment and grievance mechanism are arranged for new recruits on the first working day to make aware of their knowledge of human rights and safety, gender equality at workplace and human dignity, as well as a healthy working environment with equal rights.

Please visit our corporate website for details of Humans Rights Policy

Human Rights Due Diligence

Purpose

To implement its Human Rights Policy and ensure its effectiveness, TCC launched its human rights due diligence in 2019 to fully grasp its employees' knowledge of Human Rights Policy and endeavor to build a working environment that is willingly supportive, friendly, and healthy. The operation sites for investigation increase each year with individuals involved on the rise as well. The latest investigation surveyed 19 operation sites. With 2,818 personnel filling out and returning the questionnaires, the response rate was up to 97.37%.

Scope of Investigation

TCC as well as its subsidiaries and joint ventures

Methodology

The analysis is conducted in line with "the occurrence frequency of human rights risks" and "the impact levels to the enterprise and its employees" to identify potential human rights issues, assess the risks, and develop measures for mitigation and compensation, so as to live up to the commitment to human rights protection and render the results to responsible investigation.

Investigation Result

Consistent with the results of the previous year, there was no material risk nor nonconformity observed in 2021.

Measures for Remediation and Mitigation

We continue to push for measures for remediation and mitigation with regard to welfare policies implementation, lounge area improvement, and working environment education and trainings to eliminate incidents of human rights violation in workplace and effectively protect human rights.

Deepening the employees' understanding of the Company's sustainability ideology and recognition of its goals in sustainable business and enhance employee-company interactions. Starting from 2019, the survey has been conducted every other year. The survey has 25 items covering four sectors, i.e. organization recognition, work environment, career development, and team relations. It is designed with the aim to understand employees' experiences and their expectation for work, helping TCC to make progress. The results reveal that both the male and female employees are highly identified with TCC without a sex difference.

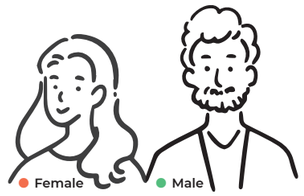
The result of the latest survey was 96.1%. TCC surveyed 6,320 employees covering about 96.71% of all employees in Taiwan-based operations including the affiliated enterprises and those in the Yingde, Guigang, and Anshun Plants in Mainland China. The coverage rate of Taiwan is 95.97% with a result of 94.3% in engagement; the coverage rate of Mainland China is 97.30% with a result of 97.5% in engagement. Furthermore, a difference analysis between males and females was conducted, which found recognition rates were 96.0% and 96.1% respectively.

Employee Engagement Survey to Gain Insights into the Needs of Employees

4.5 Workplace Diversity

TCC has been committed to fostering a willingly supportive, friendly, and healthy working environment since its establishment, taking care of its employees and their families to the best of its ability. All employees, regardless of their gender and position, are entitled to equal welfare measures so as to uphold a heathy environment of equal rights and realize gender equality.

TCC has a diversified employee composition and lives up to its commitment to human rights. Compared to the previous year, the female managers at TCC grew by 11.5% in 2021; the percentage of employees with disability by 13%; and the indigenous employees by 5%.



Total Number of Employees by Contract and Gender

Employees with an Open-Ended Contract (Including Employees on Leave Without Pay)	214 : 920
Total	1,134
Employees with a Fixed-Term Contract (Including Temp Workers & Interns)	2 : 10
Total	12

Note 1: There is no non-guaranteed hours employee nor part-time employee at TCC
Note 2: Based on the data of non-fixed term contract personnel as of December 31, 2021
Note 3: The 12 fixed-term contract employees include 1 employee at the Operation Headquarters, 1 at the Taipei Plant, 2 at the Suao Plant, 7 at the Hoping Plant, and 1 at the Hualien Plant, responsible for carbon reduction projects, hazardous solid waste projects, concrete practices, environmental safety projects, etc

Total Number of Employees by Age and Gender

30 or under	32 : 101
Total	133
31-50	156 : 543
Total	699
51 or above	26 : 276
Total	302

Number of Managers by Age and Gender

30 or under	-- : 3
Total	3
31-50	44 : 97
Total	141
51 or above	10 : 52
Total	62

Note4: Manager is defined as section chief or above

Taroko Gorge Marathon 2022

Total Number of Employees by Operation Site and Gender

Operation Headquarters	88 : 88
Total	176
Suao Plant	11 : 179
Total	109
Hoping Plant	26 : 235
Total	261
Hualien Plant	1 : 9
Total	10
Taipei Plant	36 : 173
Total	209
Taichung Plant	20 : 78
Total	98
Kaohsiung Plant	32 : 158
Total	190

Total Number of Employees by Department and Gender

Sales Department	94 : 415
Total	509
Other Departments (besides the Sales Department)	120 : 505
Total	625

Total Number of Employees by Education and Gender

Ph.D.	1 : 4
Total	5
Master's Degree	41 : 78
Total	119
Bachelor's Degree	119 : 352
Total	471
Associate Degree	28 : 159
Total	187
Senior High School, Vocational School, or Below	25 : 327
Total	352

Total Number of Employees by Job Levels and Gender

Executives	4 : 16
Total	20
Mid-level Managers	25 : 67
Total	92
Low-level Managers	25 : 69
Total	94
Professionals	69 : 127
Total	196
Direct Labor	91 : 641
Total	732

Note7: 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, Officers, or Management Associates

New Recruits and Employees Separated by Gender and Age

		Gender	Age: 30 or under	31-50	51 or above
New Recruits	No.	36 : 109	56	85	4
	Ratio	3.17% : 9.61%	4.94%	7.50%	0.35%
Total					145 | 12.78%
Employees Separated	No.	12 : 81	22	47	24
	Ratio	1.05% : 7.14%	1.94%	4.14%	2.12%
Total					93 | 8.2%
Employees Voluntarily Separated	No.	8 : 40	16	30	2
	Ratio	0.71% : 3.53%	1.41%	2.65%	0.18%
Total					48 | 4.23%

Note5: Employees within probation period/retired/dismissed/deceased were not accounted for employees voluntarily separated
Note6: Based on the data of non-fixed term contract personnel as of December 31, 2021

CHAPTER 05

Society Inclusion and Common Good

Hanben Ocean Station in Yilan

"DAKA means an observation tower in ethnic Taroko language. "TCC DAKA" contemplates to set a platform, extending from factory to community and from industry to humanity, for TCC and the Heping community to work together for a better and worthier present, where to initiate a new start for Heping."

YEAR 2021

Society Inclusion

4.51 Million
TCC DAKA Visits
2020/1/9-2022/2/28

SROI 3.54
TCC DAKA Social Impact Evaluation

96%
TCC DAKA Guided Tour of Circular Economy Satisfaction

31,000
Hanben Ocean Station Visits
2021/8/4-2021/12/31

台泥 DAKA 台灣水泥(股)公司和平分公司和平廠 台泥ＤＡＫＡ–開放生態循環工廠
2020–2022
[redacted]
Tourism Factory Label

-759.7 Metric Tons
GEMMA "Recycle with Peace (Hoping) Now!" Campaign

Empowerment

Up to
NT$75,000
Per Capita in Average

NT$1.02 Billion
Community Development Contributions
2017-2021

NT$328 Million
Social Welfare Contributions

Cultural Conservation

C.F. Koo Foundation
10 Culture Lectures With 900 Participants

CTR **600,000Hits**
Online Koo Cloud Theater

Cement Academy
x2
Students Benefited

Charitable Contributions

Education Fund

NT$ 3.842 Million
Hualien He-Ping Elementary School
2020/1/9-2021/12/31

NT$ 87,500
Yilan Aw-Hwa Elementary School
2021/8/4-2021/12/31

5.1 EARTH HELPER - Observation Tower of the Future of Green Living

TCC DAKA Open Eco-Factory (TCC DAKA) is a venue for TCC to practice co-existence and inclusion of industry and society. As of January 2022, 4.51 million visitors have shown up since its opening. If a visitor has a different idea or different practices because of the concepts of TCC DAKA communicates, there will be 4.51 million kinds of living. Maybe energy of a power plant can be saved; maybe wastes of dozens of metric tons can be saved; maybe coastlines of several kilometers can be cleaned.

"NHΩA.TCC charging station at TCC DAKA in Hualien is the first venue for TCC to ponder a new energy and how to implement it."

Chairman An-ping Chang promoted the living attitude of energy-saving, low-carbon, and downshifting on the inauguration ceremony of NHΩA.TCC. Also, he reflected on humanity's obsession with efficiency for more than 2 centuries since the Industrial Revolution. Chairman Chang was convinced that life quality, or the living style of humans, is not a mechanical, computer-based living style. Attaining efficiency when it is needed, and returning to the nature of humanity when it is not. The "24K GREEN" leisure charging service installed at TCC DAKA is to slow down for the so-called downshifting and saving unnecessary energy consumption. At present, most electric vehicles are still using power with carbon emissions generated. The clean energy cannot meet the needs of modern living in the short term. Aside from an ongoing creation of more green energies, TCC's charging service is essentially energy-saving.

TCC and Sustainability Partners to Launch EARTH HELPER

"Power charging is no longer just an act or a habit but a shared platform for bringing into effect the Green Living." TCC, 7-ELEVEN, Phihong Technology, LDC Hotels & Resorts (LDC), Giant Bicycles Taiwan, Audi Taiwan, and Dr. Cecilia Koo Botanic Conservation Center (KBCC) jointly launched "EARTH HELPER" campaign, online and offline, calling on EV drivers and everyone to reduce carbon emissions. Combined with the online game of, "EARTH HELPER" at NHΩA.TCC LINE Official Account, each power charge is converted to the amount of carbon reduced and EV owners can collect virtual medals accordingly. Or people can participate in carbon reducing activities such as beach cleanup, food waste reuse, waste recycling, and cycling, etc. to accumulate EARTH HELPER sustainable points. Upon attainment of the highest level of the medal, KBCC will restore a world-class rare species of orchid to its original habitat on Lanyu (Orchid Island) in the name of the participants.

Meanwhile, the top 3 EARTH HELPERs, determined by accumulated points, can enjoy a 5-day-4-night low carbon relaxing family trip planned by LDC, free of charge. Through the campaign, the idea of "Earth Sustainability; Everyday Practice by You & Me" is put into actions.

EARTH HELPER endeavors to strike a better balance for the complex relationship between humans and nature. Only when each one of us stays alert to help with one's hands can a better future of the Earth be anticipated.

Medal	Accumulated Carbon Reduction & Mileage
GAIA	Become a member at NHΩA LINE Official Account
PROMETHEUS	Carbon reduction reach 20 kg *(Accu. 164 km mileage)*
ATHENA	Carbon reduction reach 70 kg *(Accu. 574 km mileage)*
DEMETER	Carbon reduction reach 2000 kg *(Accu. 14778 km mileage)*
APOLLO	Carbon reduction reach 300 kg *(Accu. 14778 km mileage)*
POSEIDON	Carbon reduction reach 2000 kg *(Accu. 14778 km mileage)*
ZEUS	Carbon reduction reach 2000 kg *(Accu. 14778 km mileage)*

Turning Wastes into Gems with Superpower GEMMA

Gemma is "gem" in Italian, which is pronounced close to "decoding" in Mandarin and "today" in Minnan. GEMMA has the power to polish wastes into gems to power the Earth with energy of circulation and regeneration.

GEMMA will make its presence on events related to loving the earth. You may capture the sight of me in campaigns like "Recycle with Peace (Hoping) Now!", "New Energy, New Lifestyle", and EARTH HELPER!

"Recycle with Peace (Hoping) Now!" campaigning with start-ups, social enterprises, and welfare groups combined to promote waste recycling. Smart recycling machines have been introduced at TCC DAKA, making it the only place in the eastern Taiwan installed with interactive environmental facilities.

25,892

Total Bottles Recycled in 2021

Carbon Reduction 759.67 Metric Tons

Equivalent to 2 Daan Forest Parks

5.2 Extension of TCC DAKA's Shared Value

It marks the 3rd year of TCC DAKA, one of the most popular tourist attractions in Hualien. Through the interactive environmental education of the "3-in-1 Tour of Port, Power Plant, Cement Plant," 16,000 tourists have been drawn to the in-depth experience guided tour of circular economy. Also, the SROI analysis has been introduced. In December 2021, the project TCC DAKA was certified by Social Value International, which verified that a NT$3.54 worth of social values was created with each at NT$1 invested to the project overall.

SOCIAL VALUE INTERNATIONAL

Statement of Report Assurance

Social Value International certifies that the report

Taiwan Cement Corporation TCC DAKA Open Eco-Factory Social Return on Investment (SROI) Report

published on 24/12/21, satisfies the requirements of the assurance process.

The assurance process seeks to assess whether or not a report demonstrates a satisfactory understanding of, and is consistent with, the Principles of Social Value. Reports are independently reviewed by qualified assessors and must demonstrate compliance with the Social Value report assurance standard in order to be certified. The Social Value report assurance standard can be downloaded from the website socialvalueint.org.

Assurance here is against the Principles of Social Value only and does not include verification of stakeholder engagement, report data and calculations.

Awarded 24/12/21

Signed

Mr Ben Carpenter
Chief Executive Officer
Social Value International

Social Value UK carries out the assurance service on behalf of Social Value International. Social Value International is the global network focused on social impact and social value. We are the global network for those with a professional interest in social impact and social value. We work with our members to increase the accounting, measuring and managing of social value from the perspective of those affected by an organization's activities, through the standardised application of the Principles of Social Value. We believe in a world where a broader definition of value will change decision-making and ultimately decrease inequality and environmental degradation.

Disclaimer: Social Value International will not be responsible for any actions that an organisation takes based upon a report that has been submitted for assurance. An assured report does not grant Accredited Practitioner status to the author/authors of the report unless it is part of a full application for Accredited Practitioner status.

TCC Mining in Heping Approved via Consultation and Consent Procedure with Knlibu and Gukut Tribes

On 17 and 22 of March 2022, TCC proactively applied for tribal consultations and consent with Gukut and Knlibu Tribes at the Heping Village (in Siou Lin Township, Hualien) respectively for the extension duration of Hoping Mine. 82.2% of the Gukut households and 97.6% of the Knlibu households voted in favor of the case. TCC is especially grateful for the numerous key opinion leaders in the local communities that joined hands with TCC to work for Heping. Chairman Chang pointed out, **"Only when an industry is integrated with nature and local community can it envisions a promising future. Hence, TCC will not only help local communities at its best while keeping the business running smoothly, but also address itself to strike a balance between industry and nature for a sustainable development."**

The Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan

On 17 December 2021, TCC moved the whole TCC DAKA from Hualien to Taipei for The "Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan" at Huashan1914 Creative Park for 3 consecutive days, which drew 3,253 visitors in total.

The exhibition was a fruit given birth by the joint discussion and planning of TCC and the villagers of Heping Village. The theme "The Mysterious Giant in the Heping Village" was derived from the subject in the picture book at TCC Vision House in TCC DAKA. The giant served as a metaphor of the industrial factory that was kept at a distance from local community by high walls. Now that the plant was open to the public, it was not mysterious anymore. As such, it also echoed with the philosophy of Chairman Chang: "a plant should not be alone by itself, but a place to co-exist with the environment, the society, and the residents in the neighborhood. In collaboration with the communities, it should also be a part of their life. A factory is not only a place to make goods but also a leisure park to entertain tourists, a classroom to pass on knowledge, and a museum to store artworks."

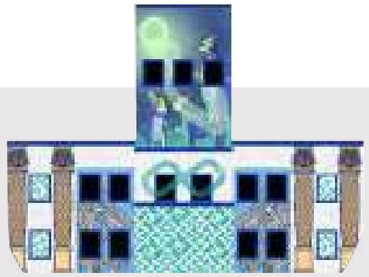
At the exhibition, visitors could realize the lives of each resident through the text wall with the stories written by TCC and the tribes together for the past 21 years. Moreover, one could observe TCC's developments in circular economy, low-carbon new cement, resource recycling, waste recycling initiatives, and the new business of green energy and energy storage. The achievements of coral transplant and restoration project of Hoping EcoPort and traditional weaving craftsmanship were exhibited. The exhibition included a runaway show of Truku modified traditional clothing by women on the tribes. Local students also gave a recital of xylophone and folk songs. A revenue of NT$112,670 from the handcrafts and the organic vegetables grown with the soil amendment converted from food waste at the Happy Farm of TCC Hoping Plant was generated for the mothers of Heping tribes. Through the innovative communication model, TCC promotes the idea that the factory is closely related to the public life.

Hanben Ocean Station

In line with TCC DAKA's innovative communication model, Hoping Power Plant collaborates with the Coast Guard Administration to revitalize its space at Hanben beach of Aohua Village, offering a venue for tourists access to the ocean and learn about marine conservation and ocean waste disposal. TCC has invested approximately NT$38 million in the construction of Hanben Ocean Station in Yilan.

Hanben Ocean Station is an architecture built for conservation. The exterior was painted by Pei-Yuan Wu, the first local youth architect of Atayal. In alignment with the local features, the exterior incorporates the ideas of circulation of ocean and the totem of Siliq, which is regarded as a sacred bird of in Atayal culture. The Station is transformed into a "stone that absorbs stories," symbolizing the unswerving protection for the local residents as well as a keystone that connects the history and future prospect of the Aohua Village.

The wall facing the sea painted with the word “RGAYUNG”, the Atayal name of Aohua Village, which means maple in Atayal language and Siliq, a grey-cheeked fulvetta, carrying a red seed. Siliq is a symbol of guidance and protection. Red seeds imply sustainability and immortality.



Do you see the infinity circular symbol? It means that the Coast Guard Administration, TCC and the local community work together for the everlasting future of Aohua.

By the side of the Station, it is IRIS Swing named after the goddess of rainbow, Iris, who has the ability to connect the heavens and earth. Tourists can speak out their wishes at the highest point of the swing.

IRIS Swing in Hanben Ocean Station

Visitors Has Reached 31,000 (2021/8/4- 2021/12/31)

There is ocean waste art section in the Station. With the discarded fishery buoys, it raises people awareness of marine conservation in an attempt to become a platform for the society to care of the issues of ocean waste.

Vakangan Geothermal Green Energy Park

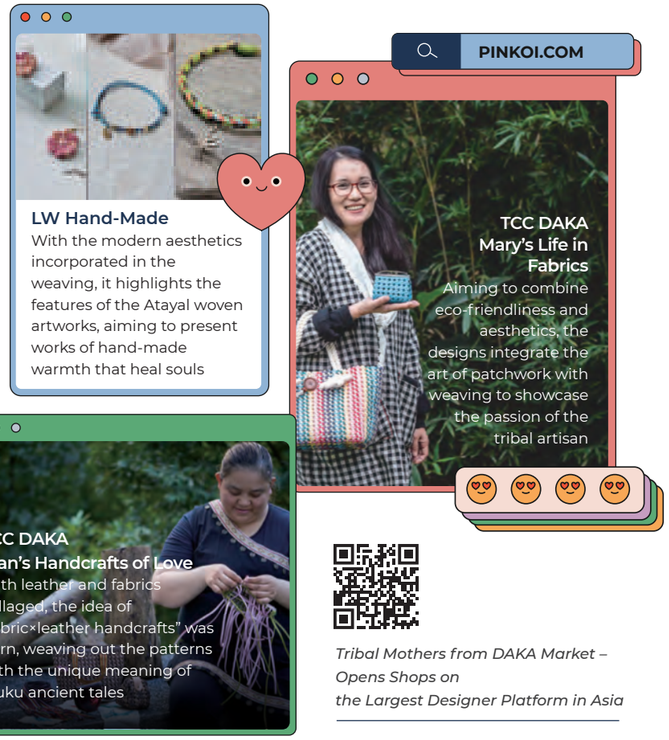
For the next step, TCC joined forces with LDC to build “Vakangan Geothermal Green Energy Park” in Taitung. The Park shall become the first demo park of renewable geothermal energy, sustainable tourism, and co-existence and local inclusion combined. TCC aims to give birth to a green corridor in the eastern Taiwan. The Park is expected to open by mid-2022.

The Park puts LDC’s expertise in tourism and Michelin three-star into good use. Also, it plans to work with local tourism and B&B services to build a platform. In the future, Vakangan will connect the resources and attractions across the five villages in the township. It shall give rise to the complete itinerary of local cultural tourist experiences, including Bunun Tribe, Kanasuoi Workshop, and Abus Traditional Garment Workshop for Bunun culture experience; important festivities of Ear-shooting Festival; Uninang Cultural Diversity Workshop, Sazasa Forest Museum, Wuling Green Tunnel, and Taitung 2626 Market featured with eco-tour experience of mountain forest.

紅葉谷
VA KANG AN

5.3 Empowerment and Rejuvenation Plan

TCC DAKA was closed for more than two months due to pandemic in the H2 2021. Considering the reduced incomes of the DAKA Market vendors, TCC organized e-commerce mentoring courses, including e-commerce practices and commodity photo shooting, etc. In terms of commodity exhibition, it taught them copywriting, advertisement design, and hands-on photo shooting practice to elevate their brand quality. The allocated amount by TCC is about NT$75,000 per capita. As a result, the handcraft artisans from TCC DAKA and Aohua opened their shops on the largest designer platform in Asia, successfully extending from offline to online and meeting a better version of ourselves.



Tribal Mothers from DAKA Market – Opens Shops on the Largest Designer Platform in Asia

Maritime Professional Activity Personnel Training – National Chinese Surf Life Saving Association and Local Youth Startup

The Yilan County Government opened the Nanao waters, which brought employment opportunities for the local community. To facilitate the local community to grow together, TCC introduced the National Chinese Surf Life Saving Association and local Youth Startup, Love Wilds Co., Ltd., to offer training courses of lifeguard, canoe, SUP, etc. A total of 24 local youth completed the training courses. TCC matched resources and employed the youth from Aohua first as TAs, mentored tribal youth studio to promote itineraries of river tracing in Aohua and Atayal Hunter Classroom, and committed the marketing resources, free of charge, to present introductions to the attractions and itineraries in and around Aohua on websites and Hanben Ocean Station for tourists, so that Aohua can be a hub of local culture exchanges.

Low-carbon Cycling in Heping – LDC & Giant

Centering around community rejuvenation and low-carbon environmental protection, TCC presents "Low-carbon Cycling in Heping," together with LDC and Giant. Tourists can ride a bike to visit the neighboring tribes in Heping and Hezhong, travel amidst the mysterious realm and private beach attraction, and listen to the interesting local stories. Tourists can also ride into the Hoping EcoPort rich in coral reefs and appreciate the underwater colorful tropical fish. What makes the project distinctive is that there will be a professional "cycling steward" made of the tribal youths or mothers to lead the way to take care of the safety in riding. They are professionally trained by Giant-offered mentorship of riding skill and bicycle maintenance. It not only allows tourists to experience the local culture in depth but also contributes to the tribal youth employment.

5.4 Sustainable Philanthropy Actions

Upholding the principle of not-for-profit at TCC DAKA, the stall fees from DAKA Market vendors, the guided-tour fees, and the regular contribution from the month surpluses of 7-ELEVEN Lienhe Store and Starbucks are directed to the He-Ping Elementary School Education Fund. A total of NT$3,842,054 has been contributed as of the end of 2021 to fund the school children's field trips, school hardware replacement, campus greenification, hiring of teacher from elsewhere, children's school stationary as well as the tribal families that suffered from the economic impacts during the pandemic for rural education improvement. The use of the Fund requires a plan in line with He-Ping Elementary School's needs, to be approved by the county government. The fund has become the greatest support to the local children and families.

As for the Hanben Ocean Station, TCC allocates the revenues from the IRIS Swing, stall rental fees, and wash area to local youth hiring first. In addition, the annual balance of NT$87,550 in 2021 was contributed in full to Aw-Hwa Elementary School Education Fund.

Earmarked Emergency Aids of Hoping Sustainability Fund

TCC established Hoping Sustainability Foundation. The contributed amount from TCC DAKA is allocated to the Fund for earmarked purposes. 50% of the Fund is used for emergency aid, so that the local villagers nearby the Hoping Plant can be taken care of in the event of emergency.

Hoping Sustainability Foundation is funded NT$5 million by TCC first. With an additional donation of NT$5 million and the annual contribution of NT$1 million minimum from TCC DAKA, the Fund can thus develop sustainably. For the oversight of the Foundation, it plans to invite the tribal chairs in Heping tribes, i.e. Knlibu (Heping), Gukut (Hechung), and Qnragan (Heren), to oversee and ensure an effective utilization of the fund together with TCC.

English Teaching Assistant (ETA) Program

TCC collaborates with the Department of Education, Hualien County Government to introduce the ETA Program from the Foundation for Scholarly Exchange, Fulbright Taiwan to Heping Elementary School. With annual NT$1 million contribution, the program has been kept running since 2020 for the school to have one foreign English teacher on campus per semesters.

TCC DAKA Wishing Tree to Realize Dreams for Children

In response to LDC Wishing Tree campaign, TCC DAKA worked with He-Ping Elementary School to collect the Christmas wishes by 30 students with harsh conditions. The children's wishes were claimed by TCC employees in less than 72 hours.

Prior to the Silent Night, Chairman Chang, President Jong-Peir Li as well as Plant CEO and Manager of Hoping Plant served as the representatives, to deliver each gift and best wishes to the children. Meanwhile, Chairman Chang hand-picked 57 children's books as the presents to He-Ping Elementary School in hopes that the children can learn about Earth and civilizations through reading and gain more knowledge and power, so that they can stand benefited to help others in the future.

Celebration of the Elderly for Double Ninth Festival

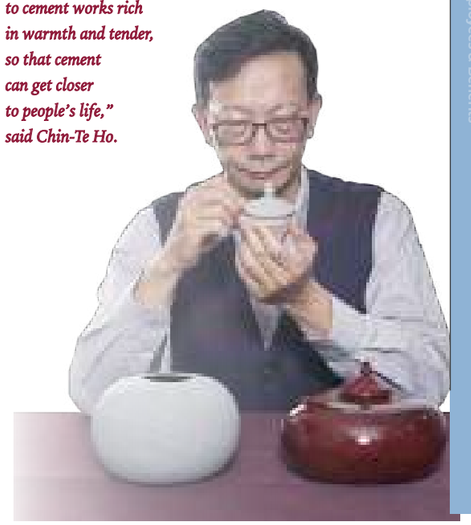
Hoping Power Plant and the Aohua Village Office co-organized the celebration activity for the Double Ninth Festival. Also, the video "Behind the Scenes: Birth of Hanben Ocean Station" was released for the first time to offer a glimpse at the station transformation process. It documents TCC Group's effort of over 1.5 years in collaboration with the township office, friends from tribes to present a different outlook as it is. In addition, the experience course of "green life with succulent plants" was arranged specifically in synergy-with the soil amendment from the Hoping Plant.

TCC Cement Workshop – Cement Worker Became Artist

In response to epidemic impacts, TCC actively planned and provided short-term job opportunities for the unemployed residents. "Cement Workshop" was established at the Hoping Plant, offering cement handcraft production trainings. 10 individuals were enrolled, and two of whom became the official employees of TCC in 2021, working specifically for the production with the skills acquired during the trainings.

The Cement Workshop incorporates creativity and design elements with cement, combining the planting knowledge and art education, to enable production of cement plants pots. Chin-Te Ho, a cement worker with 33 years of experience, turned an artist. The treasure pot he designed is exhibited at TCC DAKA Cement Design Studio and has obtained two patents from the Intellectual Property Office, MOEA in 2021.

"Through aesthetics, craftsmanship, and cement hand-made techniques, I am determined to give birth to cement works rich in warmth and tender, so that cement can get closer to people's life," said Chin-Te Ho.



Living Aesthetics of Cement Craftsmanship

Cement Handcraft Workshop organized by TCC Hoping Plant is part of the TCC DAKA guided tour. It aims to allow the general public to engage in “participatory community rejuvenation charity.” "Fantasy & Wonder of Cement" shop is expected to be set up at TCC DAKA Market in 2022, so that the works made by Cement Workshop may be seen by the broader society, extending the fruits of training the unemployed as cement handcraft artists.

Tellurion

A life-like tellurion is made with a cement sphere of 15-cm in diameter. Red metal dots are inserted across the continents as TCC global operations. The space at the core is turned into a place for storage. The countries where the Company operates are engraved around the equator. At the Pacific on the sphere, the design LXXV symbolizes the 75th anniversary of TCC.

Coaster

GEMMA was elected as the protagonist for the 75th Anniversary Coaster. The four vivid and vibrant colors of the coaster correspond to the four colors of gems of GEMMA.

Cement Magnets Cattle Bookend Giftbox

With the cement element and magnets combined, the cement magnetic cattle can stick to objects like desks, refrigerators, etc. Together with the bookend designed by TUO's core idea of optimum circularity, it offers a richer sense of literati and functionality.

Everlasting Bench

With the UHPC material TCC exclusively developed to be injected in the bench mold, the bench is designed as thin, elongated, and hollow at the core without any reinforce steel throughout. As such, it is rich in the sense of fashionable design and longer lifestyle, symbolizing an everlastingly sustainable Earth.

5.5 Cement Academy Education of Conduct and Knowledge

The Cement Academy project is a philanthropy project implemented by TCC since 2012. The school children from the disadvantage families near by the cement plants in Taiwan and Mainland China are supported in terms of schooling and proper access to education resources and nutritious food. As of 2021, a total of 21 Cement Academies were set up, benefiting 1,322 students with disadvantaged conditions such as poor household income, culture and language barriers in the New Immigrant family, the left-behind, etc. There have been 9,533 students enrolled in total cumulatively. Aw-Hwa Elementary School is expected to be added in 2022.

In 2021, TCC worked with ***CommonWealth Magazine*** across disciplines to launch the Hope Reading Program in hopes of an equal right to education for all children. Therefore, it helped the school children from He-Ping Elementary School in Hualien as well as Shih Min Elementary School and Yongle Elementary School in Yilan get access to the 100 quality children’s books at home and abroad selected by children education experts, teachers, and children book writers. In addition, combined with “Reading Passport,” prizes were available in phases to turn reading into games. With each stage registered on the Passport, the children would win the prize so as to encourage the habit of ongoing reading, reflection recording, and thinking. In the future, Cement Academy will also plan a Picture Book Creation Contest to inspire school children’s creativity.

2021 TCC Cement Academy Result Presentation & Christmas Tea Party

On the 2021 TCC Cement Academy Result Presentation, children introduced their interests and aspirations in English. They were also dressed up, be it funny punk rock style or a lovely angel style, to sing English songs together with dynamic dancing performance. The students also brought us an awe-inspiring performance of diabolo tossing show. There were result presentations by Art Creation Club and various classes as well. All their works showed quality of professional standard. Parents were taking photos for memory in pride after up-close encounters with children’s works.

5.6 Cultural Innovation and Heritage

With a mission in cultural preservation, C.F. Koo Foundation shoulders the responsibility to preserve various traditional dramas and other traditional performing arts on the verge of being lost. Furthermore, through retrieving the old, introducing the new, and cultivating talents, it passes on cultures candidly in the modern world.

Root in Campus: Lecture in Department of Drama and Theatre, NTU

Magical New Peking Opera – Touch Human Souls Despite the Pandemic

Even though there were limited opportunities for live performance due to the pandemic, the Foundation continued its effort in cultural preservation with “program production,” “theater management,” and “lecture promotion." Two productions of the year were completed as scheduled: Five brilliant “New Vintage Plays” exclusively presented by the Foundation and ***The Magic Flute in Peking Opera*** series produced and reinterpreted by Bao-Chun Li, the Peking Opera master. Audience short of plays to watch for over a year could enjoy it, as reflected in the box office and compliments in return!

In addition, with the seasoned experience in theater management, the Foundation assisted the Taipei City Government via the projects of “Technical and Service Management for the Front and Back Stages of Family Theatre” and “Dadaocheng Theater Profound Art Education & Technical Theater and Stage Management” with theater management and service of audiences and performing arts groups to facilitate venues provision through the difficult hours of COVID-19.

Inheritance and Innovation in Combination with Aesthetic Education on Campus

Pursuant to the aesthetic policy in the promotion of art and humanistic courses by the Ministry of Education, and to facilitate the inheritance of the traditional theatric art and innovative thinking as well as increase opportunities of students across schools of different levels for exposures, learnings, and depths of art, the Foundation has planned for the promotion programs since 2015 like “Rooting of Traditional Cultures on Campus” and “Fun with Peking Opera.” The young performers from Taipei Li-yuan Peking Opera Theatre served as the lecturers, offering professional materials with their demo performance, promotion lectures, acting experience, and off-site education.

Due to the pandemic impacts, activities at elementary and middle schools were minimized. Hence, it focused on small thematic sharing at senior high schools, colleges, and universities. For instance, there were lectures of “Costume Experience to Learn about the Peking Opera Wardrobe” at the Department of Textile and Clothing, Fu Jen University, “Laosheng & Monkey Play” at the NTU Peking Opera Club, and “Cross-cultural and Performer’s Challenges.” 10 lecturers toured across Hsinchu, Taichung, and Changhua with approximately 900 participants in total.

CHAPTER 06

Ecosystem Restoration & Ark Plan

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

Geothelphusa nanao (Taiwan Endemic Species) in Taibai Mountains, Suao

"Did Noah's Ark carry so much life onboard? It will remain a question unanswered.
Today, the human eye must see more clearly the sense of urgency needed for life to survive on earth."

YEAR 2021

No Deforestation Commitment

Asteroid No. 526460 Named "Ceciliakoocen"

BUSINESS FOR NATURE

100% Biodiversity Management Plan Coverage

88% Indigenous Plant Species at Mining Areas (Hoping and Suao)

288 Corals Restored
Hoping EcoPort Coral Eco-Creation

Conservation of Endangered Plant Species
34,046
As of 2021/12/31

Invested on Academic Research Projects by KBCC & Academia Sinica
NT$22 Million

33% Qualified Environmental Education Personnel

Urban Leisure Trail

Centennial Lime Kiln and Red Brick Storage

65 Areas
Collect Rainwater for Green Irrigation Systems (198 Metric Tons/Year of Water Conserved)

90.4% Indigenous Plant Species Restored 15 Hectares Green Areas Coverage

6x Green Platform with Organic Matters in Soil Increased

86% Indigenous Plant Species Restored 45 Hectares Green Areas Coverage

↓15,000 Metric Tons/Year
Carbon Reduction by Vertical Shaft Transport System

~5,000 Individual Plant of 18 Indigenous Species in Taiwan Cultivated

18 Units Automated Infrared Cameras Installed for Documentation of Wildlife

6.1 Biodiversity Management

The World Economic Forum pointed out in 2020 that 50% of the world's GDP came from natural capital and the global economies would face loss over US$42 trillion as humans encountered survival crisis if we do not actively conserve natural capital. TCC understands the importance of maintaining and protecting natural resources. Through participating in initiatives, investing and involving in species protection and restoration, and expanding environmental education, TCC maximized its efforts to maintain and protect biodiversity.

"No Deforestation" policy is in force at TCC. All mines have passed the environmental impact assessment (EIA) by the government with mining permits obtained. Red lines are drawn for mine excavation. The original ecological environments beyond the red lines are kept with zero deforestation. Meanwhile, natural-based solutions of unique, new restoration methods are adopted. Also, a biodiversity survey is conducted annually to observe the environmental changes. The land ecologies of mines are divided into flora and fauna for the statistics of species, attributes, distribution areas, and number. Directories are compiled and diversity index is calculated. In addition, the maps for plants distribution of and spots of protected animal species observed are produced. Furthermore, external parties are commissioned to conduct environmental monitoring on a quarterly basis to capture the results of mine ecology restoration and plan for relevant industry-academia collaboration.

Biodiversity Management Plan (BMP) Stipulated In Response to Business for Nature

TCC signed on Business for Nature to commit itself to the reduction of natural capital loss together with 700 international enterprises as a demonstration of its resolution in safeguarding biodiversity. In response to GCCA's Sustainability Guidelines, in line with the UN Convention on Biological Diversity, and with a scope encompassing the operation sites of the Group, the biodiversity policy was stipulated. Combined with the expert resources of the KBCC, international standards are applied to systematically manage the ecosystems in mines. The ecosystem service values of mines are estimated and reported by external entities commissioned as the base for a systematic mine restoration to reduce biodiversity loss.

Eco-friendly Mining Models

Avoidance	Mitigation	Compensation
100%	**Hilltop Platform Mode Phased-excavation**	**100% BMP Coverage**
Passed EIA by the government Zero deforestation beyond the red line Original ecology kept	Systematic explosion management & monitoring Reduce impacts on the environment	Biodiversity Management Plan Quarterly environmental monitoring

TCC×KBCC to Rebuild Ecologies with 6 Principles

With the photophilic (pioneer) plants as the key roles, the photophilic plants are grown to provide shades before a stepwise planting of shade-tolerant species to consolidate the growing environment at the mines. Also, the indigenous plant species of Taiwan are selected following the criteria as follows:

01-Indigenous Species First The benefit of selection of trees fit for the area utilized to avoid invasion of alien species	**02-Utilization of Soil and Seed Bank** The indigenous soil and plant seeds conserved properly for restoration and refilled back to the restoration area	**03-Mid-succession Used for Estimated Seedling Required** Cultivation of the artificially-selected seedlings in the sapling nursery as the major components in the flora
04-Pilot Introduction of Pioneer Plants Active introduction of local indigenous plants to rapidly facilitate the restoration performance in the area	**05-Alien Fast-growing Tree Species Replaced Stepwise by Indigenous Species** Avoidance of a blunt invasion of the natural environment by highly invasive species e.g. White Popinac	**06-Species with Economic Values First** Focused cultivation of local indigenous species with economic values to benefit the local residents

6.2 Restoration of Indigenous Species from Mines

Hoping Mine in Hualien – Consolidation of the Growing Environment at the Mine

The Hoping Mine in Hualien enjoys an even more significant result of restoration thanks to the warmer climate and conservation of the indigenous soil. Taiwan urn orchid (*Bletilla formosana* (Hayata) Schltr.), Chinese Lady's-Tresses (*Spiranthes sinensis* (Pers.) Ames), and Taiwan cotton rose (*Hibiscus taiwanensis* S.Y.Hu) were collected from the mine. Following the six principles, TCC consolidated the growing environment at the mine. The cultivation plan was executed targeting plants like Taiwan urn orchid (*Bletilla formosana* (Hayata) Schltr.), Taiwan hortensia (*Hydrangea longifolia* Hayata), Oriental chain fern (*Woodwardia orientalis* (Sw.) Sw.), Brush pot tree (*Sphaeropteris lepifera* (J.Sm. ex Hook.) R.M.Tryon), Formosana begonia (*Begonia formosana* (Hayata) Masam.), ailanthus-like prickly ash (*Zanthoxylum ailanthoides* Siebold & Zucc.), and Ricepaper plant (*Tetrapanax papyrifer* (Hook.) K.Koch). Also, the sapling nursery was created to care for the seedlings needed in the future. There are 400 buttle aseptic sowing seedlings cultivated and approximately 5,000 Taiwan urn orchid. For Oriental chain fern and Brush pot tree, the bulbil

Ecological tour

cultivation method and seedling method were used to cultivate over 3,000 plants, in which approximately 5,000 Oriental chain ferns were returned to Hoping Mine for cultivation. In addition, a small section of the flowerbed beside Bromeliads Garden in TCC DAKA was open to the local school children to plant and grow Taiwan urn orchid seedlings for the purpose of on-site introduction and education. In 2022, it plans to create an ecological pond to draw aquatics and aquatic plants in the mine to increase the biodiversity step by step.

Taibai Mountains in Suao – the Nursery for the Indigenous Flora

Started from June 2017, the Suao Plant in Yilan has been working with Professor Ji-Wei Huang from the Sustainable Landscape Laboratory, National Ilan University. Upholding the "restoring while mining" principle, it formulated a dedicated restoration plan. The method that allows a natural, balanced growth of flora and fauna was selected for restoration. Windbreak nets were set up to block strong winds; reservoirs were built to overcome the issues of the level-7 wind and of no water in the Taibai Mountains. With PV panels installed, Taibai Mountains became the first ecological restoration system with green energy in Taiwan.

After ceaseless efforts in cultivation, the total greenification area totaled 5.3973 hectares. 5,772 plants were grown, and 4,000 plants of up to 171 species of trees and shrubs were restored successfully. There are up to 43 species of large mammals, birds, and reptiles.

"Indigenous Residents in Taibai Mountains" Video www

Taibai Mountains Mine – Solar Energy & Energy Storage System

Shoushan Mine in Kaohsiung – A Place of Society and Nature Mingled

In response to the termination of mining right in 1992, the cement production of the Kaohsiung Plant in 1994. The Shouahan Mine, has been restored from 1993, to offer a lush forest with wildlife was stopped like snakes, boars, monkeys, and wild birds clustering that formed a vibrant natural ecological area, while being a great spot for dwellers in Kaohsiung to go for a casual hiking in the afternoon and holidays. Since 2014, TCC has planted indigenous plants like Mock Orange (*Murraya paniculata* (L.) Jack) successively. The results of restoration are outstanding at present. Besides ecological conservation, it is also the birthplace of the cement industry in Taiwan.

The century-old limestone kilns and the red-brick architecture built during the Japanese rule have been listed as historic monuments by the Kaohsiung City Government. TCC also allocated budgets for renovation. In the future, it is designed as a venue with industrial history, culture, and eco-tourism combined. In 2021, we kept cleaning the remaining equipment in the Gushan Plant with an area of approximately 1 hectare for a green city landscape.

DAKA Renewable Resource Recycling Center to Present Features of the Mine Plant Ecology

TCC DAKA Renewable Resource Recycling Center planned to create 3 theme gardens, World Garden, Mine Rock Garden, and Ferns Garden, which are expected to complete by 2024. At present, basic plantation information have been compiled. Plants like Taiwan urn orchid (*Bletilla formosana* (Hayata) Schltr.), Formosana begonia(*Begonia formosana* (Hayata) Masam.), and Taiwan hortensia (*Hydrangea longifolia* Hayata) are included in the cultivation project one by one. All the species were transplanted from the mine or bred via the seedling method. After a robust growth in our own sapling nursery, the plants would be relocated to the exhibition area for ecological landscaping. Currently, over 1,000 saplings of 30 species have been successfully conserved. In the future, the biodiversity in the mine will be showcased with the purpose of ex situ conservation. Also, text and illustration will be added to introduce the features of the mine plant ecology.

6.3 Coral Ecology Creation

Coral is one of the most sensitive organisms in the world. TCC engaged the ecology creation plan at the Hoping EcoPort in 2021. It was also the first industrial port that took on the mission. Rigorous self-management is in place in accordance with the Port Environmental Review System of EcoPorts (PERS) to actively maintain the environment and marine ecology of the port, flipping the stereotype for an industrial port. Visitors could see tropical fish swimming casually amidst the coral reefs with their bare eyes right over the observatory at the Wharf N2 of Hoping Port by the shore. The ample marine biology was even hailed as "the Great Barrier Reef of Hoping."

Collaboration with Environmental Conservation NGO to Transplant & Restore 288 Corals

To comprehend the underwater ecosystem of the artificial port, coral as a marine environmental health indicator was chosen to be the organism for investigation to keep records of clustering and identify hotspots for growing. At present, there are 160 coral species in the port. Through establishment of the basic information regarding the coral resources, the port water development is monitored constantly. In March 2021, we collaborated with Sea Angel to launch the plan of bio cubes for coral transplant and cultivation. The coral broken by waves outside the banks were transplanted to the artificial reef. 288 corals have been transplanted and restored currently that forms a vibrant ecology as the first case of artificial port in Taiwan to engage ecology creation. In the second quarter of 2021, implantation and growth of all the transplanted corals were observed. The restoration rate achieved is 99%. We shall keep monitoring in the future.

The fish survey of the port is expected to be conducted in 2022 to identify the fish species in the port. The basic information will be compiled, and the survey of dominant species will be conducted.

Bio Cubes for Coral Transplant and Cultivation

TCC Hoping EcoPort – PERS Certification Renewed as the Only GPAS-certified Industrial Port in Taiwan

Certified to the Port Environmental Review System of EcoPorts (PERS) in 2019 and 2021 consecutively, the port comes with a water quality the same as the Penghu waters. In 2021, it was further recognized by the Green Port Award System (GPAS) of APEC Port Services Network (APSN). As the only certified industrial port in Taiwan, it was recognized with a higher potential in energy efficiency improvement and self-management in pollution control compared to other commercial ports. As a step forward, it shall continue to exchange with eminent ports worldwide e.g. the Port of Amsterdam, Port of London, Port of Stockholm, and Port of Oslo on the environmental information regarding the ecological balance of ports in order to realize the goal of a green, sustainable port.

6.4 Ecological Outdoor Classroom

TCC actively promotes environmental education in hopes of a harmonious coexistence of industrial venues with the environment and ecosystems to communicate the possibilities of symbiosis of industry and society.

"Ecological Classroom of Hoping Industrial EcoPort" – Taiwan's 1st Port-based Environmental Education Facility

The Hoping EcoPort obtained the certification of environmental education facility in March 2022. The environmental classroom was planned for an ongoing communication of the idea of environmental protection of EcoPort via the diversified programs and promotion as well as concepts of coral ecology and EcoPort water quality maintenance. Moving forward, it shall work with academic institutions in the related fields, consulting firms, and environmental education facilities.

Through the promotion of environmental education facility certification, we actively exchanged and collaborated with the competent authority, neighboring community, and schools With the pollution prevention and control measures at the Hoping Port and the underwater ecology in the port combined, it presents the co-existence and co-benefits of industrial development and environmental conservation.

Wen-Cheng Chuang

In the process of environmental education facility certification, I saw that the environmental education is not limited to that in a classroom. Each place can be a classroom and every creature has something to learn from. So, I feel more confident in the improvement and development of the environmental education.

Wen-Chung Chang

Environmental Education Personnel of the Hoping EcoPort

Realistic Learning with AI-powered Underwater Cameras

TCC designed and built the interactive venue for environmental education. Fixed underwater cameras were installed to the ecological area. Through the deep learning algorithm, the underwater footage is presented in real-time. As such, it offers an outdoor classroom for the public to observe and experience the marine ecology in the eastern Taiwan.

TCC DAKA Open Eco-Factory – Promotion for Environmental Education Facility Certification

Bromeliads Garden, the one-and-only conservation and restoration garden for bromeliads in the world is established at TCC DAKA. There is also a flowerbed newly created to cultivate the indigenous plants of the mine for the environmental education courses of the local elementary schools as well as the TCC DAKA guided tour. In addition, through the guided tour of circular economy, visitors may follow the young tour guide from the Heping Village and colleagues of the Hoping Plant to go into the Hoping Mine and the Industrial EcoPort to observe the embodiment of the core philosophy of zero emissions, zero pollution, zero waste, and recycled resources utilization at TCC.

TCC DAKA plans to go further by applying for the environmental education facility certification. It is expected to complete the application process by 2023 upon its eligibility to such application (i.e. three years since opening).

The environmental education course helped me to see things from the perspective of environmental education and adjust the subsequent plans for software at TCC DAKA. I hope the Open Eco-factory is not just "open" in terms of the physical factory but also truly "open" in the corporate communication of ideas with the society.

Yi-Hui Lin

Through the environmental education and trainings, I found that besides the guided tour introduction, there are other means as well that are more efficient and more effective in drawing echoes from participants, which altered the conventional impressions with mines.

Yen-Shao Chang

The establishment of the environmental education partnership can also be a vital node to connect local resources. Perhaps in the future, environmental education facilities can thrive from the north to the south of Hualien so as to disseminate the ideas of environmental education to the general public.

Jerry Chen

Environmental Education Personnel at TCC DAKA

Jane Goodall Institute – Promotion for Education Resource Sharing in the Rural Areas

999,999,999 likes

TCC supported Jane Goodall Institute's Roots & Shoots: Me & My National Park Program, assisting more elementary school children to see the importance of animal conservation. About 350 students and teachers from the 8 schools in the neighborhood of TCC Hoping Plant were invited and involved. Through the on-campus education, topics were set for the students and teachers to work together. Also, seminars were organized for teachers to be environmental education personnel. In January 2022, the result presentation was held at TCC DAKA. The number of tourists reached was approximately 1,500; the amount invested was NT$2.9 million.

Jane Goodall Institute in DAKA- # Roots & Shoots: Me & My National Park Program

Society of Wilderness (SOW) – Interactive Environmental Education for In-depth Exchanges

The first stop for the Parent-Child Group of the Seventh Chapter of Hsinchu, SOW, in 2021 was TCC DAKA for the guided tour of circular economy. They went into the mine tunnels and sapling nursery to see the eco-friendly Vertical Shaft Transport System employed at TCC to reduce the CO_2 emission. At the sapling nursery, the Parent-Child Group demonstrated a keen interest in the species of restored plants besides the experience of the cleaning capability of Chinese Soap Berry's seed shells.

6.5 A World-class Conservation Base

Please visit KBCC website for more information

It marks the 14th year since Dr. Cecilia Koo Botanic Conservation Center (KBCC) established by TCC in 2007. It is the most important conservation base dedicated to the conservation of tropical and subtropical plants in the world, which houses up to 34,046 endangered plant species. The plants collected are mostly cultivated in greenhouses. There are 17 greenhouses and screen houses with the areas totaled 35,398 m^2 (approx. 3.5 hectares). There are also 2 incubators as well, dedicated to the cultivation and domestication of Aquatic plants, Carnivorous plants, Begonias, Gesneriads, Orchids, Melastomaceae etc. Various species in the collection are labeled with barcodes, which work like their digital IDs for the ease of research. In addition, the collections of Orchids, Bromeliads, Begonias, and ferns are best in the world. KBCC aims to conserve 40,000 plant species by 2027 and become the most significant sanctuary for the tropical and subtropical plants in the world.

As for the collection of live animals, there are 499 animals of 31 species collected to date. Commissioned by the Forestry Bureau, Council of Agriculture to launch the chelonian conservation program since the end of 2013, it has collected 450 chelonians of 24 species.

Asteroid in Recognition of KBCC's Selfless Devotion

The selfless devotion of KBCC to species conservation and ecological sustainability is widely recognized. In 2021, it rose to the stardom that for the National Central University specifically named the Asteroid No. 526460 discovered by Lulin Observatory as "Ceciliakoocen," which was approved by the International Astronomical Union (IAU).

Assistance to the International Botanical Congress in the Aim of Genome Sequencing

The 10,000 Plants Project (10KP) was launched at the 19th International Botanical Congress (IBC) in 2017 by BGI Research together with numerous authoritative experts in botany from the U.S., Germany, U.K., and Canada. Through the extensive global collaboration, comprehensive resource collection, as well as the systematic, scientific design and research, the genomes of 10,000 plants are being sequenced to provide extremely critical genetic resource for the botanical community to further biodiversity, evolution, ecological conservation as well as various vital and fundamental scientific research and studies in agricultural application.

Nevertheless, owing to the worldwide pandemic, the sampling progress for the research met with a serious halt. As of the end of 2020, it only received over 1,000 samples from fifty more institutions across some twenty countries like the Mainland China, the U.S., U.K., France, Australia, and Canada. The sequencing and assembly of genomes were completed for nearly 300 plant species, which was severely behind the schedule. In January 2022, the initiative team reached out to CEO Chia-Wei Li in hopes of inviting KBCC to the initiative to play a vital role for the scientific development of the botanical community – provision of genome materials.

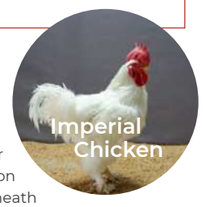
Liquid Nitrogen to Freeze Specimens and Preserve the Scientific Research Materials for the Next Generation

Several years ago, the KBCC has preserved different parts of plants in liquid nitrogen. There are 62,037 specimens of 8,709 species frozen in liquid nitrogen. These are the key research materials preserved for the scientists of next generation to collaboratively realize the goal of conservation and research of tropical and subtropical plants.

Natural Product Libraries for KMU & NTHU to Develop New Drugs for Cancers & Cranial Nerves Repair

Most of the key ingredients of humanity's medicinal development come from natural plants. The KBCC and the Graduate Institute of Natural Products, Kaohsiung Medical University (KMU) created the high-throughput screening platform, established the libraries of natural products and extracts offering unique resources for the new drug development domestically. The natural product libraries have established over 2,500 extracts, assisted in various screening projects, and discovered that the Nepenthaceae and Musaceae are capable of fighting against the breast cancer, liver cancer, oral cancer, and so on, as well as the biological activities of HBV and influenza viruses. They could also be used for COVID-19 studies.

In addition, through experiments and research, the Institute of Molecular Medicine (IMM), National Tsing Hua University (NTHU) has found that the Araceae extract may be used as a drug to repair cranial nerves, mainly facilitating the axon regeneration of the cortical neurons and hippocampal neurons after traumatic brain injuries. Meanwhile, it also proved that the extract has no negative impact on the glia cells, which may come up with applying for a patent in the future.



It is said the chicken was dedicated to the Empress Dowager Cixi of the Qing Dynasty. That was how it became Imperial Chicken, a.k.a. Empress Dowager Chicken. It appears with silk-like crown on top, feathers by the feet, and a beard beneath the beak. Bred at the Beijing Endangered Animals Research Center 20 years ago, it went extinct due to the chicken plague. The KBCC found the species of the Imperial Chicken by chance and launched its global chicken species conservation project. Through relentless selection and cultivation over a long period of time, it successfully conserves the species of the Imperial Chicken, aiming to sustain the endangered strain close to extinction.

The KBCC created the largest botanical garden at Fo Guang Shan. There are numerous medicinal plants of Āyurveda, such as pepper, ginger, turmeric, sesame, and mango, totally 55 species collected thus far. Many of the tales, dharma instruments, and rituals of Buddhism involve plants. Hence, through the cultivation of Buddhist plants and designs of the introduction system, TCC aims to create an eco-friendly environment in line with the local climate for the Buddhist culture communication and environmental education.

"Fo Guang Shan Buddha Museum Buddhist Botanical Garden" for Buddhist Culture Communication & Environmental Education

Collection Manager of KBCC – Yen-Ru Lin (aka. Ms. Turtle)

Yellow-margined Box Turtle
(Cuora flavomarginata (Gray, 1863))

Yellow-margined Box Turtle is the only terrestrial freshwater turtle in Taiwan. It is commonly seen on the manifest of poachers and smugglers. Taipei Zoo, Endemic Species Research Institute in Nantou, National Chung Hsing University (NCHU), and Pingtung Rescue Center are the domestic shelters for Yellow-margined Box Turtle. Nevertheless, the shelters are troubled by the insufficient space due to the excessive number from smuggling. The KBCC collaborates with NCHU to turn the space at the center into an environment suitable for Yellow-margined Box Turtle with a variety of plants combined.

TCC Key Indicators

Environmental – Social – Governance

GHG Emissions on Cement Plants

Unit: Metric Tons of CO_2e

Item	2018	2019	2020	2021
Scope 1	4,228,688	4,266,390	4,411,086	4,797,296
Scope 2	247,702	223,096	202,312	212,407
Total (Scope 1 & Scope 2)	**4,476,390**	**4,489,486**	**4,613,398**	**5,009,703**
Scope 3	15,041	21,083	22,427	28,761

Note 1: The GHG emissions are inventoried in terms of operational control. The formula used is emissions = activity data × emissions factor (EF) × global warming potential (GWP). (The EF is subject to the EPA GHG Emissions Factor Management Table (v. 6.0.3), and the GWP is derived from the IPCC Fourth Assessment Report (2007).) The GHGs include CO_2, CH_4, N_2O and HFCs with no GHG emissions of PFCs, SF_6, and NF_3
Note 2: Since 2018, we have been inventorying the main activity associated with Scope 3 emissions: Upstream Transportation and Distribution, which uses the GHG Protocol - Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBCSD) and is verified by a third-party
Note 3: Based on the cementitious materials yield of 6,215,232 metric tons in 2021, the emission intensity in 2021 (Scope 1 & Scope 2) was 0.806 t CO_2/metric ton of cementitious materials, which decreased 0.9% compared to 2020, and decreased 5.1% compared to 2016 (base year)
Note 4: The base year for GHG inventory is 2016 with the GHG emissions of 4,621,312 metric tons of CO_2e (Based on the SBT base year value)

GHG Emissions on RMC Plants

Unit: Metric Tons of CO_2e

Item	2018	2019	2020	2021
Scope 1	1,992	2,088	2,059	1,517
Scope 2	6,144	5,010	7,101	6,866
Total	**8,136**	**7,098**	**9,160**	**8,383**

Note 1: The GHG emissions are inventoried in terms of operational control. The formula used is emissions = activity data × emissions factor (EF) × global warming potential (GWP). (The EF is subject to the EPA GHG Emissions Factor Management Table (v. 6.0.3), and the GWP is derived from the IPCC Fourth Assessment Report (2007).) The GHGs include CO_2, CH_4, N_2O and HFCs with no GHG emissions of PFCs, SF_6, and NF_3
Note 2: In the data of 2021, the Scope 1 draws reference from the gasoline EF of 2.263 kg of CO_2/L and the diesel EF of 2.6060 kg of CO_2/L in the EPA GHG Emissions Factor Management Table (v. 6.0.3); the Scope 2 draws reference from the electricity EF of 0.509 kg of CO_2e/kWh from the Bureau of Energy, MOEA in 2019
Note 3: Based on the concrete yield of 5,168,195 m3 in 2021, the emission intensity in 2021 was 0.0016 t CO_2/metric ton of concrete

GHG Emissions on Operation Headquarters

Unit: Metric Tons of CO_2e

Item	2018	2019	2020	2021
Scope 1	-	142	140	132
Scope 2	2,172	1,240	1,199	1,119
Scope 3	-	942	907	814
Total (Scope 1 & Scope 2)	**2,172**	**2,324**	**2,246**	**2,065**

Note 1: The GHG emissions are inventoried in terms of operational control. The formula used is emissions = activity data × emissions factor (EF) × global warming potential (GWP). (The EF is subject to the EPA GHG Emissions Factor Management Table (v. 6.0.4), and the GWP is derived from the IPCC Fourth Assessment Report (2007).) The GHGs include CO_2, CH_4, N_2O and HFCs with no GHG emissions of PFCs, SF_6, and NF_3
Note 2: In the data of 2021, the Scope 1 draws reference from the gasoline EF of 2.263 kg of CO_2/L and the diesel EF of 2.6060 kg of CO_2/L in the EPA GHG Emissions Factor Management Table (v. 6.0.4); the natural gas EF of 1.87kg CO_2e/m3; the Scope 2 draws reference from the electricity EF of 0.509 kg of CO_2e/kWh from the Bureau of Energy, MOEA in 2019

Energy Consumption on Cement Plants

Item	2018	2019	2020	2021
Energy Consumption				
Coal (thousand metric tons)	679	708	699	757
Diesel (KL)	1,307	946	460	981
Purchased Electricity (GWh)	467	433	412	439
In terms of Gigajoule (GJ)				
Coal (GJ)	15,689,903	16,157,228	16,300,593	17,632,953
Diesel (GJ)	45,957	33,264	16,168	34,505
Purchased Electricity (GJ)	1,681,200	1,558,800	1,481,726	1,580,660
Total (GJ)	**17,417,060**	**17,749,292**	**17,798,487**	**19,248,118**

Note 1: Relevant values are calculated based on the heating values of the respective TCC cement plants. The conversion factor for the heating value of coal at Suao Plant: 5,532.69 kcal/kg; that of coal at Hoping Plant: 5,570.14 kcal/kg and of diesel: 8,400 kcal/L. The Scope 2 draws reference from the electricity EF of 0.509 kg of CO2e/kWh from the Bureau of Energy, MOEA in 2019
Note 2: Based on the cementitious materials yield of 6,215,232 metric tons in 2021, the unit energy consumption in cementitious materials production was 3.097 GJ/metric ton of cementitious materials, which decreased 1.3% compared to 2020
Note 3: The data of energy consumption is subject to the reported data to the Bureau of Energy

Energy Consumption on RMC Plants

Item	2018	2019	2020	2021
Energy Consumption				
Diesel (KL)	657	664	634	450
Gasoline (KL)	120	158	180	152
Purchased Electricity (GWh)	11.09	9.36	13.95	13.51
In terms of Gigajoule (GJ)				
Diesel (GJ)	23,102	23,348	22,293	15,823
Gasoline (GJ)	3,918	5,159	5,877	4,963
Purchased Electricity (GJ)	39,924	33,696	50,219	48,636
Total (GJ)	**66,944**	**62,203**	**78,389**	**69,422**

Note 1: Relevant values are calculated based on the heating values in the Emissions Factor Management Table (v. 6.0.3) released on the Bureau of Energy's website. The values are 8,400 kcal/L for diesel, 7,800 kcal/L for gasoline, and 3,600 GJ/GWh for electricity, which are applied to all TCC plants
Note 2: The RMC plants started collecting data on gasoline use in 2018
Note 3: Based on the concrete yield of 5,168,195 m3 in 2021, the unit energy consumption in concrete production was 0.0134 GJ/metric ton of concrete

Energy Consumption on Operation Headquarters

Item	2018	2019	2020	2021
Energy Consumption				
Diesel (KL)	-	-	-	3.82
Gasoline (KL)	-	-	-	2.48
Natural Gas (m3)	-	7,073	5,150	3,750
Purchased Electricity (GWh)	3.8	3.63	3.36	3.25
In terms of Gigajoule (GJ)				
Diesel (GJ)	-	-	-	81
Gasoline (GJ)	-	-	-	134
Natural Gas (GJ)	-	-	251	139
Purchased Electricity (GJ)	13,687	13,064	12,420	11,700
Total (GJ)	**13,687**	**13,064**	**12,671**	**12,054**

Note 1: The Operation Headquarters started to collect the usage data of natural gas in 2019, estimated as the natural gas fee of the year/unit fee per kWh
Note 2: Relevant values are calculated based on the heating values in the Emissions Factor Management Table (v. 6.0.4) released on the Bureau of Energy's website. The value is 8,832 kcal/m3 for natural gas
Note 3: Based on the 176 employees on the Operation Headquarters in 2021, the energy consumption per person was 68.49 GJ per capita

Air Pollutant Emissions on Cement Plants

Unit: Metric Tons

Item	2018	2019	2020	2021
NOx	6,744	6,388	6,164	6,473
SOx	85	79	106	113
VOC	0.00636	0.00616	0.00457	0.00422
Particulate Matters	643	305	249	214
Total	**7,472**	**6,772**	**6,519**	**6,800**

Note 1: The Hualien Plant did not operate in 2021 and thus had no air emissions
Note 2: Starting from the third quarter of 2018, heavy metal monitoring data was added at the request of the Environmental Protection Administration
Note 3: Starting from the fourth quarter of 2018, our cement plants reported mercury escaped in accordance with legal requirements. The mercury escaped in 2021 was 0.06969 metric ton, the emissions is 0.278762 metric ton, and there was no mercury escaped at our RMC plants
Note 4: The dioxin emission at our cement plants in 2021 were 0.121g I-TEQ. (The dioxin emission data is calculated as the average of the monitoring data of 4 quarters.) The pollutant concentration was 0.009 ng-ETQ/Nm^3
Note 5: The heavy metals (lead, cadmium, mercury, and dioxin) emitted in 2021 was 0.11153 metric ton
Note 6: The emissions were calculated as the emission factors of the third-party testing multiply by the usage data
Note 7: The business of our RMC plants was cement product ingredients mixing and transport and thus had no air pollutant emission
Note 8: In 2021, the emission intensity of NOx, SOx and Particulate Matters per ton of clinker decreased 26%, 3% and 56% compared to 2016

Water Resources Use on Cement Plants

Unit: Million Liters

Item	2018	2019	2020	2021
Municipal Water	0.00	0.00	0.00	0.00
Groundwater	1,426.60	1,109.18	1,014.34	822.52
Industrial Water	910.93	991.05	1,051.01	1,039.03
Reclaimed Process Water	452.68	23.22	93.48	102.43
Total	**2,790.21**	**2,123.45**	**2,158.83**	**1,963.98**

Note 1: Since the Hualien Plant did not operate in 2021, the scope of data disclosure for 2021 covered the Suao Plant and the Hoping Plant
Note 2: Based on the cementitious materials yield of 6,215,232 metric tons in 2021, the unit water intensity was 0.0003 million liters per metric ton of cementitious materials
Note 3: The water use data is the sum of the reported data
Note 4: All the sources of water are freshwater

Water Resources Use on RMC Plants

Unit: Million Liters

Item	2018	2019	2020	2021
Municipal Water	247.78	316.83	368.32	309.77
Groundwater	N/A	85.73	212.58	279.79
Reclaimed Process Water	152.13	247.28	307.39	430.20
Total	**399.91**	**649.84**	**888.29**	**1,019.76**

Note 1: The scope of disclosure 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 is estimated on the basis of sales
Note 2: Based on the concrete yield of 5,168,195 m3 in 2021, the unit water intensity was 0.0002 million liters per m3 of concrete
Note 3: The municipal water data is the sum of water used (in cubic meters) on the water bills, and the groundwater data is the sum of the reported data. The water use data is subject to the actual months of water use
Note 4: All the sources of water are freshwater
Note 5: TCC employed WRI Aqueduct Water Risk Atlas to conduct analysis with the distribution of water resources in Taiwan taken into account. The result revealed that all the operational sites in Taiwan are not located in the regions of high-water stress

Water Resources Use on Operation Headquarters

Unit: Million Liters

Item	2018	2019	2020	2021
Municipal Water	16.45	17.28	14.96	12.69

Note 1: The municipal water data is the sum of water used (in cubic meters) on the water bills
Note 2: All the sources of water are freshwater

2021 Water Conservation Projects

Water Conservation Project	Total Water Saved (Unit: 1,000 cubic meters)	Cost saved (Unit: NT$)
Recycling of water in shaft tunnels	6,989	78,696
D01 Effluent Recycling Project	70,280	70,280
Works of new pipeline addition and old pipeline repair for cooling water reclamation	157,332	157,332

Raw Materials Consumption in 2021

Category	Raw Material	Consumption (metric ton)
Non-recycled Raw Materials	Limestone	7,375,100
	Silica Sand	13,389
	Imported Low-alkali Cement	105,503
Recycled Raw Materials	Reducing Slag	72,483
	Calcium Fluoride Sludge	15,229
	Recycled Incinerator Aggregate	3,486
	Construction Waste Dirt	265,803
	Desulfurization Gypsum	297,293
	Coal Ash	457,868
	MgO-based desulfurized inorganic sludge and coal ash	4,028
	Inorganic Sludge\Waste Compression Molding	9,529
	Waste Compression Molding	678
	Water Treatment Plant Sludge	182
	Waste Ceramic	129
	Air-cooled Blast Furnace Slag	442
	Water-quenched Blast Furnace Slag	304
Total Amount of Raw Materials		**8,621,446**
Percentage of Recycled Raw Materials (Recycled Raw Materials/Total Amount of Raw Materials)		**13%**

TCC Key Indicators

Environmental – **Social** – Governance

Overall Social Welfare Contribution

NT$

Contribution Type	Amount
Monetary Contribution	143,693,257
Volunteering Hours Contribution	1,274,421
In-kind (Cement) Contribution	1,648,283
Management Costs	3,285,000
Total	**149,900,961**

Note 1: The volunteering hours is monetized on the basis of the hourly wage of MA
Note 2: The scope of data aggregated includes Taiwan and the Mainland China

Parental Leave

Item	2018		2019		2020		2021	
	F	M	F	M	F	M	F	M
Employees Qualified for Parental Leave without Pay in the Year (A)	13	58	18	59	16	73	22	70
Employees Applying for Parental Leave without Pay in the Year (B)	4	0	1	0	2	1	1	2
Employees Scheduled to Resume Work in the Year (C)	3	1	1	0	3	0	2	2
Actual Employees Resuming Work (D)	3	1	1	0	3	0	1	2
Employees Continuing Work at TCC after Resumption of Work for 12 Months (E)	0	2	3	1	1	0	3	0
Resumption Rate after Parental Leave without Pay (D/C)	100%	100%	100%	0%	100%	-	50%	100%
Retention Rate One Year after Resumption of Work (E/D in Previous Year)	0%	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 of Employees in 2021

Item	Occupational Accidents				Fatality Rate	Work-related Injury Rate	Recordable Incident Rate	Near Misses Rate	Lost Days	Lost Days Rate	Working Hours	
	Work-related		Recordable Incidents	Near Misses							Stipulated	Actual
	Fatality	Injuries										
Operation Headquarters	0	0	0	0	0	0	0	0	0	0	349,184	460,784
Plants	0	1	1	0	0	0.1042	0.1042	0	17	1.7888	1,900,672	1,918,896

Note 1: Work-related injuries are based on the monthly occupational accident reports submitted by each plant
Note 2: Fatality Rate = (total number of fatality / total actual working hours) × 200,000
Note 3: Work-related Injury Rate = (total number of injuries – number of fatality / total actual working hours) × 200,000. The criteria for work-related injuries are subject to "Regulations of the Examination of Injuries and Diseases Resulting from the Performance of Duties by the Insured Persons of the Labor Insurance Program"
Note 4: Recordable Incident Rate = (number of recordable incidents / total actual working hours) × 200,000
Note 5: Near Misses Rate = (number of near misses / total actual working hours) × 200,000
Note 6: Lost Days Rate = (lost days due to work-related injuries / stipulated working hours) × 200,000

Work-related Injuries of Contractors in 2021

Item	Occupational Accidents				Fatality Rate	Work-related Injury Rate	Recordable Incident Rate	Near Misses Rate	Working Hours	
	Work-related		Recordable Incidents	Near Misses					Stipulated	Actual
	Fatality	Injuries								
Contractors	1	0	0	0	0.1557	0	0	0	1,284,150	1,284,150

Note 1: Work-related injuries are based on the monthly occupational accident reports submitted by each plant
Note 2: Fatality Rate = (total number of fatality / total actual working hours) × 200,000
Note 3: Work-related Injury Rate = (total number of injuries – number of fatality / total actual working hours) × 200,000. The criteria for work-related injuries are subject to "Regulations of the Examination of Injuries and Diseases Resulting from the Performance of Duties by the Insured Persons of the Labor Insurance Program"
Note 4: Recordable Incident Rate = (number of recordable incidents / total actual working hours) × 200,000
Note 5: Near Misses Rate = (number of near misses / total actual working hours) × 200,000
Note 6: Certain stipulated working hours and actual working hours are calculated as persons entering the plants × 8 hours
Note 7: In 2021, a fatality incident occurred to a contracted driver due to vehicle slipping arising from improper parking. After investigation, the transport company was liable for the incident. Also, TCC has continued to strengthen the road safety promotion for dump trucks

TCC Key Indicators

Environmental – Social – Governance

2021 TCC Group Tax Information

Unit: NT$1,000

Item	Taiwan	Asia	Other Regions	Consolidated
Operating Revenue	41,785,030	64,439,782	816,640	**107,041,452**
Profit before Tax	6,972,874	18,201,575	903,635	**26,078,084**
Tax Expense	1,421,315	4,302,206	206,866	**5,930,387**
Effective Tax Rate	20.38%	23.64%	22.89%	**22.74%**
Income Tax Paid	2,579,121	4,916,748	13,198	**7,509,067**
Effective Tax Rate of the Income Tax Paid	36.99%	27.01%	1.46%	**28.79**
Cost-to-income Ratio	23.97%	72.55%	3.48%	**100%**

Financial Performance in 2021

Unit: NT$1,000

Unit: NT$ for EPS & DPS

NT$1,000 for the remainders

Type	Item	2020	2021
Economic	Operating Revenue	105,911,223	107,041,452
Value	Operating Income (Loss)	31,637,210	19,786,475
Generated	Non-operating Income and Expenses	4,181,873	6,291,609
Economic	Operating Costs	68,507,746	80,391,353
Value	EPS	4.32	3.30
Distributed	DPS	3.5	2.0
	Cash Dividend per Share	3.5	1.0
	Stock Dividend per Share	0	1.0
	Income Tax (TW)	2,547,535	1,421,315
	Income Tax (Asia)	4,796,696	4,302,206
	Income Tax (Europe)	-	206,866
	Employee Wages and Benefits	7,107,219	8,561,808
	Community Investments	328,275	426,333
Economic Value Retained	Retained Earnings	10,368,186	6,824,620

Note 1: DPS, Cash Dividend per Share, and Stock Dividend per Share are to be adopted in the Shareholders' Meeting of 2022
Note 2: The financial data in the 2020 CSR Report encompasses Taiwan Prosperity Chemical Corp., and the financial data such as the operating cost, income taxes, employee salaries and benefits of the company is thus included. Nevertheless, after the disposal of Taiwan Prosperity Chemical Corp.in 2021, Taiwan Prosperity Chemical Corp. would no longer be a business under the TCC Group per IFRS. As such, in compiling the 2021 financial statement, the data of 2020 was required to be adjusted for readers' comparison

Expenditures on Public Participation

Total Amount Allocated (NT$)	2018	2019	2020	2021
Political Lobbying, Interest Representation	0	0	0	0
Local, Regional, or National Political Campaigns, Organizations, and Candidates	0	0	0	0
Chambers of Commerce or Tax-Exempt Organizations (e.g. thinktank)	10,951,743	10,936,559	11,832,811	12,286,514
Matters Related to Election or Referendum	0	0	0	0
Total	**10,951,743**	**10,936,559**	**11,832,811**	**12,286,514**
Information Coverage	**100%**	**100%**	**100%**	**100%**

Seven Targets for Sustainable Supplier Management

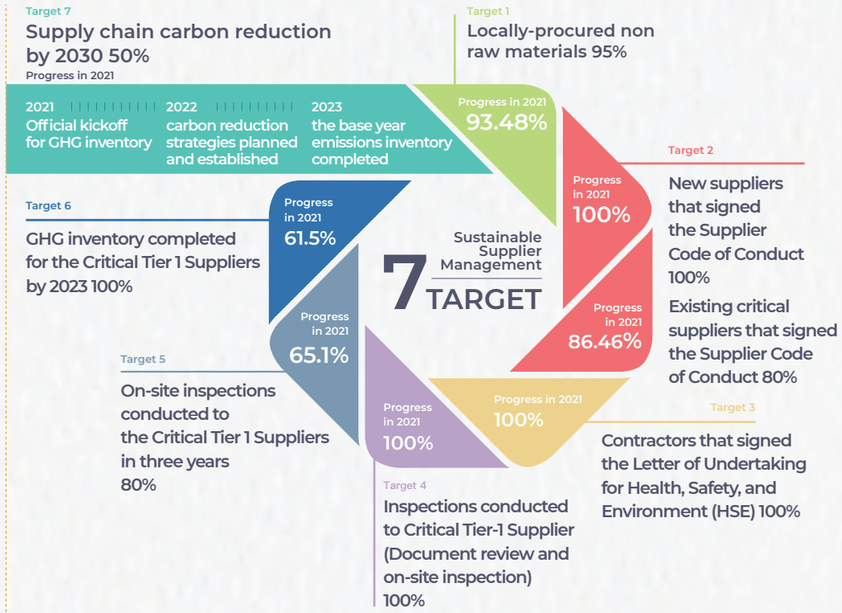


Table of Supply Chain Procurement Amount in 2021

Unit: NT$

Raw Materials	Outsourcing & Subcontracting	Equipment & Parts	Transport	Construction	Explosives
10,593,156,648	286,730,672	6,722,175,332	1,492,506,713	1,324,160,382	44,459,063

Total 20,463,188,810

Education and Training Hours by Age, Gender, and Job Levels

Unit: Hours

Item	Item	Female	Male	Total Hours	Average Hours
Age	30 or less	1,075.7	23,666.3	24,742.0	186.0
	31-50	8,301.3	44,512.6	52,813.9	75.6
	51 or above	441.9	2,359.9	2,801.9	9.3
Job Levels	Executives	297.7	676.6	974.2	48.7
	Mid-level Managers	937.2	1,569.4	2,506.6	27.2
	Low-level Managers	603.1	1,523.7	2,126.8	22.6
	Professionals	6,355.4	60,387.1	66,742.5	340.5
	Direct Labor	1,625.6	6,382.0	8,007.6	10.9
Total Hours		**9,818.9**	**70,538.9**	**80,357.8**	**70.9**
Average Hours		**45.9**	**76.7**		

Note 1: 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, Officers, or Management Associates
Note 2: The scope of education and training hours include regions overseas

Stakeholder Engagement

TCC values the opinions of its stakeholders, actively communicating and engaging with regard to material sustainability issues, which are incorporated in the corporate sustainable development blueprint. In line with the nature of the industry and with reference to the GRI Standards, SASB Standards, and Dow Jones Sustainability Index (DJSI) as well as AA1000 Stakeholder Engagement Standard, it employs the five principles, i.e. Responsibility, Influence, Tension, Diverse Perspectives, and Dependency in the identification and ordering of stakeholder significance. Upholding the spirit of open transparency, TCC discloses information through a variety of communication channels, ensuring effective and quality communication results with its stakeholders. TCC systematically designed sustainability issue survey questionnaires, with which it collects and analyzes feedbacks of stakeholders; meanwhile, it evaluates the impacts and risk levels of sustainability issues on corporate operation, identifying material issues and prioritizes responses and reactions to meet the expectations of stakeholders toward TCC. In addition, TCC values expectations of its stakeholders for the Company and incorporates the areas of concern as the reference for corporate operation and sustainable development blueprint, so that TCC may better promote sustainable operation, fulfilling its corporate social responsibilities. TCC is convinced that only with smooth and effective communication channels with its stakeholders can TCC capture the pulses in the markets, economy, society, and environment, and ultimately put TCC's sustainability missions of "Nature First" and "Benefit to Society" into action.

STAKEHOLDER
Government Agencies

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
54

Communication Methods and Frequency

- Updates of information on the corporate website and the Market Observation Post System (MOPS) on a regular basis
- Participation in interviews, seminars, conferences from time to time
- Communication via official document and correspondence

Area of Concern

- Legal compliance
- Local inclusion
- Pollution control and management
- Climate actions and net-zero emissions
- Client relationship management

Communications Performance in 2021

- Participation in Hualien County Government's "Hualien County Special Tax on Mining and Landscape Conservation Autonomous Regulations" draft public hearing
- Participation in Taiwan-France Industrial Cooperation for Carbon Reduction Consultation Meeting organized by IDB, MOEA
- Participation in Key cement manufacturers meeting organized by IDB, MOEA to discuss carbon pricing supporting policies and CCUS's potential in carbon reduction
- Participation in EPA's consultation meeting on enterprises using livestock manure for green energy development in response to CBAM and carbon credits
- Discussion with EPA on matters of cement plants to assist with waste treatment and resource recycling
- Participation in TWSE investor relations forum as a speaker

TCC's Approach

Keep tabs on public policies, laws and regulations while leveraging our status as an industry leader to promote legal compliance and support policy implementation

STAKEHOLDER
Clients

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
102

Communication Methods and Frequency

- Annual Client Satisfaction Survey on a regular basis
- Communication with clients by telephone and the external mailbox from time to time

Area of Concern

- Sustainable products
- Client relationship management
- Ethical management
- Pollution control and management
- Green transportation

Communications Performance in 2021

- Annual Client Satisfaction Survey for cement plants and RMC plants with a high satisfaction level maintained
- Concrete product traceability certification and result presentation organized with presence of approx. 100 clients and representatives from industries and the academic circle

TCC's Approach

Continue to provide products and services consistent in quality and in line with safety standards and implement environmental protection via ethical management to meet clients' expectations

STAKEHOLDER
Employees

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
4,076

Communication Methods and Frequency

- Annual performance appraisals and interviews
- Quarterly labor-management meetings, union meetings, employee welfare meetings, and Town Hall Meetings
- Monthly departmental meetings
- Explanation and signing of the Statement of Integrity and Ethical Conduct
- Employee feedbacks anytime (employee mailbox)
- Promotion of human rights policies – internal announcements and disclosure on the corporate website
- Publication of TCC Technology Journal

Area of Concern

- Climate actions and net-zero emissions
- Ethical management
- Operational performances
- Care for employees
- Corporate governance

Communications Performance in 2021

- 1,800 copies of TCC Technology Journal "Fantasy & Wonder of Cement" released for employees to better see the directions of corporate operation and the focused short-, mid-, and long-term efforts
- One copy for each of the 1,500 retirees in celebration of the 75th anniversary of TCC in 2021, which documents every effort they have made for TCC and shares the ample achievements made along the way

TCC's Approach

Recruit suitable talent, invest in training and educational activities, and provide safe workplaces so that all employees can enjoy working at TCC

STAKEHOLDER
Shareholders Investors

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
19

Communication Methods and Frequency

- Annual general meeting (AGM)
- Updates of information on the corporate website and the MOPS on a regular basis
- Replies to shareholders' questions by phone or mail

Area of Concern

- Operational performance
- Ethical management
- Risk control
- Green energy and energy storage
- Pollution control and management

Communications Performance in 2021

- 1 AGM held
- 12 board meetings held
- 6 institutional investor conferences held
- Replies to all inquiries on material agenda raised by shareholders via phone from time to time

TCC's Approach

Continue to maintain a steady operation in the cement industry and develop new opportunities in the environmental aspect in order to constantly produce excellent results of operation

STAKEHOLDER
Local Communities

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
80,013

Communication Methods and Frequency

- Annual visits to local communities and schools
- Promotion of featured cases
- Communication via phone and email from time to time
- Social media (LINE)
- Corporate website
- Industrial park meetings

Area of Concern

- Pollution control and management
- Local inclusion
- Social participation
- Resource co-processing

Communications Performance in 2021

Assistance during the Pandemic

- The Hoping Plant's assistance in vaccination site set-up with 145 doses of vaccines administered; Hoping Testing Station set up together with the County Government with relevant medical expenses sponsored for 1,800 villagers at the Heping Village to have test at close and at ease
- TCC DAKA's assistance to Siou Lin Township Office to jointly distribute epidemic prevention supplies of 774 supply packages to the Heping Villagers
- The Suao Plant's assistance to the neighboring Changan, Yongguang, Yongchun, Yongle Villages in environmental cleaning and sanitation

Community Empowerment

- Low-carbon Cycling in Hoping plan in partnership with GIANT and LDC to cultivate cycling talents from the tribes in adjacent to TCC DAKA (on halt temporarily due to the pandemic)
- Assistance in tribal itineraries promotion; arrangement of training courses of lifeguard, canoe, SUP, etc. for villagers from Heping and Aohua Villages with 24 villagers trained in total
- 2 promo videos released for marine activity promotion with a reach of 76,510 on Facebook (Reach on Facebook: 4,510 for teaser trailer Sea of Aohua; 72K for main promo video SUP Marine Adventure)
- Assistance to youth studio in Aohua to promote tribal itineraries of river tracing in Aohua and Atayal Hunter Classroom; support in obtainment of legal business license for marine activity; resource matching and employing the youth from Aohua first as instructors, with a monthly of 50 tourists in 6 groups as the result
- Courses on e-commerce marketing and commodity photo shooting open; mentorship for four tribal handmade vendors at the DAKA market and Hanben Ocean Station in planning heir online shops, of which three online shops launched successfully
- Co-curating the 3-day "The Mysterious Giant in the Heping Village - An Exhibition of the Sustain able Hoping at Huashan" together with the Heping Village at the Huashan1914 Creative Park, which drew 3,253 visits with a sales amount of NT$76,700 from the tribal women handcrafts

Industrial Communication

- A tour for the local villagers nearby the Hoping Plant to the mine for the manufacturing process and plantation and greening efforts (postponed to January 7, 2022 due to the pandemic) with 59 participants in total
- A tour for approx. 40 students and teachers from Yongle Elementary School nearby the Suao Plant to observe the manufacturing process and plantation and greening efforts on March 16, 2021

Community Exchange & Development

- Heping Christmas Day with 20 groups of performers signing up for Heping Singing and 100 groups of kids and parents for the parade activities
- DAKA Music Village promotion with 1 opening performance and 2 sessions of indigenous music stage (the subsequent registered session cancelled due to the pandemic)
- Assistance to the Coast Guard Administration in renovating the idle space of Bailaifen Inspection Office at Hanben, Nanao into Hanben Ocean Station, officially in business in August, to promote marine education and "Voting for the exterior design of Hanben Ocean Station" co-organized with Aohua Village Office with Pei-Yuan Wu, an architect from Aohua, selected with 456 votes in favor

- "Celebration of the Elderly for Double Ninth Festival and Hanben" for 23 elderlies from the Aohua Village to visit Hanben Ocean Station and produce handmade cement pots

TCC's Approach

Optimize environmental protection at the plants and continue to communicate and interact with neighboring communities, so that people can appreciate better TCC's efforts

STAKEHOLDER
Environmental Groups/NGOs

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
1,560

Communication Methods and Frequency

- Communication by phone or email from time to time
- Corporate website

Area of Concern

- Climate actions and net-zero emissions
- Green energy and energy storage
- Resource co-processing
- Green transportation
- Biodiversity

Communications Performance in 2021

- A visit to TCC DAKA for the tour in the Hoping Mine by Parent-Child Group of the Seventh Chapter of Hsinchu, SOW of 60 participants
- Support to Jane Goodall Institute Taiwan's Roots & Shoots: Me & My National Park Program, inviting the students and teachers from the neighboring elementary schools of Hoping Plant and Taroko National Park to animal conservation education; result presentation on January 15, 2022 at TCC DAKA with approximately 1,500 people reached
- Collaboration with Sea Angel to set up bio cubes for coral restoration, which successfully transplanted and restored 288 corals with a restoration rate of 99%

TCC's Approach

Continue to push for environmental sustainability, reduce damage to the natural environment, restore the original natural environment, and explore opportunities of eco-friendly and green energy to help tackle the environmental issues

STAKEHOLDER
Media

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021
103,061

Communication Methods and Frequency

- Media delegation tour
- Communication by phone or email from time to time
- Corporate website
- Facebook Fan Page /WeChat offcial account/Instagram

Area of Concern

- Corporate governance
- Ethical management
- Sustainable products
- Sustainable supplier management
- Climate actions and net-zero emissions
- Green energy and energy storage
- Resource co-processing
- Pollution control and management
- Local inclusion

Communications Performance in 2021

Press conference

- "TCC Report towards the 100th Year – Commitment, Action, New Horizons" press conference for the whole new corporate image video of TCC with a video reach of 66,754 and 14 news exposures
- "Ceciliakoocen Asteroid" press conference and ceremony with 18 news exposures
- 2 press releases issued a month in average

Media Delegation

- Groundbreaking ceremony of Molie Quantum Energy with the media delegation of 20 journalists
- "Recycle with Peace (Hoping) Now!" Campaign launched with the media delegation of 25 journalists
- Inauguration ceremony for TCC Green Energy Corporation's "AFC Smart Energy Storage System & TCC Green Energy Corporation Changbin Base" with the media delegation of 20 journalists

Social Media

- 18 posts on Instagram (TCC & Hanben Ocean Station)
- 379 posts on Facebook (TCC, TCC DAKA, and Hanben Ocean Station)
- 22 videos on YouTube

Physical Exhibition

3-day "The Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan" organized at the Huashan1914 Creative Park with 3,253 visits

TCC's Approach

Continue to communicate and exchange with the external media to deepen the society's knowledge on TCC's performances in corporate management and sustainable development

STAKEHOLDER

Industry Associations/ Industrial & Academic Organizations

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021

52

Communication Methods and Frequency

- Communication via phone, official document, and email from time to time
- Regular attendance in the meetings of the CNS Technical Committee annually
- Corporate website

Area of Concern

- Climate actions and net-zero emissions
- Green energy and energy storage
- Legal compliance
- Ethical management
- Sustainable supplier management

Communications Performance in 2021

International Exchange

- Ongoing participation in GCCA meetings on carbon reduction pathways in 2021; disclosure of the 2050 Roadmap by GCCA during COP26

Domestic Inheritance

- Participation in the government's meeting on strategies for net-zero by 2050 and carbon reduction pathways
- Participation in the annual conference of Taiwan Concrete Institute (TCI) with 7 papers published and a booth to introduce the various products and R&D results of TCC
- Taiwan Construction Research Institute(TCRI) commissioned for the concrete product traceability system certification
- Participation in Taiwan Society for Circular Economy
- Participation in the seminar "Replacing Fossil Fuels with SRFs to Generate Heat Energy at Boilers and Burners" to discuss the emission reduction methodology by the GHG offset project of replacing fossil fuels with SRFs organized by Taiwan Society for Circular Economy
- Participation of ITRI's "CCS R&D Alliance of MOEA"
- Participation in the video conference of "Thematic Seminar for the Net-zero Pathways of Manufacturing Industry in Taiwan: Cement Industry"

Physical Exhibition

7 members of TAITRA and 22 students and teachers of Taipei Tech invited to "The Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan"

TCC's Approach

Continue to participate in relevant organizations to promote the industry's development as well as communicate and exchange on operational outcomes and support each other in terms of operational issues

STAKEHOLDER

Suppliers /Contractors

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021

1,236

Communication Methods and Frequency

- Annual audits
- Tender meetings from time to time
- A supplier suggestion mailbox on the corporate website
- Communication via external mailboxes, phone, and email from time to time

Area of Concern

- Climate actions and net-zero emissions
- Green transportation
- Sustainable supplier management
- Operational performances
- Pollution control and management
- Green energy and energy storage

Communications Performance in 2021

- Supplier Convention on Sept. 17, 2021 attended by 298 suppliers (Taiwan: 68; Mainland China: 230)
- Annual audits to 183 suppliers completed (111 existing and 72 new suppliers)
- 273 contractor meetings, safety meetings, and education and trainings organized
- 28 sessions of ethical management trainings organized for contractors
- 454 mails received by the supplier suggestion mailbox in 2021
- Announcement & ESG relevant information on Procurement Portal (e.g. supplier carbon inventory launch, TCC carbon reduction targets, carbon reduction targets for TCC suppliers, etc.)

TCC's Approach

Improve management mechanism for supplier management to build a steady, long-term collaborative relationships that enable the suppliers to continue to grow with TCC

STAKEHOLDER

Sustainability Associations

QUANTIFIED COMMUNICATIONS PERFORMANCE IN 2021

56

Communication Methods and Frequency

- Participation in sustainability exchange activities
- Communication by phone or email from time to time

Area of Concern

- Ethical management
- Biodiversity
- Climate actions and net-zero emissions
- Legal compliance
- Risk control
- Resource co-processing
- Pollution control and management
- Workplace health and safety

Communications Performance in 2021

Event Exchange

- Founding member of CWS, involved in 4 sessions of sustainability capacity-building workshop
- Founding member of Association of Taiwan Net Zero Emissions, involved in the policy dialogue on Climate Change Response Act by Taiwan Alliance for Net Zero Emission
- Participation in the 7th International Conference on Trends of Sustainability 2021 of CSRone
- Member of BCSD; participation in Corporate Climate Action – TCG Climate Action Initiative online promotion; participation in the natural capital assessment workshop with 5 participants
- Participation in 2021 "BSI Sustainability Standards" as panelists on "ESG Panel on net-zero targets planning; sustainability implementation"
- Member of Center for Corporate Sustainability; participation in GCSF as a speaker for the keynote speech "Blueprint for Carbon Reduction to March toward the Net-zero Targets"

Physical Exhibition

- Leading the 24 corporate representatives of CWS, 7 members of CSRone, and 10 members of TAISE to "The Mysterious Giant in the Heping Village - An Exhibition of the Sustainable Hoping at Huashan"

TCC's Approach

Keep tabs on the activities, initiatives, and guidelines of sustainability associations so as to exchange on sustainability experiences and jointly strengthen sustainability measures

	Material Issues	SASB Disclosure Topics	GRI Topics / Self-defined Topics	Policies/Commitments/Targets	Assessment Mechanism/Management Indicators	Impact Boundaries	Relevant Section
Governance Issues	Ethical Management		GRI- 205 Anti-corruption	◆ Three anti-corruption and anti-bribery policies and goals stipulated as the guiding principles for the entity's corporate management ◆ Directors and employees of the Company required to sign on statements/letters of undertaking relevant to ethics; business partners required to sign on Supplier Corporate Social Responsibility Code of Conduct and Anti-Corruption Statement to commit themselves to compliance with all the TCC regulations regarding integrity ◆ ISO 37001 Anti-bribery management systems introduced	◆ Preventing graft and corruption within the Company, monitoring the latest information from the competent authorities at all times, evaluating and adjusting policies and regulations pertaining to ethical management, and ensuring the business activities conducted in line with the highest principles of ethics ◆ 100% of all new recruits sign on the Code of Integrity and Ethics Statement.	■TCC □CLIENTS □SUPPLY CHAIN	3.4 Ethical Management
		EM-CM-520a.1. Pricing Integrity & Transparency	GRI-206 Anti-competitive Behavior				
	Operational performances		GRI-201 Economic Performance	◆ Active global development to promote the international reputation of the Company ◆ Ongoing elevation of productivity and cost reduction ◆ Market strategy development and new market exploration to maintain the leadership in the industry	◆ Fulfilling obligations to shareholders as TCC's critical commitment in operational performances while ceaselessly creating economic values via comprehensive corporate governance, rigorous risk management, and robust financial planning	■TCC □CLIENTS ■SUPPLY CHAIN	Global Operations
	Legal Compliance		GRI-307 Environmental Compliance	◆ Ongoing enhancement of employees' awareness of legal compliance ◆ Improvement of shortcomings management via the internal audit mechanism	◆ Strict adherence to domestic laws and regulations with zero violation as the management target	■TCC □CLIENTS □SUPPLY CHAIN	3.4 Ethical Management
			GRI-419 Socioeconomic Compliance				
	Risk Control		Risk Control	◆ Stipulation of "Risk Management Policy and Principles"; "Risk Management Committee" directly answer to the Board of Directors established to identify risks to be actively planned for and managed via assessment of the likelihood of risk factors and impact levels thereof	◆ Regular review of risk management mechanisms for an effective implementation of risk management processes	■TCC □CLIENTS □SUPPLY CHAIN	3.2 TCFD Climate Risk Management
Environmental Issues	Sustainable Products	EM-CM-410a.1 EM-CM-410a.2 Product Innovation	Sustainable Products	◆ Promotion of Carbon Footprint Label system and ongoing development of eco-friendly products	◆ Regular disclosure of the percentage of revenue from concrete used in green buildings in the overall concrete revenue	■TCC ■CLIENTS □SUPPLY CHAIN	1.1 Science-Based Carbon Reduction Initiative 3.5 Responsible Production
	Climate actions and net-zero emissions	EM-CM-130a.1 Energy management	GRI-302 Energy	◆ SBTs kick-off and approval with the goal of carbon neutrality for concrete by 2050 ◆ Joining the GCCA and commitment to a 25% carbon reduction by 2030 ◆ Founding Member of Taiwan Alliance for Net Zero Emission and a commitment to the target of net-zero by 2030 for the Operation Headquarters and offices	◆ To effective comply and respond to climate action, establishing GHG reduction targets in line with international standards and linking the carbon reduction performance with the appraisal system for a comprehensive climate action	■TCC □CLIENTS ■SUPPLY CHAIN	NET ZERO New Horizon of 1.5°C - TCC Action: EARTH HELPER
		EM-CM-110a.1 EM-CM-110a.2 GHG emissions	GRI-305 Emissions				
	Resource co-processing	EM-CM-150a.1 Waste Management	GRI-306 Waste	◆ Waste Recycling: 1.25 million metric tons reduced by 2025; 1.57 million metric tons by 2030; 2.5 million metric tons by 2050	◆ Ongoing assistance to the government and industries in solving complicated waste issues and tracking the volume of waste treated to ensure practices on sustainability issues through leveraging TCC's industry characteristics	■TCC □CLIENTS □SUPPLY CHAIN	2.1 Low-carbon Production Cycling
	Pollution Control and Management	EM-CM-120a.1 Air quality	GRI-305 Emissions	◆ Air emissions management: 50% reduction for NOx, 30% for SOx, and 50% for TSP by 2025; 70% reduction for NOx, BACT minimum for SOx and TSP by 2030; BACT minimum for NOx by 2050.	◆ Reducing risks of environmental pollution, engaging in pollution and waste control and management, and regularly reviewing the pollution management results ◆ Emission of dust (10 mg/m3) lower than the regulatory standards	■TCC □CLIENTS □SUPPLY CHAIN	1.3 Water Resource Management 1.5 Waste Management
		EM-CM-150a.1 Waste Management	GRI-306 Effluents and Waste				
	Biodiversity	EM-CM-160a.1 EM-CM-160a.2 Biodiversity Impacts	GRI-304 Biodiversity	◆ Biodiversity Management Plan onboard with 90% of indigenous species restored by 2030 and 95% by 2050	◆ To preserve biodiversity on Earth, serious considering the ecological balance and reconstruction, ongoingly engaging the following restoration management for a true mine revival and restoration of limestone ecology step by step	■TCC ■CLIENTS ■SUPPLY CHAIN	CH. 6 Ecosystem Restoration & Ark Plan
	Green Energy and Energy Storage	EM-CM-130a.1 Energy management	GRI-302 Energy	◆ 570 MW of renewable energy installed by 2025, 700 MW by 2030, and 1GW by 2050	◆ Regular meeting to review performance in green energy target achievement ◆ With EV100 and RE100 as the goal to strengthen its energy management: charging stations installed to Operation Headquarters; addition of electric vehicles for company cars replacement on a yearly basis; active promotion of renewable energy production for self-consumption	■TCC □CLIENTS ■SUPPLY CHAIN	NHΩA NEW HORIZONS AHEAD -TCC Inaugurates: New Energy, New Lifestyle
Social Issues	Workplace Health and Safety	EM-CM-320a.1 EM-CM-320a.2 Workforce Health & Safety	GRI-403 Occupational Health and Safety	◆ Aiming for "zero work-related injury," "Occupational Safety and Health Management Regulations," "Occupational Safety and Health Management Plan," "Occupational Safety and Health Code of Practice," "Human Factor Hazard Prevention Program," and "Prevention Plan for Ailments Induced by Exceptional Workload" formulated	◆ Emphasizing occupational health and safety issues; regularly convening the Occupational Safety and Health Committee; and reporting implementation results ◆ Reviewing the cause of accidents and tracking results of correction in the event of critical occupational accidents, besides disciplinary actions in line with respective responsibilities ◆ Maintaining the goal of zero work-related injury	■TCC □CLIENTS ■SUPPLY CHAIN	4.3 Care for Employee Safety
	Local Inclusion		GRI 413 Local Communities	◆ A regular investment of NT$8 million yearly	◆ Regular disclosure on the budgets allocated to local communities	■TCC □CLIENTS □SUPPLY CHAIN	CH. 5 Society Inclusion and Common Good
	Talent Cultivation and Development		GRI-401 Employment GRI 404 Training and Education	◆ A regular investment of NT$25 million yearly	◆ Regular disclosure on budgets allocated to education and trainings	■TCC □CLIENTS □SUPPLY CHAIN	4.1 Talent Cultivation & Development

■ indicates a direct impact
□while the remainders indirect impacts

GRI Standards Reference Table

Code	Disclosure	Corresponding Section	Page	Description (Synopsis included)
GRI 2：2021				
The organization and its reporting practices				
2-1	Organizational details	Global Operations	9-10	
		About the Report	16	
2-2	Entities included in the organization's sustainability reporting	About the Report	16	
		Global Operations	9-10	
2-3	Reporting period, frequency and contact point	About the Report	16	
2-4	Restatements of information			No restatement of information for TCC in 2021
2-5	External assurance	About the Report	16	
Activities and workers				
2-6	Activities, value chain and other business relationships	Global Operations	9-10	No nomination for committee at TCC in 2021
		3.5 Responsible Production	63	
		3.6 Supply Chain Sustainability	65-67	
2-7	Employees	4.5 Workplace Diversity	81-82	
2-8	Workers who are not employees	4.5 Workplace Diversity	82	
Governance				
2-9	Governance structure and composition	3.1 Board of Directors	53	
2-10	Nomination and selection of the highest governance body	3.1 Board of Directors	54	Mr. Nelson An-ping Chang is the Chairman of Taiwan Cement Corporation, overseeing the TCC Group (encompassing the affiliated enterprises related to low-carbon cement and new building materials, resource recycling, and green energy).
2-11	Chair of the highest governance body			Mr. Jong-Peir Li is the President of Taiwan Cement Corporation, in charge of the operation and management thereof. As such, the Chairman and the President are not the same individual.
2-12	Role of the highest governance body in overseeing the management of impacts	3.1 Board of Directors	54	
2-13	Delegation of responsibility for managing impacts	3.1 Board of Directors	54	
2-14	Role of the highest governance body in sustainability reporting	3.1 Board of Directors	54	
2-15	Conflicts of interest	3.1 Board of Directors	55	Please refer to TCC's official website and 2021 Annual Report.
2-16	Communication of critical concerns	3.1 Board of Directors	54	
2-17	Collective knowledge of the highest governance body	3.1 Board of Directors	54	
2-18	Evaluation of the performance of the highest governance body	3.1 Board of Directorson	55	

GRI Standards Reference Table

Code	Disclosure	Corresponding Section	Page	Description (Synopsis included)
2-19	Remuneration policies	3.1 Board of Directors	55	Please refer to Taiwan Cement Corporation's Annual Report for the remunerations paid to Directors, Supervisors, President, and Vice Presidents.
2-20	Process to determine remuneration	3.1 Board of Directors	55	Please refer to the Remuneration Committee Charter of Taiwan Cement Corporation.
2-21	Annual total compensation ratio	3.1 Board of Directors	55	Remuneration at TCC in 2021 is yet to be disclosed.
Strategy, policies and practices				
2-22	Statement on sustainable development strategy	Chairman's Address	16	
2-23	Policy commitments	4.4 Human Rights Protection	79-80	
2-24	Embedding policy commitments	4.4 Human Rights Protection	79-80	
2-25	Processes to remediate negative impacts	3.2 TCFD Climate Risk Management	56-60	
		4.4 Human Rights Protection	79-80	
2-26	Mechanisms for seeking advice and raising concerns	3.4 Ethical Management	61-63	
2-27	Compliance with laws and regulations	3.4 Ethical Management	62	
2-28	Membership associations	3.7 Sustainability Associations	67-68	
Stakeholder engagement				
2-29	Approach to stakeholder engagement	Stakeholder Engagement	111-118	
2-30	Collective bargaining agreements	4.4 Human Rights Protection	79-80	
GRI 200: Economic Disclosures				
GRI 201: Economic Performance 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
201-1	Direct economic value generated and distributed	ESG Performance	108	
201-2	Financial implications and other risks and opportunities due to climate change	3.2 TCFD Climate Risk Management	57-59	
201-3	Defined benefit plan obligations and other retirement plans	4.2 Remuneration & Benefits System	74-76	
201-4	Financial assistance received from government			TCC has not received financial assistance from government.
GRI 205: Anti-corruption2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
205-2	Communication and training about anti-corruption policies and procedures	3.4 Ethical Management	62	
205-3	Confirmed incidents of corruption and actions taken	3.4 Ethical Management	62	

GRI Standards Reference Table

Code	Disclosure	Corresponding Section	Page	Description (Synopsis included)
GRI 206: Anti-Competitive Behavior 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
206-1	Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	3.4 Ethical Management	62	
GRI 300: Environmental Disclosures				
GRI 301: Materials 2016				
301-1	Materials used by weight or volume	1.4 Raw Materials Management	40	
301-2	Recycled input materials used	1.4 Raw Materials Management	40	
GRI 302: Energy 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
302-1	Energy consumption within the organization	ESG Performance	105-106	A total of 982 GJ of renewable energy were consumed by TCC in 2021.
302-3	Energy intensity	ESG Performance	105-106	
302-4	Reduction of energy consumption	2.2 Energy Saving and Bioenergy Development	45-46	
		ESG Performance	105-106	
GRI 303: Water 2018				
303-1	Interactions with water as a shared resource	1.3 Water Resource Management	39	
303-2	Management of water discharge-related impacts	1.3 Water Resource Management	39	
303-3	Water withdrawal	ESG Performance	107	
GRI 304: Biodiversity 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	CH6 Ecosystem Restoration & Ark Plan	97	TCC has no operational site in protected areas or areas of high biodiversity value.
304-2	Significant impacts of activities, products, and services on biodiversity	CH6 Ecosystem Restoration & Ark Plan	98-104	TCC conducts biodiversity survey and observation of environmental changes yearly as well as environmental monitoring and survey quarterly. Please refer to TCC official website for the survey results.
304-3	Habitats protected or restored	CH6 Ecosystem Restoration & Ark Plan	97	No TCC operational site is situated in areas of IUCN Red List species and national conservation list species.
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations	CH6 Ecosystem Restoration & Ark Plan	97	
GRI 305: Emissions 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
305-1	Direct (Scope 1) GHG emissions	1.1 Science-Based Carbon Reduction Initiative ESG Performance	35	
305-2	Energy indirect (Scope 2) GHG emissions	1.1 Science-Based Carbon Reduction Initiative ESG Performance	35	
305-3	Other indirect (Scope 3) GHG emissions	1.1 Science-Based Carbon Reduction Initiative ESG Performance	35	
305-4	GHG emissions intensity	ESG Performance	105	
305-6	Emissions of ozone-depleting substances (ODS)	1.2 Air Emissions Management ESG Performance	37-38	No ozone-depleting substance was emitted by TCC in 2021.
305-7	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	1.2 Air Emissions Management ESG Performance	37-38	
GRI 306: Waste 2020				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
306-1	Waste generation and significant waste-related impacts	1.5 Waste Management	40	
306-2	Management of significant waste-related impacts	1.5 Waste Management	40	
306-3	Waste generated	1.5 Waste Management	40	
306-4	Waste diverted from disposal	1.5 Waste Management	40	
306-5	Waste directed to disposal	1.5 Waste Management	40	
GRI 307: Environmental Compliance 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
307-1	Non-compliance with environmental laws and regulations	3.4 Ethical Management	62	
GRI 400: Social Disclosures				
GRI 401: Employment 2016				
401-1	New employee hires and employee turnover	4.5 Workplace Diversity	81-82	
401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	4.2 Remuneration & Benefits System	75-76	
401-3	Parental leave	4.2 Remuneration & Benefits System ESG Performance	76	
GRI 403: Occupational Health and Safety 2018				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement	111-118	
403-1	Occupational health and safety management system	4.3 Care for Employee Safety	77	

GRI Standards Reference Table

Code	Disclosure	Corresponding Section	Page	Description (Synopsis included)
403-2	Hazard identification, risk assessment, and incident investigation	4.3 Care for Employee Safety	78	
403-3	Occupational health services	4.3 Care for Employee Safety	79	
403-4	Worker participation, consultation, and communication on occupational health and safety	4.3 Care for Employee Safety	79	
403-5	Worker training on occupational health and safety	4.3 Care for Employee Safety	79	
403-6	Promotion of worker health	4.3 Care for Employee Safety	79	
403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	4.3 Care for Employee Safety	78-79	
403-9	Work-related injuries	4.3 Care for Employee Safety ESG Performance	79	
403-10	Work-related ill health	4.3 Care for Employee Safety	79	
GRI 404: Training and Education 2016*				
404-1	Average hours of training per year per employee	4.1 Talent Cultivation & Development ESG Performance	71-74	
GRI 405: Diversity and Equal Opportunity 2016*				
405-1	Diversity of governance bodies and employees	3.1 Board of Directors 4.5 Workplace Diversity	54,81-82	
GRI 412: Human Rights Assessment 2016				
412-2	Employee training on human rights policies or procedures	4.4 Human Rights Protection	79-80	
GRI 413: Local Communities 2016				
103-1	Explanation of the material topic and its Boundary	Stakeholder Engagement	111-118	
103-2	The management approach and its components	Stakeholder Engagement	111-118	
103-3	Evaluation of the management approach	Stakeholder Engagement CH5 Society Inclusion and Common Good	111-118	
413-1	Operations with local community engagement, impact assessments, and development programs		11	The Hoping Plant has engaged a comprehensive communication and impact assessment of local communities, which accounts for 50% of the cement plants.
413-2	Operations with significant actual and potential negative impacts on local communities	5.1 EARTH HELPER – Observation Tower of the Future of Green Living	85-86	TCC has introduced the Social Return On Investment (SROI) and been accredited by Value UK. Please refer to TCC SROI Report for relevant information.
GRI 419: Socioeconomic Compliance 2016				
103-1	Explanation of the material topic and its Boundary	TCC's Material Issues on Identification Stakeholder Engagement	111-118	

GRI Standards Reference Table

Code	Disclosure	Corresponding Section	Page	Description (Synopsis included)
103-2	The management approach and its components	TCC's Material Issues on Identification Stakeholder Engagement CH3 Corporate Governance & Risk Management	55	
103-3	Evaluation of the management approach	CH3 Corporate Governance & Risk Management	55	
419-1	Non-compliance with laws and regulations in the social and economic area	3.4 Ethical Management	62	

Sustainability Accounting Standards Board (SASB) Reference Table

Topics	Code	Category	Accounting Metric	Page	Description
Greenhouse gas emissions	EM-CM-110a.1	Quantitative	▪Gross global Scope 1 emissions	105	TCC operational sites are not covered under emissions-limiting regulations.
			▪Percentage covered under emissions-limiting regulations	105	
	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	105	
Air quality	EM-CM-120a.1	Quantitative	▪Air emissions of the following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) particulate matter (PM10), (4) dioxins/furans, (5) volatile organic compounds VOCs), (6) polycyclic aromatic hydrocarbons (PAHs), and (7) heavy metals	106	The scope of disclosure is mainly of stationary sources.
Energy Management	EM-CM-130a.1	Quantitative	▪Total energy consumed	105-106	
			▪Percentage grid electricity		
			▪Percentage alternative		
			▪Percentage renewable		
Water management	EM-CM-140a.1	Quantitative	▪Total fresh water withdrawn	107	Reclaimed amount in the process/total water consumed 17.38%
			▪Percentage recycled		
			▪Percentage in regions with High or Extremely High Baseline Water Stress		
Waste management	EM-CM-150a.1	Quantitative	▪Amount of waste generated	40	
			▪Percentage hazardous		
			▪Percentage recycled		
Biodiversity impacts	EM-CM-160a.1	Qualitative	▪Descriptions of environmental management policies and practices for active sites	98	
	EM-CM-160a.2	Quantitative	▪Terrestrial acreage disturbed	97	116.34 ha. mined; 59.66ha. mined area greened with up to 51% restored
			▪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	108	
			▪Near miss frequency rate (NMFR) for full-time employees and contract employees		
	EM-CM-320a.2	Quantitative	▪Number of reported cases of silicosis		No case of silicosis was reported with TCC in 2021.

Sustainability Accounting Standards Board (SASB) Reference Table

Topics	Code	Category	Accounting Metric	Page	Description
Product innovation	EM-CM-410a.1	Quantitative	▪Percentage of products that qualify for credits in sustainable building design and construction certifications	52	Of TCC's concrete products sold to clients in 2021, the sales from green building applications accounted for 11.2% 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		32.91%[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	62	There was no legal proceeding associated with cartel activities, price fixing, or anti-trust activities at TCC in 2021.
Activity Metrics	EM-CM-000.A	Quantitative	▪Production by major product line	11	6,215,232 metric tons of cementitious materials were produced in 2021.

Note: The sustainable products defined by TCC are the cement products with Gold-rated Eco-friendly Cement Label, and the ration of which is calculated as cement products with Gold-rated Eco-friendly Cement Label/Total revenue from TCC cement, clinkers, and RMC in Taiwan. The revenue data does not include cement consumed by its own RMC plants.

Mining and Metals Sector Supplement

Aspect	Indicator	Commentary	Corresponding Section or Note (Synopsis Included)	Page
Biodiversity	MM1	Amount of land disturbed or rehabilitated.	CH6 Ecosystem Restoration & Ark Plan	96
Biodiversity	MM2	The number and percentage of total sites identified as requiring biodiversity management plans according to stated criteria, and the number (percentage) of those sites with plans in place.		96
Emissions, Effluents, and Waste	MM3	Total amounts of overburden, rock, tailings, and sludges and their associated risks.		96
Employment	MM4	Number of strikes and lock-outs exceeding one week's duration, by country.	No such incident observed in 2021	
Community	MM6	Number and description of significant disputes relating to land use, customary rights of local communities and Indigenous Peoples.		
Artisanal and Small-scale Mining	MM8	Number (and percentage) of company operating sites where artisanal and small-scale mining (ASM) takes place on, or adjacent to, the site; the associated risks and the actions taken to manage and mitigate these risks.		

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INDEPENDENT AUDITORS' LIMITED ASSURANCE REPORT

The Board of Directors and Stockholders
Taiwan Cement Corp.

We have performed a limited assurance engagement on the selected subject matter information (see Appendix) in the Sustainability Report (the "Report") of Taiwan Cement Corp. (the "Company") for the year ended December 31, 2021.

Responsibilities of Management for the Report

Management is responsible for the preparation of the Report in accordance with Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies and GRI Standards and Sector Guidance published by the Global Reporting Initiatives (GRI) and other applicable rules according to its sector features, and for such internal control as management determines is necessary to enable the preparation of the Report that are free from material misstatement.

Auditors' Responsibilities for the Limited Assurance Engagement Performed on the Report

We conducted our work on the selected subject matter information (see Appendix) in the Report in accordance with the 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 the preparation, in all material respects, of the Report. The nature, timing and extent of procedures performed in a limited assurance engagement are different from and more limited than a reasonable assurance engagement and, therefore, a lower assurance level is obtained than a reasonable assurance.

We applied professional judgment in the planning and conduct 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:

- Obtaining and reading the Report.
- Inquiring management and personnel involved in the preparation of the Report to understand the policies and procedures for the preparation of the Report.
- Inquiring the personnel responsible for the preparation of the Report to understand the process, controls, and information systems in the preparation of the selected subject matter information.
- Analyzing and examining, on a test basis, the documents and records supporting the selected subject matter information.

Inherent Limitations

The subject information included non-financial information, which was under 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 Controls

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 contains integrity, objectivity, professional competence and due care, confidentiality and professional behavior as the fundamental principles. In addition, the firm applies Statement of Auditing Standard No. 46 "Quality Control for Public Accounting Firms" issued by the Accounting Research and Development Foundation of the Republic of China and, accordingly, maintains a comprehensive system of quality controls, including documented policies and procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

Conclusion

Based on the procedures performed and evidence obtained, nothing has come to our attention that causes us to believe that the selected subject matter information in the Report are, in all material respects, not prepared in accordance with the above mentioned reporting criteria.

Other Matters

We shall not be responsible for conducting any further assurance work for any change of the subject matter information or the criteria applied after the issuance date of the Report.

Deloitte & Touche

Deloitte & Touche
Taipei, Taiwan
Republic of China

May 23, 2022

SUMMARY OF SELECTED SUBJECT MATTER INFORMATION

#	Assurance Subject Matter (GRI Standards/SASB[1] Standards)	Descriptions of Indicators	Corresponding Section	Applicable Criteria
1.	GRI 205-3: 2016	Confirmed incidents of corruption and actions taken	3.4 Ethical Management	Total number of confirmed corruption incidents related to the organization, its employees or business partner.
2.	GRI 302-1: 2016	Energy consumption within the organization	ESG Performance Table	Amount of energy consumed from coal, gasoline, electricity sold, and natural gas.
3.	GRI 303-3: 2018	Water withdrawal	ESG Performance Table	A breakdown of water withdrawal from produced water, groundwater and industrial-use water.
4.	GRI 305-7: 2016	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	1.2 Air Emissions Management ESG Performance Table	Air emissions of nitrogen oxides, sulfur oxides, particulate pollutants, and volatile organic compounds.
5.	GRI 306-3: 2020	Waste generated	1.5 Waste Management	Total weight of non-hazardous waste (both recyclable and non-recyclable)
6.	GRI 403-9: 2018	Work-related injuries	4.3 Care for Employee Safety ESG Performance Table	The number and rate of fatalities as a result of work -related injury of employees and workers (contractors); the number, rate and hours of recordable work-related injuric.
7.	GRI 403-10:2018	Work-related ill health	4.3 Care for Employee Safety	The number and rate of fatalities as a result of work-related ill health of employees and workers; the number and rate of recordable work-related ill health cases.
8.	GRI 413-1: 2016	Operations with local community engagement, impact assessments, and development programs	CH5 Society Inclusion and Common Good Appendix GRI Standards Reference Table	Percentage of operations with implemented local community engagement, impact assessments, and development programs.
9.	SASB EM-CM-110a.1	1) Gross global Scope 1 emissions 2) percentage of emissions covered under emissions-limiting regulations	ESG Performance Table	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations.
10.	SASB EM-CM-120a.1	Air emissions of the following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) particulate matter (PM10), (4) dioxins/furans, (5) volatile organic compounds (VOCs), (6) polycyclic aromatic hydrocarbons (PAHs), and (7) heavy metals	1.2 Air Emissions Management ESG Performance Table	Air emissions of nitrogen oxides (NOx), sulfur oxides (SOx), particulate pollutants, and volatile organic compounds (VOCs).

[1] Refers to the SASB standards formulated by the Sustainability Accounting Standards Board.

#	Assurance Subject Matter (GRI Standards/SASB[1] Standards)	Descriptions of Indicators	Corresponding Section	Applicable Criteria
11.	SASB EM-CM-140a.1	1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress	ESG Performance Table	Total amount of water withdrawal from produced water, groundwater and industrial-use water, percentage recycled, and percentage in regions with High or Extremely High Baseline Water Stress.

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INDEPENDENT ASSURANCE OPINION STATEMENT

Taiwan Cement Corporation 2021 Sustainability Report

The British Standards Institution is independent to Taiwan Cement Corporation (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 purposes of assuring its statements relating to its sustainability, 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 Taiwan Cement Corporation 2021 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 Taiwan Cement Corporation 2021 Sustainability Report provides a fair view of the TCC sustainability programmes and performances during 2021. 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: Core option were fairly stated.

Methodology

Our work was designed to gather evidence on which to base our conclusion. We undertook the following activities:

- a 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.
- 20 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: Core option (For each material topic covered by a topic-specific GRI Standard, comply with all reporting requirements for at least one topic-specific disclosure). 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 Lead 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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2022-05-03

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TCC

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