



2021
CTCI TCFD Report

TCFD

TASK FORCE ON
CLIMATE-RELATED
FINANCIAL
DISCLOSURES



Climate change has become an internationally concerned topic, and it is highly related to all industries with certain levels of impacts. Since 2018, CTCI has introduced the “Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)” in order to identify potential risks and opportunities of climate change on the operation of CTCI, and to quantify its financial impact, in order to adopt relevant management actions and responses early. For the TCFD disclosure aspects, an explanation is provided with respect to the governance, strategy, risk management, metrics and targets in the following:

I. Climate Change Governance Mechanism

The ESG and net zero organizational structure of CTCI is as shown in Figure 1., and the Board of Directors serves as the highest governance level responsible for ESG and net zero related affairs. In 2021, the “ESG and Net Zero Committee” was established under the Board of Directors. At least one meeting is convened annually, and meetings may also be convened at any time, depending upon the needs. In 2021, a periodic meeting was convened on December 10 with Evon Chen, independent director, assuming the role of the convener while Yancey Hai, director, and Michael Yang, Chairman at CTCI Corporation assuming the role of the supervisors.

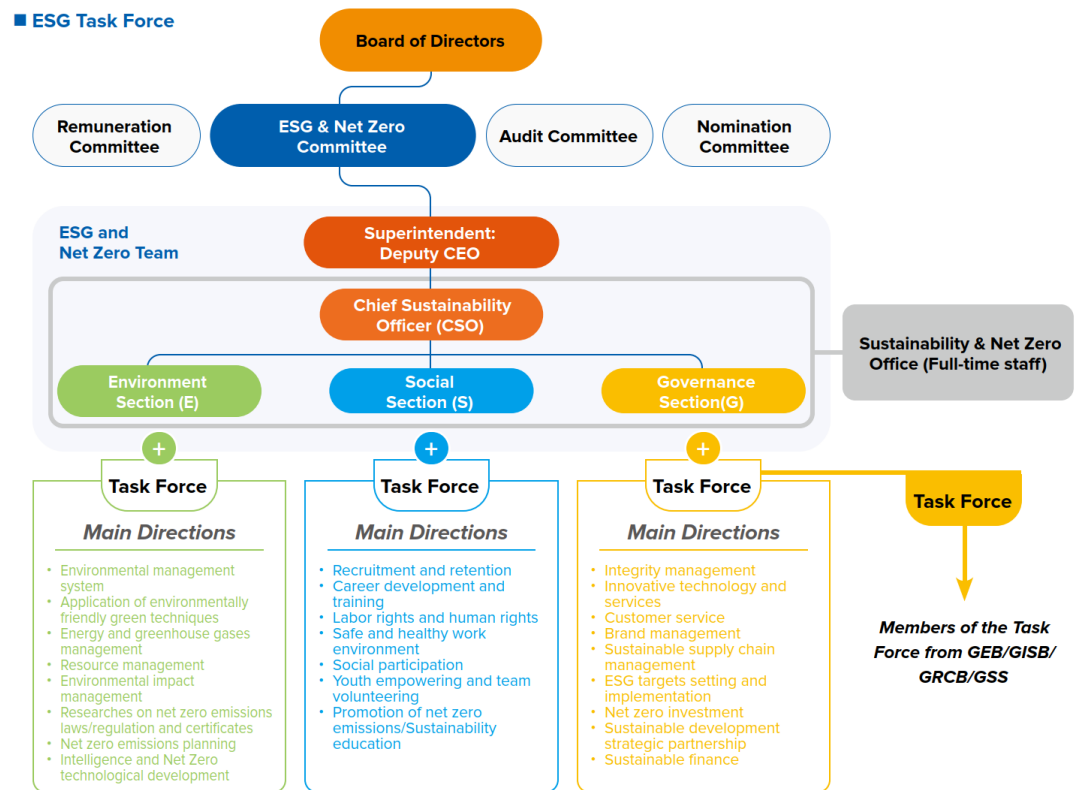


Figure 1.The ESG and net zero organizational structure



CTCI has established the full-time ESG Officer and “ESG and Net Zero Office” of the Group level in order to be in charge of the establishment of ESG and net zero related strategies of the Group, action plans and promotion of business affairs. In addition, it also combines with members of the “ESG and Net Zero Promotion Task Force” of each business unit in order to promote the works of environmental protection, social participation and corporate governance jointly, which also manages five main job functions and responsibilities, including policy, system, engagement, disclosure, and progress. Furthermore, relevant progress and effectiveness are also evaluated through follow-up of the job functions and responsibilities. The President supervises the convention of the ESG and Net Zero Improvement Meetings monthly and the report of the implementation performance to the Group’s Decision Making Center, and the ESG Officer reports the outcome to the Board of Directors periodically.

Responsibilities of the ESG and Net Zero Committee

- Establishment of sustainable development and net zero emissions policies of the Company.
- Establishment of the Company's sustainable development goals, strategies and execution plans, including sustainable governance, ethical management, and environmental and social aspects.
- Review, follow-up and revision of the sustainable development and net zero emissions implementation status and outcome of the Company, and report to the Board of Directors periodically.
- Monitor topics concerned by all stakeholders, including shareholders, customers, suppliers, employees, the government, non-profit organizations, communities and media, and supervise communication plans.



II. Information on Response Strategies to Climate Change

CTCI cares about the topic of global climate change and identifies relevant risks and opportunities according to TCFD. In addition, CTCI has also adopted strategies to reduce risks and threats, and is able to seize business opportunities for development. The strategies developed by CTCI are as follows:

1. **Transformation in Green Engineering**

“Market heads toward low carbon products and services”. For the main risks and opportunities identified, if the original business operation method continues to be adopted with any change, the Company will face the situation of business reduction with revenue decline. On the contrary, if the Company engages in transformation actively, it is able to seize the ESG and net zero development trend.

CTCI has implemented various green engineering plans, divided into three main aspects: green technology, green contracting, and green investment. The construction project amount has increased from 23% in 2015 to 74% in 2021, and the growth rate has reached 450%. CTCI continues to engage in transformation and has established the Advanced Tech Facility Business Operation, in order to seek carbon reduction/net zero new technologies and investment business opportunities. CTCI also collaborates with Industrial Technology Research Institute (ITRI) in collaborative research, including hydrogenic energy, energy storage, carbon capture, utilization and storage (CCUS), carbon neutrality application for technology collaboration and business development. It also acts as the convener of the Taiwan-US Carbon Capture, Utilization and Storage (CCUS) Industries Promotion Alliance (TUCA), in order to understand and manage key technologies.

2. **Green engineering is integrated with intellectualization based on the core business of CTCI (iEPC/Digital Twin):**

CTCI further integrates intellectualization with the green engineering transformation basis, in order to strengthen the green engineering energy, and the intellectualization includes:

(1) Intelligent Turnkey Project (iEPC):

Originally independent design, procurement and construction departments were linked together in order to digitize their information, and through the cross-department information integration platform, all changes can be responded to timely, in order to achieve integration and management of higher efficiency.



- With regard to the engineering design (E), design automation and intelligence are promoted, such as intelligent piping design, design rule base to facilitate machine learning, etc.
- For the procurement (P), “Supplier Information Communication Platform” and “CAP (CTCI) Alliance Partner Mechanism” are established, allowing the internal of CTCI to communicate and exchange information with external suppliers timely, to understand suppliers’ production progress and manufacturing status after order placement, and to also understand material demand and change status. Big Data analysis to facilitate subsequent purchase decision making.
- For the construction (C), construction site electronic and mobile management are promoted, and automated devices are promoted to the key construction sites.

(2) Digital Twin:

During the construction of the physical facility, a virtual facility is also constructed at the same time, in order to achieve the objective of virtual and physical integration. Since the facility construction stage, the Group’s exclusive “Intelligent Turnkey Project” platform collects data of each stage of engineering design (E), procurement (P) and construction (C) completely, and digital technology is implemented to improve the execution performance. In addition, during the physical facility handover stage, the digital handover is also performed at the same time, in order to provide virtual factory and relevant data to the proprietor simultaneously.

3. Net Zero Carbon Emissions Commitment

CTCI leads the industry to initiate the Taiwan Alliance for Net Zero Emission jointly and is committed to setting up a net zero reduction goal satisfying the SBTi Science Based Targets Initiative, in order to progressively achieve the 2050 net zero carbon emission goal as explained in the following:

(1) Initiate Taiwan Alliance for Net Zero Emission Jointly:

CTCI is one of the founding members initiating the “Taiwan Alliance for Net Zero Emission”. The Group Chairman acts as the alliance's executive director to jointly promote net zero development in Taiwan, and CTCI also commits to achieve the office net zero carbon emissions by 2030, and net zero carbon emissions for offices and production sites by 2050.



(2) Commitment to setting net zero reduction goal satisfying SBTi Science Based Targets Initiative:

CTCI has committed to setting the net zero reduction goal of satisfying the 1.5 degree C of SBTi in 2022. The annual reduction goal for 2020~2030 is 4.2%, the reduction goal for 2030~2050 is 2.9%, and it is also set to reach net zero by 2050.

4. Total Participation in ESG to Practice Net Zero EPC:

CTCI understands that everyone is involved as we live on the same Earth. Accordingly, through various measures, the awareness of the ESG topic of all employees of the Group is increased continuously, allowing the concept of sustainability to be deep-rooted in everyone's mind, such that it can then be implemented in our living and workplace. The activities include the promotion of ESG Moment, integration of various ESG training courses in "CTCI University", organization of ESG and net zero series of courses or ESG forum, such as Taiwan ESG engineering forum, ESG action plan proposal contest for all employees/ESG Award, promotion of green office/green new living of employees, etc.

5. Lead Suppliers to Head Toward Net Zero Jointly:

CTCI also requires cooperation of suppliers during the transformation stage. Presently, the ESG supply chain management framework has been adopted to improve supply chain resilience, and a supplier conference is organized to improve the ESG understanding of suppliers. Currently, the "Vendor's Commitments to Corporate Sustainable Management and Net Zero" has been issued. Through the survey on the current condition of ESG, suppliers are encouraged to implement reduction and set up carbon reduction goals. In addition, subsequent reward and punishment mechanisms will also be implemented, in order to provide carbon reduction incentives. Accordingly, the Scope 3 carbon reduction goal can be implemented progressively, thereby establishing a low carbon and sustainable supply chain with suppliers jointly.

III. Management of Climate Change Risks and Opportunities

1. Climate Risk and Opportunity Management System

CTCI integrated the climate change risk in the “CP-004 Risk Management Regulations”, and the Risk Management Execution Committee is required to review climate risk and to report to the Board of Directors according to the schedule. The risk management organizational structure is as shown in Figure 2.

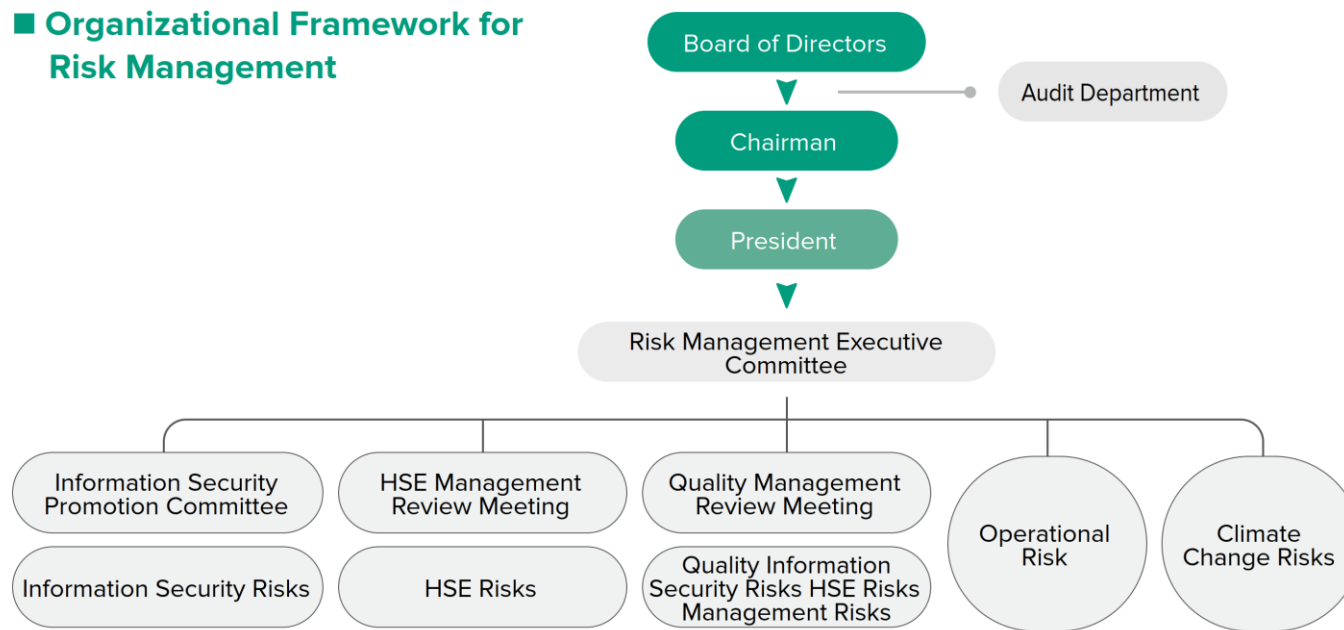


Figure 2. Climate change risk included in the risk management organization structure

To properly complete climate risk assessment, CTCI newly established the “CP-009-B Climate Change Risk Management Regulations” and an implementation operation process was established, in order to facilitate the identification and analysis of climate risks and opportunities according to TCFD framework. The management process is as shown in Figure 3.

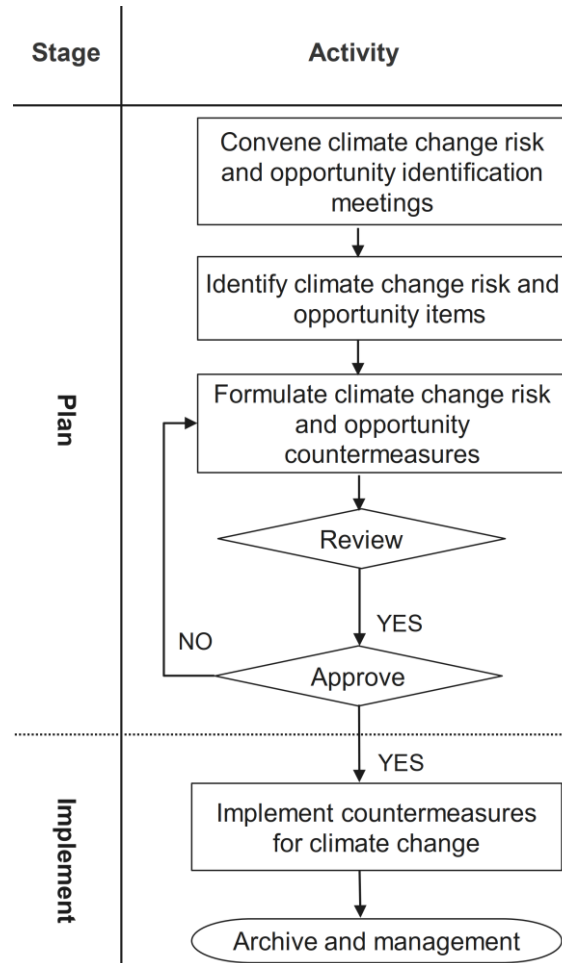


Figure 3. Climate change risk and opportunity management process



The ESG and Net Zero Team convenes meetings periodically, and climate change risk management representatives of all units are invited to participate in the climate change risk and opportunity identification conference. According to the climate change risk and opportunity identification table, the occurrence rate and impact level are assessed, and risk matrix is used to analyze each risk level. For major risk items identified, their risk impacts are assessed.

After identification and assessment results are submitted to the unit supervisor for review and approval, relevant response measures are established. The climate change risk management representatives establish response measures according to the climate change risk file identified, and after it is submitted to the business department head for review. Climate change risk file and response measures are followed by implementation and control according to the Risk Management Regulations.

2. Risk and Opportunity Identification and Assessment

According to international relevant research reports, industrial characteristics and benchmark analysis, CTCI updates the climate topic database periodically in order to design climate change risk and opportunity assessment questionnaires for distribution to all units for assessment, thereby generating the matrix diagram for materiality sequential arrangement.

CTCI identifies climate risk and opportunity items from the organization, upstream (suppliers) and downstream (customers), in order to establish the risk and opportunity matrix diagram, as shown in Figure 4.

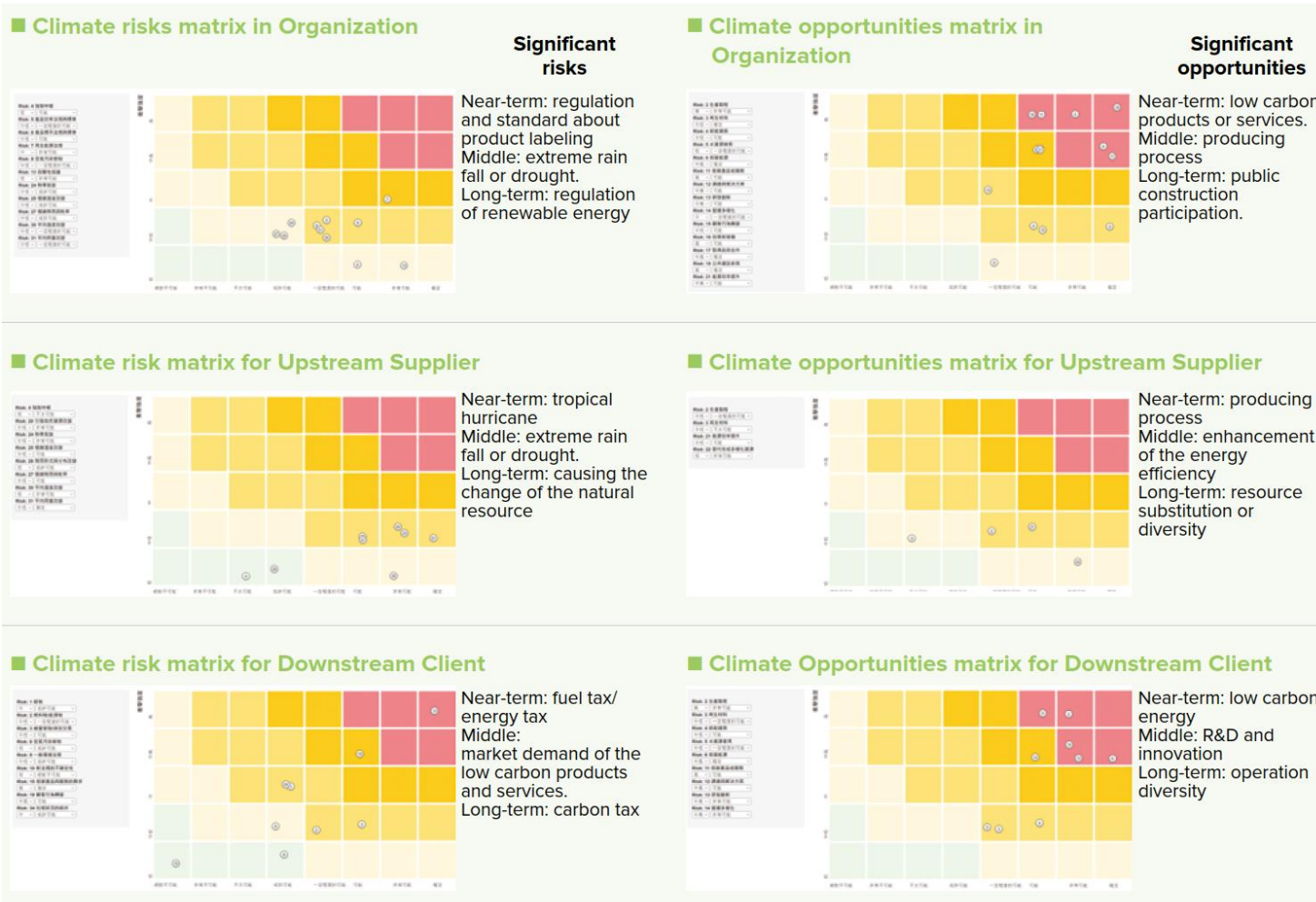
Assessment Method

Please refer to “CP-004 Risk Management Regulations” 5.3.1 “Consequence/Probability Matrix Method”:

Risk/Opportunity Rating = Consequence Severity*Probability

- The consequence severity is assessed according to the “Financial” and Non-financial” indicators, and is indicated in five levels “Extremely Significant”, “Significant”, “Medium”, “Slight”, and “Extremely Slight”.
- Probability is indicated in eight levels of “Virtually Certain”, “Very Likely”, “Likely”, “Possible”, “Maybe possible”, “Unlikely”, “Very Unlikely”, and “Exceptionally Unlikely”.

For a detailed definition of the consequence severity and probability, please refer to the explanation in “CP-009-B Climate Change Risk Management Regulations”.



Legend: Significance High Mid-High Middle Mid-Low Low

Figure 4. The climate risk/opportunity matrix diagram



3. Climate Risk and Opportunity Impact and Management Response

For major climate risks identified, CTCI provides explanation in terms of the scope of impact, risk encountered, potential financial impact and management action:

Table 1. Explanation on major climate risk impact and response

Category	Risk Item	Scope of Impact	Risk Encountered by CTCI	Potential Financial Impact	CTCI Management Action	Implementation Outcome
Transformation Risk	Decline of Oil Refining and Petrochemical Industry	Internal of Organization Customer End	Under the global trend of reduction, the customer behaviors in the market also change accordingly, such that oil refining and petrochemical tender projects are reduced, and the revenue ratio of oil refining and petrochemical industry decreases year after year (CTCI's oil refining and petrochemical revenue ratio decreased from 51% in 2018 to 35% in 2021)	<ul style="list-style-type: none"> •Decrease of revenue •Increase of operating cost •Decrease of asset value 	<ol style="list-style-type: none"> 1. Implement business transformation by integrating green engineering with intellectualization based on the core business of CTCI (iEPC/Digital Twin), and invest in various types of low carbon and environmental protection projects 2. Include the green engineering contract signing achievement rate and net zero EPC achievement rate in the department's performance KPI 	<ol style="list-style-type: none"> 1. Ratio of low carbon and environmental protection projects increased from 16.7% in 2020 to 45.4% in 2021
	Policies and Regulations	Internal of Organization Customer End	The government progressively requests enterprises to perform greenhouse gas	<ul style="list-style-type: none"> •Increase of operating cost •Increase of capital expense 	<ol style="list-style-type: none"> 1. Enroll in SBTi, and commit to the establishment of net 	<ol style="list-style-type: none"> 1. Letter of commitment has been submitted to SBTi



Category	Risk Item	Scope of Impact	Risk Encountered by CTCI	Potential Financial Impact	CTCI Management Action	Implementation Outcome
		Suppliers	inventory inspection and reduction, and to increase the renewable energy consumption ratio, including: <ol style="list-style-type: none"> 1. National Development Council has announced the “Taiwan 2050 Net Zero Emissions Roadmap”, and the government subsequently requests all departments to reduce volume 2. The Financial Supervisory Commission has announced the “Sustainable Development Roadmap for TWSE/TPEX Listed Companies to request publicly listed companies to perform greenhouse gas inventory inspection and verification 	•Decrease of asset value	zero roadmap based on the target of 1.5° C <ol style="list-style-type: none"> 2. Expand greenhouse gas inventory inspection scope, and plan the completion of third party verification for all business locations of the Group during 2023 Q1 3. Purchase green electricity since 2022, and the headquarters and “headquarters and domestic/overseas construction sites” use 100% of green electricity in 2027 and 2050 	<ol style="list-style-type: none"> 2. All business locations completed the greenhouse gas inventory education and training, and preliminary verification 3. Promote energy saving measures consecutively, and building per capita carbon emissions and construction site million working hours carbon emissions are reduced by 2.2% annually in comparison to the base year 2018 4. Purchased 100 thousand kWh of green electricity, and completed green electricity annual purchase plan



Category	Risk Item	Scope of Impact	Risk Encountered by CTCI	Potential Financial Impact	CTCI Management Action	Implementation Outcome
Transformation Risk	Carbon Fee/Carbon Tax/Energy Tax	Internal of Organization Customer End Suppliers	Various countries are amending laws and regulations consecutively, and in the future, enterprises may be charged with carbon fee/carbon tax/energy tax, such that project costs will be increased, and the profit of CTCI will be affected	•Increase of operating cost	<ol style="list-style-type: none"> 1. Increase building and construction site energy consumption efficiency and use of green electricity 2. Include greenhouse gas management in the department performance KPI 3. Adjust purchase strategy to reduce construction life cycle carbon footprint, and reduce emissions together with the supply chain 	
Physical Risk	Extreme Climate (Rainfall and Drought)	Internal of Organization Suppliers	<ol style="list-style-type: none"> 1. Construction delay, construction structure damage and property loss, personnel cannot perform work or suffer from injury or death 2. If rainfall is insufficient, construction water demand can be affected 	<ul style="list-style-type: none"> •Increase of operating cost •Decrease of asset value 	<ol style="list-style-type: none"> 1. Pre-construction survey on potential risk (such as a flood) and purchase of natural disaster insurance 2. Used water recycle and reuse 	<ol style="list-style-type: none"> 1. Construction comprehensive insurance (insured scope includes flood and typhoon, etc.) 2. Headquarters and construction sites have been installed with rainwater recycle systems to perform irrigation and construction site cleaning to prevent dust scattering



For major climate risks identified, CTCI provides an explanation in terms of the scope of benefit, development opportunity, potential financial impact and management action:

Table 2. Explanation on major climate opportunity impact and response

Opportunity Item	Scope of Benefit	Development Opportunity for CTCI	Potential Financial Impact	CTCI Management Action	Implementation Outcome																				
Operation Diversity	Internal of Organization Customer End Suppliers	<ol style="list-style-type: none"> Under the trend of ESG and net zero emissions, the development of green and low carbon construction works are expected to flourish, which will be the key business promotion for CTCI. Circular economy and waste recycling to replace linear economic model gradually 	<ul style="list-style-type: none"> •Increase of revenue •Reduction of operating cost •Increase of asset value 	<ol style="list-style-type: none"> Green engineering is integrated with intellectualization based on the core business of CTCI (iEPC/Digital Twin) in order to achieve the differential advantage of high added value Establish High-tech Business Development and Strategy Management Committee, and seek low carbon/net zero new technology and investment project business opportunities 	<p>Accumulated ratio of construction work in process up to July 2022:</p> <table border="1"> <caption>Accumulated ratio of construction work in process up to July 2022</caption> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Power</td> <td>20%</td> </tr> <tr> <td>Environment</td> <td>19%</td> </tr> <tr> <td>Hydrocarbon</td> <td>14%</td> </tr> <tr> <td>Natural gas</td> <td>11%</td> </tr> <tr> <td>Energy from waste plants</td> <td>10%</td> </tr> <tr> <td>High tech</td> <td>10%</td> </tr> <tr> <td>Transportation</td> <td>9%</td> </tr> <tr> <td>others</td> <td>4%</td> </tr> <tr> <td>Industrial</td> <td>3%</td> </tr> </tbody> </table>	Category	Percentage	Power	20%	Environment	19%	Hydrocarbon	14%	Natural gas	11%	Energy from waste plants	10%	High tech	10%	Transportation	9%	others	4%	Industrial	3%
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R&D Innovation	Internal of Organization Customer End Suppliers	Various types of R&D innovations, such as production intelligence, various types of carbon reduction/net zero new technologies, are the key for CTCI to maintain its competitiveness	<ul style="list-style-type: none"> •Increase of revenue •Reduction of operating cost •Reduction of capital expense •Increase of asset value 	<ol style="list-style-type: none"> Collaborate with Industrial Technology Research Institute (ITRI) in collaborative research, including hydrogenic energy, energy storage, carbon 	<ul style="list-style-type: none"> • Construction Digital Information Capturing Technology Development • Group digital and AI intelligent technology development and application (iEPC/Digital Twin) 																				



<p>Renewable Energy and Low Carbon Energy Business</p>	<p>Internal of Organization Customer End</p>	<p>Provide renewable and low carbon energies (such as natural gas receiving station) construction service and operation investment with increasing business demands</p>	<p>•Increase of revenue</p>	<p>capture, utilization and storage (CCUS), carbon neutrality application for technology collaboration and business development</p> <p>4. Act as the convener of the Taiwan-US Carbon Capture, Utilization and Storage (CCUS) Industries Promotion Alliance (TUCA), in order to understand and manage key technologies</p> <p>5. Share courses on net zero sustainability and renewable energy, etc. through CTCI University, such as “CTCI Group Net Zero Sustainability Leadership Forum”, “CTCI Net Zero Sustainability Action Seminar”, in order to improve the understanding and awareness of employees</p>	<ul style="list-style-type: none"> • Underwater foundation pile and offshore wind farm foundation connection section manufacturing works • Molicel Quantum Energy lithium battery plant turnkey project • Taoyuan City Biomass Energy Center
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IV. Climate Change Management Indicator and Goal

1. Greenhouse Gas Emissions Information

In 2021, the greenhouse gas Scopes 1 and 2 emissions of CTCI was 9,599 tons of CO₂e, which mostly referred to the Scopes 1 and 2 emissions from the headquarters building of 159 and 2,445 tons of CO₂e respectively, Scopes 1 and 2 emissions from the global construction sites of 4,318 and 2,677 tons of CO₂e respectively, as shown in Table 3. The Scope 3 emissions were 205 tons of CO₂e, and the inventory inspection scope referred to the headquarters building waste transportation and treatment, and oil consumption of the vehicles leased and used by the headquarters and domestic construction sites, as shown in Table 4. Since 2015, CTCI has performed third party verification on the emissions of the headquarters building and global construction sites. In addition, since 2017, Scope 3 emissions have been included in the inventory inspection and the third party verification.

Table 3. Scopes 1 and 2 emissions during 2018~2021

Region	Scope	Annual Performance				Goal		
		2018	2019	2020	2021	2021	Achieved or not	2022
Headquarters Building	Scope 1	126	149	142	159	146	X [®]	126
	Scope 2	2,910	2,710	2,557	2,445	2,772	○	2,386
Subtotal	Scope 1+2	3,059	2,859	2,699	2,604	2,917	○	2,512
Global Construction Sites	Scope 1	7,026	7,431	4,835	4,318	6,912	○	6,724
	Scope 2	5,115	4,775	2,408	2,677	5,655	○	5,501
Subtotal	Scope 1+2	12,141	12,206	7,243	6,995	12,567	○	12,225
Add up	Scope 1+2	15,177	15,065	9,942	9,599	15,484	○	14,737

Table 4. Scope 3 emissions in 2021

Emission source	Greenhouse Gas Emissions of Scope 3 (tons of CO ₂ e)
Greenhouse Gas Emissions of Headquarters Building (tons of CO ₂ e/year)	35
Domestic Construction sites Greenhouse Gas Emissions (tons of CO ₂ e/year)	170
Oversea Construction sites Greenhouse Gas Emissions (tons of CO ₂ e/year)	0
Total	205

2. 2050 Reduction Roadmap

CTCI has prepared the 2050 reduction roadmap complying with the SBTi Science Based Targets Initiative committed in 2022, and the year 2022 is used as the base year in order to set up the goal of reduction of at least 4.2% annually for 2020~2030, and reduction of at least 2.9% annually for 2030~2050. Accordingly, the reduction in 2025 is 21% in comparison to the base year, the reduction in 2030 is 45%, the reduction in 2040 is 71% and the reduction will reach the goal of net zero emissions in 2050. Furthermore, it also satisfies the goal of “office with net zero carbon emissions in 2030, and office and production sites with zero carbon emissions in 2050” committed by the Company to the “Taiwan Alliance for Net Zero Emission”, as shown in Figure 5.

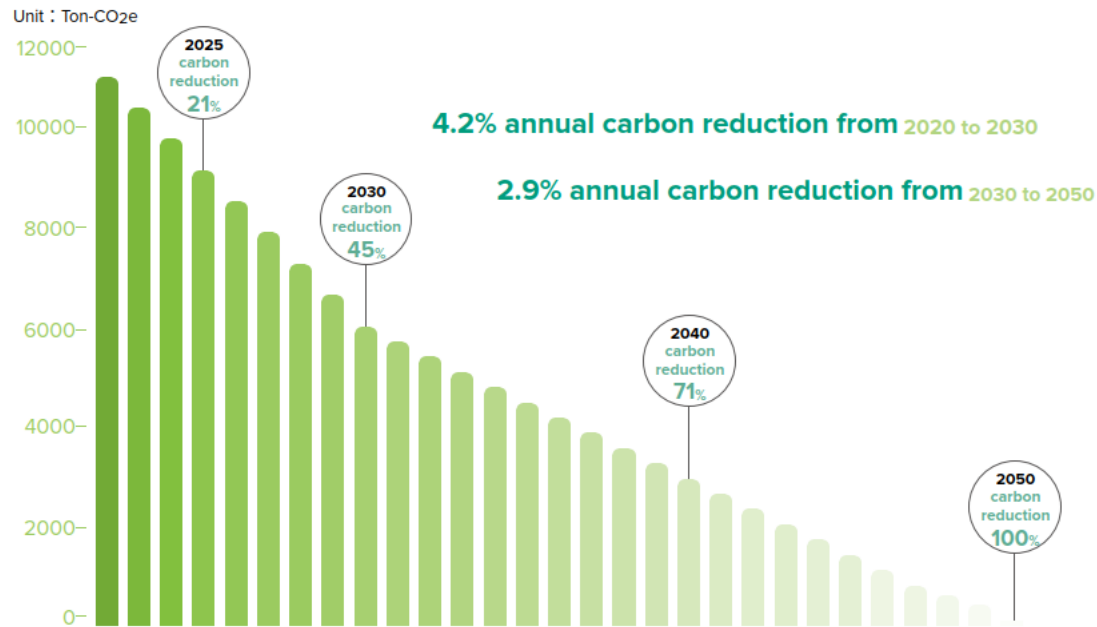


Figure 5. The greenhouse gas reduction roadmap

3. Greenhouse Gas Performance Management Indicator

To reduce greenhouse gas emissions according to the greenhouse gas reduction roadmap, the Company has set up various management indicators in order to determine whether energy use efficiency is increased, and greenhouse gas emission of unit economic activity is reduced. The indicators need to be tracked continuously in order to understand the trend of change and to use it as a basis for long-term management improvement strategy. The indicators set are as follows:

- Energy use efficiency: Headquarters building unit area electricity use intensity (EUI), per capita electricity consumption of headquarters building, electricity consumption of average million working hours of global construction sites
- Greenhouse gas emissions of unit economic activity: Per capita greenhouse gas emission intensity of headquarters building, greenhouse gas emission intensity of average NT\$ million of revenue of headquarters building and emissions of average million working hours of global sites

Indicator trend of the most recent year is summarized in Table 5:

Table 3. The greenhouse gas performance management indicator for the most recent year

Region	Indicator	Unit	Annual Performance				Goal		
			2018	2019	2020	2021	2021	Achieved or not	2022
Headquarters Building	Energy Use Intensity (EUI)	kWh of electricity/square meter	125.5	121.5	120.0	116.4	119.6	○	102.9
	Emission Intensity	Tons of CO ₂ e/person	1.51	1.38	1.35	1.40	1.41	○	1.38
	Emission Intensity	Tons of CO ₂ e/million NTD revenue	0.085	0.108	0.104	0.085	0.113	○	0.082
	Energy Intensity	kWh/person	2,616	2,448	2,510	2,612.5	2,418	×	2,361
Global Construction Sites	Emission Intensity	Tons of CO ₂ e/million working hours	504.5	401.7	293.4	330.94	471.2	○	460.1
	Energy Intensity	kWh of electricity/ million working hours	-	-	-	242,916.0	-	-	327,176

Notes

- ① The goals are based on the 2021 energy management performance indicators, the estimated number of people at the headquarters, and estimated number working hours at the construction sites.
- ② The number of employees indicates the average number of employees at the end of each month of the year.
- ③ Million NTD revenue indicates the unconsolidated revenue of the year.
- ④ The carbon emissions of each indicator are calculated based on the sum of Scope 1 and Scope 2.
- ⑤ Since the 2021 targets of CO₂e emissions per person at the headquarters building and CO₂e emissions per million working hours at construction sites were listed as material issues, so it was reduced by 6.6% in 2018.
- ⑥ The use of electricity in the headquarters building in 2021 was decrease by 3% compared with 2020; and the average number of people in 2021 was 1,800 compared with 2,002 in 2020, a greater decrease of 7%. Therefore, energy intensity (kWh/person) was unable to reach the goal. In 2022, energy-saving management and control measures will be implemented for equipment and operations such as air conditioning, lighting, elevators, sockets, water, paper, and resource recovery in the headquarters building.