Chunghwa Telecom
2022 TCFD
Report

March 2023

Content

I. About the Report

The impact of climate change on the earth and human life is becoming increasingly significant, and it is now a topic of global concern. As the leader of Taiwan's telecommunications industry, Chunghwa Telecom (hereinafter known as CHT) shoulders the responsibility of promoting Taiwan's sustainable development. To this end, CHT launched the TCFD project in 2020 to identify, analyze and assess climate risks and opportunities for the Company, so as to transition towards low carbonization and emission transition by 2050. Continuing to build on the results of the existing TCFD project, CHT has re-examined and assessed climate risks and opportunities this year (2023), as well as publishing this report based on the Recommendations of the Task Force on Climate-related Financial Disclosures (hereinafter known as TCFD) as the tool for examining the results of TCFD implementation this year (2023), so as to help the company stay updated with the impact of climate change and explore future business opportunities in a timely manner.

The scope of this report covers CHT's sites and businesses all over Taiwan from January 1, 2022 to December 31, 2022.

II. Introduction

(I) Overview of TCFD Implementation by CHT

To manage the impact of climate change on the Company, CHT launched the TCFD project in 2020. The Company focuses on four major areas to mitigate and adapt the climate change while inviting international third-party organizations to verify our TCFD implementation efforts. As a result, CHT was once again obtained a conformity statement with the highest level of "Level 5+: Excellence grade," making it the world's first telecommunications company to obtain TCFD verification.

Table 1. CHT Climate Change Management Framework

Governance	The Environment (E) group under the Sustainable Development Committee coordinates climate change efforts and submits the results of climate risk and opportunity assessment to the Risk Management Committee. The Risk Management Committee reports companywide risks to the Board of Directors on a regular basis.
Strategy	Strategies and initiatives for climate change mitigation and adaptation have been formulated, including: Mitigation: Taking actions towards improving energy efficiency, adopting renewable energy, engaging in the research and development of emerging technologies. Adaptation: Strengthening the climate resilience of our communication equipment and facilities to reduce the impact of natural disasters on the Company.
Risk Management	Following the ISO 31000 Risk Management - Guidelines to set up climate change risk management processes. The impact of climate change is assessed each year.
Metrics & Targets	The target of 2050 net zero emissions have been set. The Company's climate change adaptation targets align with that of the National Climate Change Adaptation Action Plan.

(II) Review of CHT's Road to Low-carbon Transition

Table 2. CHT's Road to Low-carbon Transition

Year	Description
2022	● Proposing targets for mitigating climate change, including: – Reducing Scope 1 and 2 emissions by 50% in 2030 with 2020 as baseline year; – Reducing Scope 3 emissions by 50% in 2030 with 2020 as baseline year; – Achieving the target of RE100 by 2040
2021	● Proposing the net-zero emissions target for 2050 ● Developing a Science Based Target (SBT) commitment ● Joining the Taiwan Alliance for Net Zero Emission ● Launching the BS 8001 circular economy project ● Setting up the Sustainable Development Committee
2020	● Obtaining the TCFD conformity statement ● Launching the TCFD project ● Building the largest photovoltaic power station in Yilan as part of the BT model
2019	● The Syntrend store passed ISO 14067 and PAS 2060 carbon neutrality standard
2018	● Becoming a TCFD supporter
2017	● Becoming a CDP Supply Chain member
2011	● Introducing ISO 50001 energy management systems
2008	● Launching the GHG inventory project ● Developing and launching the EARTH system

III. Sustainable Climate Governance

(I) Board of Directors' Oversight of Climate-related Risks and Opportunities

The Board of Directors is the highest governance body of CHT, with the Chairman of the Board and President serving as the Chairperson and Vice Chairperson of the Sustainable Development Committee. The Sustainable Development Committee reports the results of climate change policy implementation to the Chairman and President each month, as well as significant ESG issues and results of stakeholder communication every 6 months to the Board for annual performance appraisal. The Sustainable Development Committee divides its responsibilities into three groups, with the Environment (E) group overseeing climate change mitigation and adaptation as well the TCFD recommendations. The Environmental Group reports aforementioned tasks for the review and oversight of the Board, including climate change risk and opportunity management, the progress of climate change mitigation and adaptation strategies and objectives, the annual implementation plan and budget for the following year, etc. CHT follows the guidance of the Board of Directors to promptly revise climate change and adaptation strategies to facilitate decision-making by Board members.

(II) Assessment and Management of Climate-related Risks and Opportunities by the Sustainable Development Committee

CHT set up the Sustainable Development Committee for coordinating and promoting the Company's effort in aspects including environmental (E), social (S) and governance (G). The Sustainable Development Committee is chaired by the Chairman of the Board, with the President serving as the Vice Chairperson, as well as the Company's four Executive SEVPs leading the 4 ESG groups to complete their tasks. The Sustainable Development Committee holds group meetings once a month, cross-group meetings once a quarter, committee meetings every six months, as well as reporting to the Board of Directors every quarter. The report includes annual ESG results and promotion plans for the upcoming year. Please refer to Figure 1 for the organizational chart of the CHT Sustainable Development Committee.

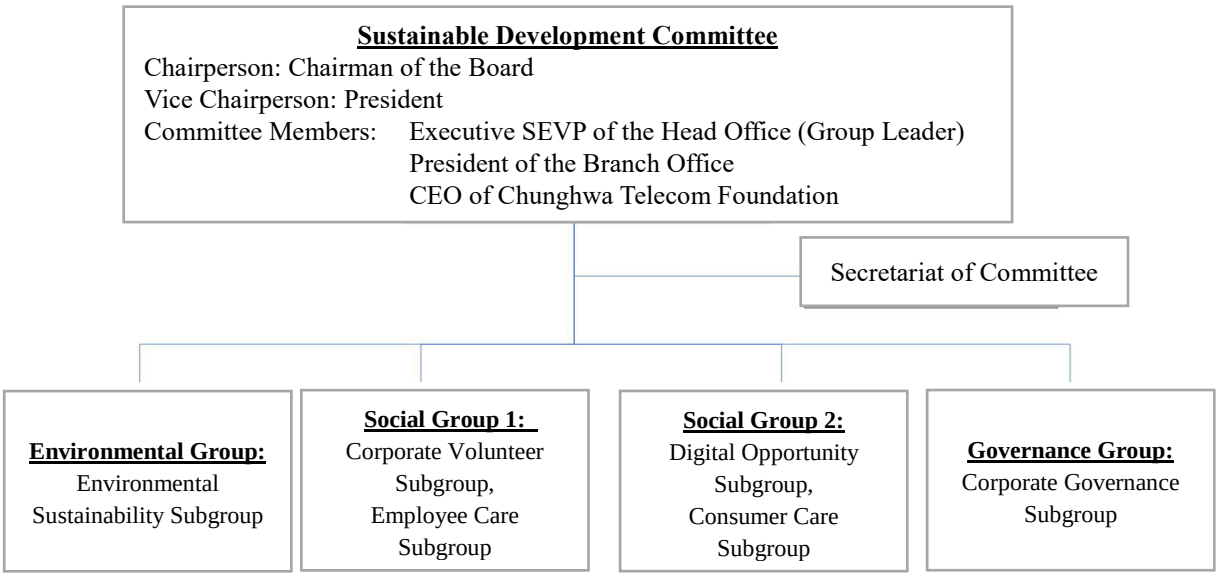

Figure 1. Organizational Structure of CHT Sustainable Development Committee

(III) Connection between Director, Executive and Employee Compensation and Sustainability Performance

To foster climate change awareness and culture, the Company has tied the compensation of Directors and employees with corporate sustainability/climate change issues, so as to encourage both Directors and employees to engage in climate change effort and help the Company move towards a low carbon transition.

1. Directors

All Directors of CHT are nominated by the Board of Directors and shareholders with shares of statutory percentage, and are elected by the shareholders general meeting. To tie the Directors' performance with the corporate vision for sustainability and the short, mid-, and long-term strategic targets, assess the required core competencies, strengthen accountability, link performances with compensation, retain and attract key talents to the Board of Directors, the Compensation Committee incorporates sustainable management strategic targets in the indicators for Directors' compensation with a degree of flexibility to tie it with the variable compensation in accordance with regulations such as the Articles of Incorporation and achieve a win-win situation.

2. Executives

In line with the "Performance Management Guidelines for Executives of Chunghwa Telecom," the sustainability indicators for CHT's executives and variable compensation include: (1) risk management, (2) codes of ethical conduct, (3) IT network security, (4) climate change, (5) stakeholder engagement and inventory, as well as (6) social participation. The performance evaluation of climate change indicators has an impact on the overall variable compensation of executives.

3. Employees

To ensure environmental sustainability can be promoted both from top-to-bottom and bottom-to-top, CHT has formulated the "Guidelines for Environmental Sustainability Incentives" for top management of the department, local operating sites and all employees to motivate the management team. If the department is granted the incentive, it will help improve the individual annual performance appraisal of top management and local operating sites. In the meantime, it can be associated with the individual annual performance appraisal for employees.

The top 5 departments will receive major administrative rewards (as in a significant increase in the department's annual bonuses) and high-quality accommodation vouchers. The winning departments and employees' effort will be publicly acknowledged so as to encourage department employees to participate in energy conservation and carbon reduction. This fosters a net zero sustainable corporate culture with aspects listed as follows:

Energy conservation (50%): We evaluate the annual electricity and water consumption of each unit through the Earth System. Compared with the previous year, the organizations that save more resources will get a higher score.

Procurement (20%): The amount of green procurement recorded in the EARTH System is taken into consideration, including the purchase of eco-friendly products certified by the Environmental Protection Administration such as the Eco Label, Energy Label, Water Label and Green Building Material Label. The higher the procurement amount for these products, the higher the score.

Activities (15%): CHT counts the number of times each organization promotes environmental education, ecological activities and environmental protection. Those with a wider range and more times of participations get a higher score.

Innovation (15%): CHT collects information on renewable energy management, water resource recycling, waste recycling, awards, etc. of each organization. Those who participate in a wide range of activities with outstanding performance will receive a higher score.

Combining the scores of aforementioned evaluation indicators, the 15 teams with the highest total score are given administrative reward points and accommodation vouchers to encourage employees to make proposals that will reduce corporate carbon emissions and shape the Company's image as the forerunner in environmental protection.

IV. Assessment of Climate-Risks and Opportunities

CHT follows TCFD recommendations to divide risks for the industry into transition risks and physical risks, and subdividing transition risks into policy and legal, technology, market and reputation, the acute and chronic of physical risks, as well as subdividing opportunities into resource efficiency, energy source, products and services, markets and resilience. Processes for identifying and assessing climate change risks and opportunities are also conducted. As a principle, CHT implements an assessment at least once a year, covering CHT, its upstream and downstream, as well as all existing operating sites.

(I) Process for Identifying Climate-Risks and Opportunities

CHT collects global industry risk management reports, local regulations and policies and peer reports based on TCFD recommendations to identify relevant issues for each category of risks and opportunities. The associated short-, medium-, and long-term climate risks and opportunities (Table 4) are identified based on the definition of short-, medium-, and long term (Table 3).

Table 3. Time Range for Climate Change Risks and Opportunities

Time Range	Time
Short-term	2022-2025 (1-4 years)
Medium-term	2026-2030 (5-10 years)
Long-term	2031-2050 (11-30 years)

Table 4. Issue Identification for CHT's Climate-related Risks and Opportunities

Risks/Opportunities	Category	Time Range	Issue
Transition Risks	Policy and Legal	Short-term Medium-term Long-term	● The national net zero emission policy increases the cost of GHG emissions ● The national renewable energy policy requires an investment in renewable energy ● Other sustainability related legislation might increase operating costs
	Technology	Short-term Medium-term	● Failed investment in new technologies (for example, the technology under

		Long-term	development no longer produce low-carbon benefits, so the investment in new technology fails) ● The Company have not invest in low-carbon transition technologies, so missed the trend of investing in the R&D of low carbon technologies
	Market	Short-term Medium-term Long-term	● Changes in customer behavior (such as increased awareness of climate change among consumers and evolving demand for products and services)
	Reputation	Medium-term Long-term	● The risk of litigation might affect reputation ● The suppliers' carbon reduction performance does not meet expectations, which has an impact on Company reputation
Physical Risks	Acute	Short-term Medium-term	● Increased severity of extreme weather events such as typhoons and floods resulting in damage to facilities/equipment ● The impact of extreme weather events on supplier operations and production resulting in interruption/delay of product supply
	Chronic	Short-term Medium-term	● The average temperature continues to rise, resulting in an increase in energy consumption ● Long-term changes in the climate and environment (such as rainfall patterns,

			temperature, sea level), resulting in asset damage ● Long-term changes in the climate and environment (such as rainfall patterns, temperature, sea level), resulting in an impact on supplier operations and production
Opportunities	Resource Efficiency	Short-term Medium-term Long-term	● Adopting a more efficient operating model to reduce operating costs
	Energy Source	Short-term Medium-term Long-term	● Adopting low-carbon energy to reduce GHG emissions
	Products and Services	Short-term Medium-term Long-term	● Developing and/or increasing low-carbon products and services (including energy-saving measures in the supply chain) to increase revenue
	Markets	Short-term Medium-term Long-term	● The popularity of emerging technologies such as 5G, IoT and big data drives industrial transformation
	Resilience	Short-term Medium-term Long-term	● Strengthening asset resilience to reduce the impact of physical risks

(II) Process for Assessing Climate-Risks and Opportunities

CHT adopted the Delphi method to interview each department for their opinions and feedback on risk and opportunity categories, before conducting an analysis of climate risks and opportunities based on the Analytic Hierarchy Process (AHP). CHT formulated a hierarchy based on the climate change risks and opportunities proposed by TCFD to compare the risks and opportunities in each category against one another in pairs for assessing the relative importance of different categories of risk and opportunity, before

finally coming up with the weights and priorities for each category of risks and opportunities.

As stated in Table 5, CHT's analysis shows that the weight of climate-related opportunities is 0.735, the weight of climate-related transition risks is 0.207, and the weight of climate-related physical risks is 0.058. CHT sets climate-related opportunities, climate-related transition risks and physical risks with the highest weight as the material risk/opportunity category. Therefore, the material risk categories are policy and legal risks, as well as acute risks. Climate-related opportunities come from energy source.

Table 5. Results of Climate Risks and Opportunities Analysis - Weight by Category

	Cost Consideration for the Program	**Estimated Benefits of the Program**	**Loss for Violating the Regulations**	**Impact of Climate Disasters**
Climate-related Opportunities (0.735)	0.044	0.109	0.666	0.181
Resource Efficiency (0.075)	0.064	0.077	0.611	0.248
Energy Source (0.435)	0.043	0.096	0.666	0.194
Products and Services (0.029)	0.045	0.11	0.681	0.164
Markets (0.094)	0.041	0.154	0.729	0.076
Resilience (0.367)	0.042	0.121	0.662	0.175
Climate-related Transition Risks (0.207)	0.073	0.128	0.653	0.147
Policy and Legal	0.041	0.123	0.67	0.165

(0.648)				
Technology (0.041)	0.036	0.127	0.649	0.187
Market (0.11)	0.051	0.145	0.682	0.121
Reputation (0.201)	0.178	0.135	0.589	0.098
Climate-related Physical Risks (0.058)	0.104	0.181	0.629	0.086
Acute (0.75)	0.051	0.209	0.643	0.097
Chronic (0.25)	0.249	0.105	0.592	0.054

(III) Process for Managing Climate-Risks and Opportunities

The Environment (E) group reports the results of the assessment and analysis to the Risk Management Committee. The Risk Management Committee evaluates climate change risks and other risks the Company faces to take necessary mitigation measures according to the degree of risk. In addition, the Sustainable Development Committee reports the implementation results of the TCFD project (including risk assessment results) in committee meetings, as well as reporting to the Board of Directors in due course. CHT lists its response measures for each category of climate-related risks and opportunities, as shown in Table 6.

Table 6. Response Measures to Each Category of Climate-related Risks and Opportunities

Risks / Opportunities	Category	Description
Transition Risks	Policy and Legal	CHT pays close attention to laws and regulations at home and abroad, as well as actively engaging with stakeholders. CHT is subject to policies and regulations including the Climate Change Response Act (including Taiwan's 2050 net zero emission policy and carbon fee), the Renewable Energy Development Act, and disclosure requirements for information on climate change by the stock exchange in Taiwan and the United States, etc. CHT needs to invest resources to comply with aforementioned regulations,

Risks / Opportunities	Category	Description
		resulting in an increase in the Company's operating costs. CHT has taken corresponding measures to comply with aforementioned regulations, including setting the target of net zero emission by 2050, achieving RE100 in 2040, fully adopting renewable energy in IDCs by 2030, and implementing GHG inventory and reduction plans.
	Technology	According to the IEA report, the best way for enterprises to save energy and reduce carbon emissions is to improving energy efficiency. In this vein, technological improvement will help save energy and reduce carbon emissions. The ICT industry can develop emerging technologies such as 5G, AI, big data analysis, and the Internet of Things based on its professional technologies and advantages, and these technologies will in turn help the customers save energy and reduce their carbon footprint. If CHT does not actively research and develop relevant emerging technologies, the Company's ICT technology may lag behind its peers with an impact on its market share. In recent years, CHT has invested considerable resources into the research and development of emerging technologies such as 5G, AI, big data analysis, and the Internet of Things to master key technologies in the ICT industry and enhance the competitiveness of its core products. CHT has formulated long-term business development plans as follows: (1)Actively expanding emerging businesses, making good use of the R&D resources of Chunghwa Telecom Laboratories and the capacity of strategic partners to build the industrial ecosystem, promoting smart services and solutions for corporate customers and consumers, improving the operational efficiency of corporate customers, enhancing the well-being of consumers, expanding domestic and overseas markets to become the leader of smart life and the enabler of the digital economy. (2) Simultaneously strengthening the Company's operating costs and procurement benefits through smart

Risks / Opportunities	Category	Description
		technologies, digitalization, network virtualization, software-defined networking and other similar technologies, increasing the output/input ratio of resources, and effectively optimizing investment and cost of construction.
	Markets	As the impact of climate change becomes more and more significant, customers' awareness of carbon reduction and environmental protection has also been enhanced. Therefore, the market will transition towards low-carbonization. With the rapid development of the ICT industry, failing to stay updated with the current situation and market trends will have an impact on the operations of CHT. Nevertheless, CHT believes that there are many opportunities in terms of products and services. For example, the transition such as the low-carbon economic transition driven by global climate change, coupled with the impact of the global COVID-19 outbreak in early 2020, have given rise to business opportunities in ICT and online telecommunications services. To speed up industrial transformation and upgrading, the Taiwanese government proposed the 5+2 Industrial Innovation Plan as the core to drive the growth of Taiwan's next-generation industries. One of the plans is the Asia Silicon Valley Development Plan with IOT as the core of an innovative ecosystem. This happens to be one of CHT's core businesses. CHT actively grasps the business opportunities brought about by climate change. In order to help promote the national policy of the 5+2 Industrial Innovation Plan, CHT takes "Smart City" as the core, coupled with network disadvantages, innovative ICT technology, and environmental protection solutions to assist local enterprises in taking actions towards low-carbon transition.
	Reputation	Climate change has become an issue of global concern. As a leader in the telecommunications industry, CHT may lose the favor of customers if it does not actively take actions, leading to an impact of the Company's business performance and reputation. In September 2021, CHT officially pledged its net zero

Risks / Opportunities	Category	Description
		emission target by 2050. It will actively assist the entire value chain in engaging in zero carbon work with its professional expertise, such as emerging technologies including 5G, AI and big data analysis.
Physical Risks	Acute	The operations of CHT's data centers and base stations are vulnerable to extreme weather, such as typhoons, heavy rains, and other natural disasters, which may lead to severe damage to the Company's mobile communication network equipment. To this end, we have formulated short-, medium- and long-term climate change adaptation plans, which are categorized as short-term for 1-3 years, medium-term for 3-8 years and long-term for over 8 years. The adaptation plan covers 100% of the existing and newly-built operating sites and communication equipment. CHT's climate change adaptation plan has three subitems, including short-, medium- and long-term core tasks, namely: (1) Action plan for flood and disaster prevention for telecommunications equipment and building facilities in the data centers (2)Adaptation action plans for network facilities in response to climate change (3)Network adaptation action plan in response to climate change for mobile communication base stations
	Chronic	
Opportunities	Resource Efficiency	According to the results of CHT's GHG inventory, Scope 2 emissions account for more than 96% of the total Scope 1 and 2 emissions. As a result, a more efficient operating model can not only reduce GHG emissions but also save energy costs. CHT's highly efficient operating model covers equipment replacement in data centers, base stations and buildings, baseband unit integration for C-RAN architecture, 2G gateway switch phaseout, 3G-F2 cell shutdown, 4G sleep Mode, RRU relocation for base stations, adopting natural ventilation or exhaust fans, IP conversion to SVG for PSTN equipment, replacing old electric air conditioners with hot and cold aisles and high sensible heat air conditioning, as well as NG SDH elimination and so on.
	Energy	According to the results of CHT's GHG inventory, Scope 2

Risks / Opportunities	Category	Description
	Source	emissions account for more than 96% of the total Scope 1 and 2 emissions. According to the IEA report, the second best path for companies to save energy and reduce carbon emissions is using renewable energy. Therefore, renewable energy can reduce GHG emissions and save energy costs. In 2022, CHT purchased land-based wind power and photovoltaic energy, providing 5 million kWh of land-based wind energy and 17 million kWh of photovoltaic energy, adding up to a total of 22 million kWh (equivalent to reducing carbon by 11,440 tCO2e). In the future, 62 million kWh (equivalent to 31,124 tCO2e in carbon reduction) will be provided each year as part of CHT's pledge to continuous deployment and procurement of renewable energy.
	Products and Services	As the society's awareness of climate change continues to increase, the demand for low carbonization is also becoming more significant. If CHT can respond to the customers' demand for low-carbon products and services in time, the market share can be stabilized and increased. CHT's IDCs are green data centers with high energy efficiency (PUE 1.657). We will work towards PUE 1.5 for IDCs by 2030.
	Markets	The International Telecommunication Union (ITU) pointed out that in order to achieve the climate targets of the Paris Agreement, the ICT industry can use its own technological advantages and capabilities to contribute to global energy conservation and carbon reduction. For example, the low-carbon economic transition coupled with the impact of the global COVID-19 outbreak in early 2020 have given rise to business opportunities in the ICT industry. To speed up industrial transformation and upgrading, the Taiwanese government proposed the 5+2 Industrial Innovation Plan, including building an innovative IoT ecosystem, which is one of CHT's core businesses. CHT complies with national policies and combines forward-looking ICT technologies to propose low-carbon solutions, including engaging in the energy-saving transition of smart cities/factories/buildings by taking advantage of ICT

Risks / Opportunities	Category	Description
		technologies such as 5G, IoT and data innovation, effectively assisting customers in moving towards the low-carbon economic transition and realizing revenue growth for CHT. Take AIoT as an example, CHT's IoT platform currently has 8,300 users and 710,000 devices as the biggest in Taiwan, with fields of application including smart energy, construction, transportation, tourism and agriculture.
	Resilience	IPCC predicts that the number of tropical cyclones (typhoons) will decrease in the future, but the strongest Category 4 (with a wind speed of 58-70 meters per second, which is equivalent to a severe typhoon) and Category 5 (with a wind speed greater than 70 meters per second, which is equivalent to a severe typhoon) cyclones are expected to occur more frequently. If the frequency and severity of severe typhoons increase, CHT's operating sites, data centers and base stations will face the risk of damage. On the other hand, if CHT implements good climate change adaptation measures and strengthens the adaptability of assets and equipment, it can avoid damage and maintain normal operations. We formulate short-, medium- and long-term climate change adaptation plans, which last 1-3 years for short-term, 3-8 years for medium-term and over 8 years for long-term, covering 100% of the existing and newly-built operating sites and communication equipment. CHT's climate change adaptation plan has three subitems, including short-, medium- and long-term core tasks, namely: (1) Action plan for flood and disaster prevention for telecommunications equipment and building facilities in the data centers (2) Adaptation action plans for network facilities in response to climate change (3) Network adaptation action plan in response to climate change for mobile communication base stations

V. Scenario Analysis for Climate Change Risks

(I) Climate-related Scenarios Adopted by CHT

CHT's climate change strategy is divided into mitigation and adaptation. The climate change mitigation strategy prioritizes achieving net zero emissions by 2050 as the main mission, as well as leading upstream and downstream partners to achieve the 1.5°C target set in the Paris Agreement together. The climate change adaptation strategy prioritizes strengthening the climate resilience of the Company's infrastructure and communication equipment to ensure that the Company's business operations remain uninterrupted.

CHT follows the TCFD framework to set a baseline scenario and a 1.5°C scenario to identify and analyze short-, medium- and long-term climate risks and opportunities in the Company's scope of business, upstream and downstream, and the entire life cycle of assets. The climate change mitigation strategy (transition risk) adopts IEA STEPs (baseline scenario) and IEA NZE (1.5°C scenario) climate scenarios, while the climate change adaptation strategy (physical risk) adopts IPCC RCP 8.5 (baseline scenario) and IPCC RCP 2.6 (1.5°C scenario) as climate scenarios.

(II) Physical Risks

1. Climate Risks CHT Faces

To stay updated with physical risks faced by CHT and facilitate the formulation of relevant response plans, CHT conducts assessment with tools developed by UN's WRI and Taiwan's National Science and Technology Center for Disaster respectively.

For the tool developed by UN's WRI, in addition to the overall water risk of the baseline year, two different years (2030 and 2040) are also adopted for future assessment paired with pessimistic, BAU(business as usual) and optimistic scenarios for risk analysis targeting overall water stress. The result of the analysis shows that more than 85% of CHT's operating sites are located at medium-high or below risk under any scenario.

For the tool developed by Taiwan's National Science and Technology Center for Disaster, the risks faced by each operating base under the influence of heavy rain are respectively analyzed by flood and rainfall (Level 1 warning value), hillslope disaster warning value and landslide disaster warning value. Since the Taiwanese government has only proposed future estimates of torrential rains and has not yet included heavy rains in the analysis, if the Taiwanese government releases the occurrence of heavy rains and extremely torrential rains under different climate scenarios in the future, the process and results of the analysis will be revised. According to the analysis results, the flood rainfall (Level 1 warning value), hillslope disaster warning value and landslide disaster warning value in areas where CHT operating sites are located all exceed that of torrential rains, meaning that there is little impact on CHT under any climate scenario.

2. Analysis of Significant Climate Risks

According to CHT's assessment of climate change risks and opportunities, acute risks have the highest weight as material risks among physical risks. As climate change becomes more and more significant, IPCC predicted that the number of tropical cyclones (typhoons) will decrease in the future, but the strongest Category 4 (with a wind speed of 58-70 meters per second, which is equivalent to a severe typhoon) and Category 5 (with a wind speed greater than 70 meters per second, which is equivalent to a severe typhoon) cyclones are expected to occur more frequently. If the frequency and severity of severe typhoons increase, CHT's operating sites, data centers and base stations will face the risk of damage. Taiwan's TCCIP also specifically pointed out that the intensity of typhoon rainfall will increase by 20% to 40%, meaning that some areas may be flooded, especially the central region and the central and northern mountainous areas. If an area suffers from flooding or a landslide caused by typhoons in the area where CHT's operating sites, data centers and base stations are located, the Company's assets will be damaged.

The IPCC report pointed out that in the 1.5-2°C scenario, the number of tropical cyclones (typhoons) is expected to decrease with a higher frequency for the most intense Category 4 and 5 cyclones (severe typhoons). This projection is roughly consistent with a higher temperature increase (i.e. greater than 2°C scenario). The assessment results showed that under the climate scenarios of RCP 8.5 and RCP 2.6, the potential annual financial impact of severe typhoons on the Company is at least NT$149 million.

CHT adopted the tool developed by UN's WRI to conduct assessments for data centers and base stations throughout Taiwan. In addition to the overall water risk of the baseline year, two different years (2030 and 2040) are also adopted for future assessment paired with pessimistic, BAU and optimistic scenarios for risk analysis targeting overall water stress. The result of the analysis falls in the low-medium range. In other words, CHT's base stations, operating sites and data centers remain in safe locations before 2040.

CHT has formulated short-, medium- and long-term climate change adaptation plans, which last 1-3 years for short-term, 3-8 years for medium-term and over 8 years for long-term, covering 100% of the existing and newly-built operating sites and communication equipment. The annual budget will be prepared in accordance with the progress of the climate change adaptation plans.

CHT's climate change adaptation plan has three subitems, including short-, medium- and long-term core tasks, namely:

(1) Action plan for flood and disaster prevention for telecommunications equipment and building facilities in the data centers.

(2) Adaptation action plans for network facilities in response to climate change.

(3) Network adaptation action plan in response to climate change for mobile communication base stations.

3. Physical Risks in the Supply Chain

To stay updated with the physical risks faced by the supply chain and help CHT formulate relevant response plans, CHT has analyzed the physical risks of key suppliers (suppliers with an annual transaction amount of more than NT$50 million), with the key suppliers' purchase amount accounting for 80.71% of 2022. CHT adopted the tool developed by UN's WRI to conduct assessments. In addition to the overall water risk of the baseline year, two different years (2030 and 2040) are also adopted for future assessment paired with pessimistic, BAU and optimistic scenarios for risk analysis targeting overall water stress. Furthermore, the degree of risk faced by each category is categorized into financial, commodity, general labor and construction and repair based on the purchase amount.

The result of the analysis showed that more than 90% of CHT's key suppliers are rated as low and low-medium risk. Therefore, CHT's key suppliers are operating in safe locations before 2040.

(III) Transition Risks

According to CHT's assessment of climate change risks and opportunities, policy and legal risks have the highest weight among transition risks as material risks. After the United Nations passed the Paris Agreement, countries around the world have set climate change mitigation targets. In March 2022, the Taiwanese government published "Taiwan's 2050 Net-Zero Emission Path and Strategies," providing the trajectory and path to net zero emissions by 2050. In addition, the "Climate Change Response Act" passed the third reading in January 2023, which clearly stipulates the target of net zero emissions in 2050. Therefore, all enterprises in Taiwan are regulated by the "Climate Change Response Act" and must achieve net zero emissions by 2050 .

In the IEA STEPs scenario, assumed that the Taiwanese government achieves the 2050 net zero emission targets and the corresponding milestones, that is, a 10% reduction in 2025 and a 24% ± 1% reduction in 2030. To this end, CHT must invest in net-zero actions including buying electric company vehicles for Scope 1, the purchase of renewable energy in Scope 2, etc. The remaining carbon emissions may be written off by purchasing carbon rights. The estimation shows that in order to achieve the trajectory of net zero emissions in 2050 assuming that both carbon emissions and energy consumption remain at the 2020 level, in 2025, 2030, 2040 and 2050, additional expenses will reach NT$650 million, NT$3.945 billion, NT$8.393 billion and NT$2.045 billion.

In the IEA NZE scenario, assumed that the Taiwanese government achieves the 2050 net zero emission target and further amends the law to set the baseline year as 2020, its carbon

reduction target is revised up to 21% in 2025, 42% in 2030, and net zero in 2050 while strengthening the policy. The estimation shows that in order to achieve the trajectory of net zero emissions in 2050 assuming that both carbon emissions and energy consumption remain at the 2020 level, in 2025, 2030, 2040 and 2050, additional expenses will reach NT$1.447 billion, NT$7.891 billion, NT$6.398 billion and NT$3.050 billion.

With reference to the IEA report, CHT clearly understands that the most effective ways to reduce carbon emissions are (1) improving energy efficiency and (2) using renewable energy. The carbon reduction plans proposed by the Company include but are not limited to: improving energy efficiency of IDCs, replacing old equipment as well as maintaining and optimizing existing equipment and facilities, construction and purchase of renewable energy fields, pure green energy procurement, renewable energy certificates, development of energy storage equipment and other projects. In 2021, CHT implemented projects including equipment replacement in data centers, base stations and buildings, baseband unit integration for C-RAN architecture, 2G gateway switch phaseout, 3G-F2 cell shutdown, 4G sleep Mode, RRU relocation for base stations, adopting natural ventilation or exhaust fans and so on. As a result, the Company's electricity consumption dropped from 1,509.09 million kWh in 2020 to 1,428.25 million kWh, which is equivalent to a carbon reduction of 51148.808 tCO2e. According to the results of the ISO 14064-1 and GHG Protocol inventory, CHT's Scope 1 and 2 GHG emissions in 2021 was 734,866.73 tCO2e, namely a 7.02% carbon reduction compared with the baseline year (2020), exceeding the existing carbon reduction target.

VI. Response Strategies to Climate Change

(I) Climate change mitigation Management Strategies

SBT published the GUIDANCE FOR ICT COMPANIES SETTING SCIENCE BASED TARGETS in 2020, requiring the ICT industry to set SBTs based on this standard. 2020 is chosen as the baseline year for the ICT industry to reduce carbon emissions by 45% by 2030. The new version of SBT ICT adopts the following methodology while staying in line with the 1.5°C target of the UN's Paris Agreement.

- IPCC 1.5°C P2 scenario requiring a halving of emissions between 2015 and 2030
- SBTi 1.5°C trajectory demanding 42% reduction over 10 years
- A 1.5°C scenario, carbon budget approach based on the ICT sector maintaining a fixed share of overall electricity usage (based on IEA ETP)

CHT proposed to reduce carbon emissions by 50% by 2030 by formulating the 2020-2030 carbon reduction roadmap based on the scenario and targets (IEA NZE) in new version of SBT ICT, which is 5% higher than that in the new version of SBT ICT. In line with the requirement of SBT ICT, CHT has set carbon reduction targets covering the entire company.

In addition, the Taiwanese government announced the 2050 net zero emission target in 2021. As the largest integrated telecommunications company in Taiwan, CHT has the responsibility to coordinate with national policies and the global net zero trend by proposing a net zero emission target. To this end, CHT took the initiative to join the Taiwan Alliance for Net Zero Emission as one of the founding members, and promised to achieve net zero emissions at the organization's head office and branch offices by 2030, and for the entire company by 2050 as the Company's long-term vision and target for carbon reduction.

Table 7. Metrics for Climate change mitigation Management Strategies

Corresponding Material Risks	Metrics	Description
Policy and Legal (Taiwan's net zero emission target by 2050)	GHG emissions (Scope 1, 2 and 3)	According to the Company's climate risk identification results, most risks are related to the issue of GHG reduction. If CHT fails to effectively reduce GHG emissions, the impact of the Company's climate risk will be exacerbated.

	Renewable energy	According to the Company's climate risk identification results, most risks are associated with GHG reduction. The use of renewable energy can effectively reduce carbon emissions and meet regulatory requirements.
	PUE of IDCs	CHT is a part of an industry that is high in energy consumption, especially the data centers. Failure to improve the energy efficiency of data centers has an indirect impact on GHG emissions, resulting in climate risks.

1. Scope 1 and Scope 2 E

A. Targets

CHT estimated the energy consumption from 2021 to 2030 based on the Company's strategy and business volume, before coming up with an estimate of carbon emissions from Scope 1 and 2 GHG (assuming Scope 2 carbon emissions account for 96.55% of the total). This leads to our carbon emissions roadmap under the BAU scenario. The Company's business volume continues to grow in data centers, causing carbon emissions from data centers to rise. In terms of mobile network, 5G infrastructure is being constructed and expanded, and 3G is expected to be shut down in 2025, so carbon emissions from mobile network will continue to grow till 2025 before starting to decline and remain at a fixed level. In the meantime, we proposed a 50% carbon reduction target in 2030 compared to 2020 based on the carbon reduction target for the ICT industry according to SBT. We also planned the annual carbon reduction to draw up a carbon emission roadmap under the 1.5C scenario. In the future, we will work on energy conservation and carbon reduction according to this roadmap. The results of the ISO 14064-1 and GHG Protocol inventories show that Scope 1 and 2 of CHT's GHG emissions in 2021 was 734,866.73 tCO2e, which reduces carbon reduction by 7.02% compared with the baseline year (2020), exceeding the carbon reduction target.

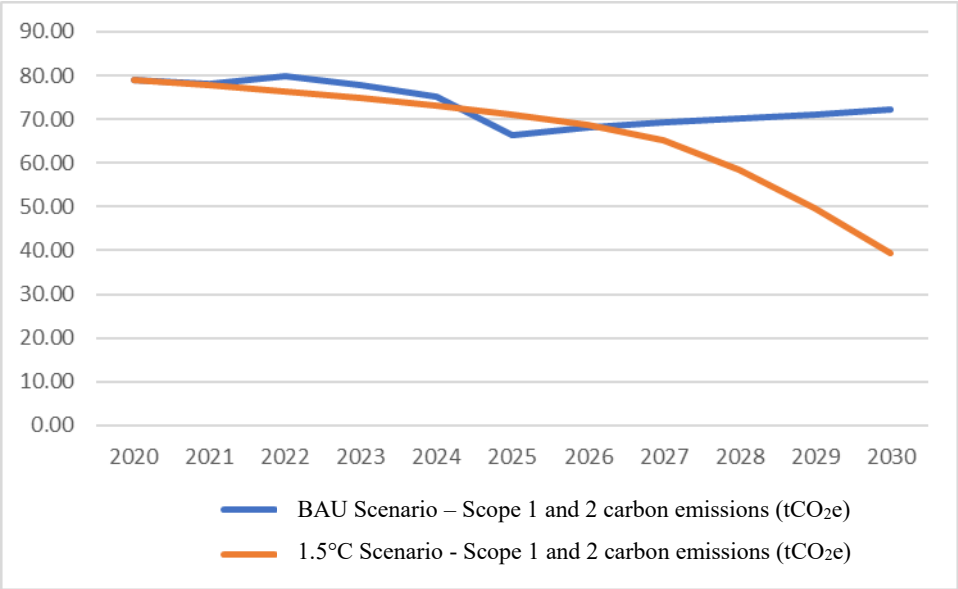

Figure 2. Carbon reduction roadmap for Scope 1 and 2 GHG emissions

B. Strategies

With reference to the IEA report, CHT clearly understands that the most effective ways to reduce carbon emissions are (1) improving energy efficiency and (2) using renewable energy. The carbon reduction plans proposed by the Company include but are not limited to: improving energy efficiency of IDC, replacing old equipment as well as maintaining and optimizing existing equipment and facilities, construction and purchase of renewable energy fields, pure green energy procurement, renewable energy certificates, development of energy storage equipment and other projects. In the meantime, CHT plans to join the RE100 initiative to achieve the target of RE100 by 2040, as well as using 100% of renewable energy for IDCs by 2030.

In 2021, CHT implemented projects including equipment replacement in data centers, base stations and buildings, baseband unit integration for C-RAN architecture, 2G gateway switch phaseout, 3G-F2 cell shutdown, 4G sleep Mode, RRU relocation for base stations, adopting natural ventilation or exhaust fans, IP conversion to SVG for PSTN equipment, replacing old electric air conditioners with hot and cold aisles and high sensible heat air conditioning, as well as NG SDH elimination and so on. In the meantime, the Company has installed 4,506 kWp of PV capacity entirely for self-consumption. Therefore, the Company's energy consumption has dropped from 1,509.09 MWh in 2020 to 1,428.25 MWh, which is equivalent to a carbon reduction of 51,148.808 tCO_2e.

In addition, CHT purchased land-based wind power and photovoltaic energy in 2022 to provide 5 million kWh of land-based wind power and 17 million kWh of photovoltaic energy, achieving a total of 22 million kWh (equivalent to a carbon reduction of 11,440 tCO2e). This will provide 62 million kWh each year (equivalent to carbon reduction of

31,124 tCO_2e). CHT will also continue to source and purchase renewable energy. With other plans to improve the energy efficiency of IDCs and base stations, CHT expects to achieve the carbon reduction targets set in the carbon reduction roadmap between 2022 and 2030.

C. Performance over the Years

CHT regularly adopts international standards to conduct GHG inventory each year to stay updated with the Company's GHG emissions and structure as the basis for formulating effective energy-saving and carbon-reduction strategies and achieving the target of net zero emissions by 2050.

In 2021, the total Scope 1 and Scope 2 emissions of the Company was 734,866.73 t-CO2e. As the Company is not involved in the production of products, its GHG emissions mainly come from energy use (Scope 2 accounts for about 97.6% of the total). As a result, CHT addresses the issue by investing in improving energy efficiency of the equipment and replacing old equipment, such as introducing high-efficiency equipment to IDCs and low-carbon base stations, as well as procuring low-carbon equipment with green labels issued by the government to reduce carbon emissions. In 2021, the GHG emissions decreased by 7% compared with the previous year (2020). In addition, compared with 2019 and 2020, the Scope 1 and Scope 2 emissions in 2021 have gradually decreased year by year, with the hope to move towards net zero emissions by 2050.

Table 8. Scope 1 and Scope 2 Emissions of CHT in the Last Three Years

Year	Scope 1 Emissions (tCO_2e)	Scope 2 Emissions (tCO_2e)	Total Emissions (tCO_2e)	Annual Increase/Decrease (%)
2021	17,887.47	716,979.26	734,866.73	-7.02%
2020	22,192.93	768,128.07	790,321.00	-4.06%
2019	28,455.59	795,295.50	823,751.09	-1.29%

Note: The 2022 GHG inventory and verification is expected to be completed in April 2023.

2. Scope 3 Emissions

A. Targets

SBT published the GUIDANCE FOR ICT COMPANIES SETTING SCIENCE BASED TARGETS in 2020, requiring the ICT industry to set SBTs based on this standard. The new version of the SBT ICT does not set Scope 3 carbon reduction standards and targets for the ICT industry, but requires the ICT industry to set Scope 3 carbon reduction targets based on the SBT Criteria for general industries. According to the latest version of SBT Criteria (Version 5.0 published in October 2021), if Scope 3 carbon emissions exceed 40% of the total carbon emissions, it is necessary to set a Scope 3 carbon reduction target

covering at least 66%, with a minimum of 2.5% of carbon reduction according to the Well-Below 2°C scenario. CHT follows the new version of SBT ICT standards and the specification of SBT Criteria (Version 5.0) to propose a 50% carbon reduction target in 2030 compared with 2020 in Scope 3 GHG, formulated in accordance with the 1.5°C climate target.

For a complete inventory of 15 Scope 3 GHG categories, CHT launched the 2020 Scope 3 GHG inventory project in 2022 to quantify the amount with the GHG Protocol Scope 3 Evaluator, and has passed the level of limited assurance. In the same year, CHT completed the 2021 Scope 3 GHG inventory to quantify Scope 3 carbon emissions by using a combination of screening and inventory methods. The results of the biennial inventory show that the three major sources of Scope 3 GHG include Category 1 (purchased goods and services), Category 2 (capital goods), Category 3 (fuel- and energy-related activities), Category 11 (use of sold products) and Category 13 (downstream leased assets). As a result, these categories will be CHT's key carbon reduction projects in the future. In addition, CHT will gradually expand the proportion of inventory and reduce that of screening to reflect Scope 3 carbon emissions as truthfully as possible.

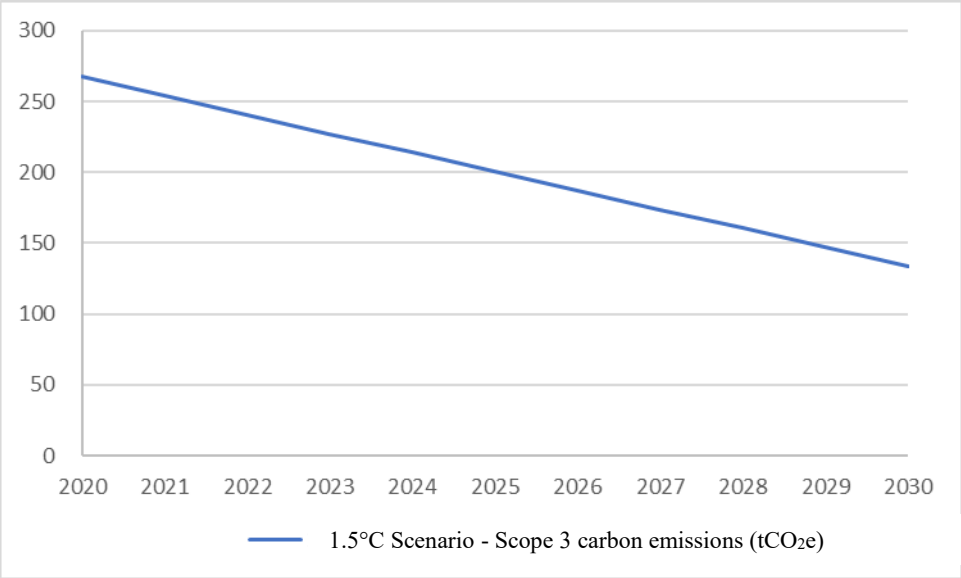

Figure 3. Scope 3 GHG Carbon Reduction Roadmap

B. Strategies

CHT refers to the recommendations of the new version of the SBT ICT standards to focus Scope 3 carbon emissions on the purchased goods and services from the upstream and the use of sold products sold at the downstream, as well as expanding to capital goods, fuel- and energy-related activities and downstream leased assets which account for a high proportion of Scope 3 with a total of 5 categories. CHT will first expand the scope and number of suppliers to be inventoried to enhance their awareness of GHG, as well as

focusing on carbon reduction for the aforementioned 3 projects in 5 categories.

(1) Purchased goods and services, capital goods: Prioritizing the procurement of green products and encouraging suppliers to reduce carbon emissions.

(2) Fuel- and energy-related activities: Improving the energy efficiency of the Company to reduce the consumption of fuel and energy.

(3) Use of sold products: Optimizing the energy efficiency of the Company's products to reduce energy consumption.

(4) Downstream leased assets: In view of the fact that the Company has many assets and lessees, we will encourage lessees to save energy and reduce carbon

C. Performance over the Years

In addition to regular and comprehensive inventory of the organization's GHG emissions, CHT conducted a complete inventory of Scope 3 GHG in line with the GHG Protocol and ISO 14064-1:2018 to conduct a complete inventory of all Scope 3 GHG emissions from 2020, as shown in Table 9, as well as obtaining a conformity statement from an international organization. As shown in Table 14, the information from Scope 3 inventory will be completed while gradually working towards reduction.

Table 9. Scope 3 Emissions of CHT in 2020 and 2021

Item		2020 Emissions (tCO_2e)	2021 Emissions (tCO_2e)	(%) Annual Increase/Decrease (%)
ISO 14064-1:2018	GHG Protocol Value Chain Scope 3			
Category 3: Indirect GHG emissions from transportation	4. Upstream transportation and distribution	587.2520	571.0138	-2.77%
	9. Downstream transportation and distribution	32.5643	141.8628	335.64%
	6. Business travel	5,749.0489	4,771.1007	-17.01%
	7. Employee commuting	20,400.0000	8,665.2226	-57.52%
	Subtotal	26,768.8652	14,149.1999	-47.14%
Category 4: indirect GHG emissions from products used by organization	1. Purchased goods and services	1,418,672.6765	466,201.0584	-67.14%
	2. Capital goods	666,346.4982	364,752.9818	-45.26%
	3. Fuel- and energy-related activities	159,173.8463	135,568.0273	-14.83%

	5. Waste generated in operations	609.1278	1,359.3998	123.17%
	8. Upstream leased assets	-	18,492.1388	
	Subtotal	2,244,802.15	986,373.6061	-56.06%
Category 5: indirect GHG emissions associated with the use of organization's products	11. Use of sold products	271,067.2507	307,742.3346	13.53%
	12. End-of-life treatment of sold products	50.1194	383.1154	664.41%
	13. Downstream leased assets	130,903.2678	145,217.4281	10.93%
	14. Franchises	851.2790	2,969.6603	248.85%
	Subtotal	402,871.9169	456,312.5384	13.26%
Category 6: indirect GHG emissions from other sources	Others	-	-	
Total Emissions		2,674,442.931	1,456,835.344	-45.53%

Note: Scope 3 GHG emissions in 2020 is calculated using the GHG Protocol official tool, Scope 3 Evaluator. Scope 3 GHG emissions in 2021 is based on inventories conducted on relevant stakeholders, with some items calculated Scope 3 Evaluator. CHT will gradually expand the scope of actual inventories conducted on relevant stakeholders in the future.

3. Renewable Energy

A. Targets

In view of the industry characteristics, CHT is high in energy consumption with Scope 2 emissions accounting for over 96% of Scope 1 and 2 emissions. According to the IEA WEO 2019 report, renewable energy is one of effective method for carbon reduction. To this end, CHT refers to international reports to set the targets of 40% of renewable energy in 2030 and 100% of renewable energy in 2040, while applying for RE100.

B. Strategies

The IEA report points out that the most effective ways to reduce carbon emissions are (1) improving energy efficiency and (2) using renewable energy. Therefore, CHT adopts the two recommendations for carbon reduction from IEA, including:

(1) Reducing energy consumption from the source by improving energy efficiency, including but not limited to improving energy efficiency in equipment in IDCs, replacing old equipment, and maintaining and optimizing existing equipment and facilities;

(2) Actively sourcing renewable energy, including the construction and purchase of renewable energy fields, pure green energy procurement, renewable energy certificates, energy storage equipment development and other projects.

Besides increasing energy efficiency, CHT has constructed its own renewable energy farm (with 4,506 kWp of capacity) to reduce energy consumption from 1,509.09 MWh in 2020 to 1,428.25 MWh, which is equivalent to a carbon reduction of 51,148.808 tCO2e at 5.66%. In addition, CHT has purchased land-based wind power and photovoltaic energy with an annual power generation capacity of 62 million kWh for the short term. CHT will focus on offshore wind power in the medium and long term. It is actively negotiating with offshore wind power developers in bidding and continuing to build energy farms for self-consumption and purchase certificates.

C. Performance over the Years

CHT's used of renewable energy from 2019 to 2021 is shown in Table 10.

Table 10. Use of Renewable Energy

Year	Total Power Consumption (MWh)	Renewable Energy Consumption (MWh)	Proportion of Renewable Energy (%)
2019	1,350,660	81,932	6.07%
2020	1,575,811	87,632	5.56%
2021	1,479,259	89,979	6.08%

Note: The 2022 GHG inventory and verification is expected to be completed in April 2023 (including total power and renewable energy consumption).

4. Power Usage Effectiveness (PUE) for Internet Data Centers (IDCs)

PUE (Power Usage Effectiveness) is the standard for calculating IDC energy conservation. The ratio of IDCs' "total power consumption" to "power supply to IT equipment" is calculated. The lower the PUE value, the less electricity consumed by air conditioners and non-IT equipment in the data centers. The ideal PUE ratio is 1.0. As a matter of fact however, there is a large amount of electricity consumed by non-IT equipment such as air conditioners in the data centers. As IT equipment generates a lot of heat when it is running, it will overheat and stop functioning if there is no cooling system. Moreover, lighting and other devices consume energy in IDCs. As a result, the PUE ratio of IDCs is definitely greater than 1.0.

A. Targets

In view of the industry characteristics, CHT's data centers are high in energy consumption with high Scope 2 emissions from IDCs. After considering the overall carbon reduction strategy, the target for PUE in IDCs is set to decrease to 1.5 by 2030, meaning that the power consumed by air-conditioning, lighting and other power-consuming equipment in the IDCs will decrease. This will help the Company reduce carbon emissions and meet the requirements of SBT ICT carbon reduction targets.

B. Strategies

CHT will reduce the PUE and need for power of IDCs. For the moment, the energy-saving plan for ICT IDCs (including IDCs) is being implemented while engaging in dynamic energy management over the Internet by effectively taking advantage of the Intelligent Energy Network Service (iEN) it developed and the Power Operation Supervisory System (POSS) for IDCs to achieve the benefits of carbon reduction and environmental protection via technology. In addition, CHT requires that the PUE value of the newly built IDCs to be lower than 1.5. Combined with other energy-saving plans for IDCs, it is expected that the target of reducing the PUE to 1.5 will be achieved in 2030.

C. Performance over the Years

CHT's PUE value of IDCs for the baseline year (2020) is 1.67, and it was decreased to 1.657 in 2021.

5. Carbon Pricing

To effectively promote CHT's carbon reduction targets, as well as enhancing the awareness of energy conservation and carbon reduction for all units to improve energy efficiency and change internal behaviors, CHT has formulated an internal carbon pricing system by setting NT$1,600 per ton of carbon, with the scope covering Scope 1 and 2, including all operating sites and branches. CHT carbon pricing is implemented in three phases. The first phase is launched on July 1, 2022 with Scope 2 emissions as part of the pilot program. Carbon pricing is provided to each unit for reference with no charges for the time being. The second phase started on January 1, 2023, covering Scope 1 and 2. Carbon emissions will be calculated with carbon fee collected, as well as being included as a KPI. The third phase is including Scope 3 emissions but only when it is practically feasible. Because each unit will take carbon fees and KPI assessment into consideration, internal carbon pricing must be factored in future operations and procurement decisions, to encourage energy saving and carbon reduction in each unit and transition towards low-carbon operations.

CHT will set up a carbon fee fund as the cost for promoting energy conservation and the carbon reduction, as well as the R&D for low-carbon technologies, including encouraging

all units to propose innovative carbon reduction measures, purchase renewable energy, replace high-efficiency and energy-saving equipment, etc. Management guidelines are still under discussion and will be implemented with the approval of the Chairman and President.

(II) Climate change adaptation Management Measures

In view of the fact that CHT's communication equipment and facilities are all over Taiwan, and the impact of climate change will become more and more significant, CHT has formulated short-, medium-, and long-term climate change adaptation plans since 2020 to avoid the impact of long-term climate events on communication equipment and facilities. Short-term plans last 1-3 years, medium-term 3-8 years and long-term over 8 years, with adaptation plans covering 100% of the existing and newly-built operating sites and communication equipment.

Table 11. Metrics Adopted by Climate change adaptation Management Strategies

Metrics	Description
Degree of climate disaster	Due to the nature of the industry, the Company's facilities/equipment are vulnerable to extreme weather events with damage to the facilities/equipment. In addition to maintenance costs, they may also lead to interruptions in operations and an impact on revenue.

CHT's climate change adaptation plan has three subitems, including short-, medium- and long-term core tasks. The details and results in 2022 are as follows.

Table 12. Climate change adaptation Plans and Implementation Results in 2022

Adaptation plans	2022 Operational Results/Progress
(1) Flood and Disaster Control Action Plans for Telecommunications IDC, Telecommunications Equipment, and Buildings	
Short-term adaptation plans (1-3 years)	
Continue monitoring and analyzing climatic disasters (including droughts, tsunamis, floods, wind storms, slope failure, and lightning stroke). In the meantime, reduce disaster risk, and improve disaster preparedness, disaster recovery drills, disaster response measures	● Each of the units responsible for management of our telecommunications data centers have established measures for preventing natural disasters, as well as business continuity and emergency response plans. They have also carried out planned data evacuation/data backup and recovery drills, and in 2022 successfully passed third-party certification for ISO 27001/27011. ● All of our telecommunications equipment have been

Adaptation plans	2022 Operational Results/Progress
and optimize our standard operating procedures for our telecommunications data centers, equipment, buildings, and facilities.	equipped with weather monitoring systems. In the event of a sudden disaster, we are able to quickly grasp our network status, and prepare the appropriate rescue and repair resources according to the scale of the disaster while also constantly monitoring how the situation is developing. ● Drought prevention drills are carried out each year for our Taipei Aiguo Facility. These drills include: Flood proof doors have been installed on four exits, one each at the car path, the motorcycle path, the basement stairwell, and the basement emergency exit, as well as on the exit leading from the outdoors area on the first floor to the basement level.
Reduce the reliance of our equipment and facilities on electricity, conduct a carbon inventory of our operational processes to identify areas where our greenhouse gas emissions can be reduced and improve our ability to save energy and reduce emissions. (For example, accelerating the phasing out of older and less energy-efficient data center equipment and improving our data platforms to move towards a fully-online service model).	● Based on a statistical analysis, we managed to conserve the most electricity in these three areas in 2022: 1. Electricity (energy) conserved by fixed network server rooms Replaced older air-conditioning equipment, SMR equipment, ADSL DSLAM, V1 DSLAM, 7342 GPON OLT, and consolidated AGG-E broadband, stopped using NG SDH-UT, reduced ERI loads. Across all of our operating locations, we conserved 62.09 million kWh of electricity as of November of last year, achieving our goal to conserve 17.41 million kWh of electricity. 2. Electricity (energy) conserved by mobile network server rooms (including base stations) Replaced old energy inefficient equipment, adopted the C-RAN framework for our base stations, stopped use of 2G gateway switches, adopted night sleep mode for 4G, stopped providing value-adding services, and adopted energy conservation measures in our building server rooms. In 2022, we conserved 5.52 million kWh of electricity, reducing our electricity expenses by NT$45.99 million (savings from conserved power + changes to power contract terms and time-based electricity pricing) 3. Electricity (energy) conserved by IDC server rooms

Adaptation plans	2022 Operational Results/Progress
	Procured high-efficiency, low energy consumption, and high heat tolerance communications equipment, reducing electricity consumed by air conditioning. Replaced electrical equipment, adopted high-efficiency transformers and UPS, and inverter air conditioners (such as magnetic centrifugal cold water mainframes, EC fans, and variable-frequency drives).
Medium-term adaptation plans (3-8 years)	
Based on climate monitoring and analysis results, and taking into consideration other factors such as potential risks and the impact to our business operations, we have taken measures to make our telecommunications data centers, equipment, buildings, and facilities more resilient to climate change. These measures include implementing flood prevention and water drainage infrastructure and establishing backup routing.	● Establishing backup routing: The fragile public routes to Taiwan's eastern regions are often interrupted during typhoons or the flood season, leaving the region connected through a single unprotected route and greatly reducing the eastern region's electrical network stability. Through an OTN network and the WSON (Wavelength Switched Optical Network) function, we have been able to automatically switch and provide a wide variety of different routes, greatly improving electrical network stability. ● Distributed routing design: We have established numerous backbone and core urban network nodes to carry out cross-region information transmission and local information delivery. Our western data links utilize 5 trunk fiber optic cables, while our eastern data links utilize 2 trunk fiber optic cables. In this way, data routing is distributed, protecting our routing networks. ● Analysis of switching and protection functions: Our OTN equipment supports OSNCP (Optical Subnetwork Connection Protection) and Restoration (R;) settings, and we are able to provide our electrical networks with 1+1, 1+R (rerouting), and 1+1+R (1+1 protection + rerouting) protections, based on information category.
In order to reduce our reliance on electricity, gradually standardize the types of locations where the electrical equipment in our telecommunications data centers are installed to avoid rooftops	● Reliability is a priority for our IDC server rooms, and the PUE value is also dependent on the IT electricity usage of our customers after they move into the facility. The Company has already made plans to gradually phase out and consolidate less energy-efficient small-scale server rooms in order to increase

Adaptation plans	2022 Operational Results/Progress
and other areas which heat up easily. In the meantime, adjustment the cold and hot aisles in our data centers, and procure more efficient energy conserving equipment with the goal of improving the Power Usage Effectiveness (PUE) of our data centers from bronze (PUE of 1.94) to silver level (PUE between 1.43-1.67). Due to reliability limitations, and also the rate of our customers' IT electricity usage, we set PUE target to 1.5 by 2030.	the overall PUE of our server rooms. ● Adopted more efficient and energy conserving air conditioning equipment, and accelerated the process of replacing older less efficient equipment in order to improve the electricity utilization rates of our server rooms.
Considering the risk that a climate disaster might cause a blackout, leading to business interruption, and in cooperation with the government's policy encouraging citizens to generate their own electricity, we have developed energy storage technologies and expanded the capacity of our energy storage infrastructure. We increase the proportion of renewable energy used by our data centers to reduced our reliance on electricity generated by petrol, and allows us to maintain a stable electricity supply in case of intermittent blackouts in the future.	● From an energy storage system safety perspective, analyzed the UL 9540, UL9540A, and IEC62933 safety requirements standards for our existing energy storage system, and our systems for handling energy storage battery fires and energy storage system thermal runaways. Proposed system design recommendations (a. ensure sufficient construction area; b. establish an effective energy storage battery monitoring system; c. establish fire containment zones; d. optimize ventilation and fire-fighting systems for energy storage areas; e. obtain system safety certification) that can serve as a basis for the Company's energy storage safety and prevention systems, allowing the Company to improve communications equipment safety. The above measures are only applicable to lithium-ion batteries, and not to lead-acid batteries. ● Continued to procure lithium-ion batteries, and establish a timetable for independently building solar power systems for the Company's buildings in line with the Company's renewable energy procurement and policies, increasing the proportion of renewable energy used by server rooms.
Long-term adaptation plans (More than 8 years)	

Adaptation plans	2022 Operational Results/Progress
Integrate national and private resources, combine telecommunications technologies, collaborate with different business, nation and academic organizations, agencies, and institutions to develop disaster analysis and prevention technologies, allowing us to provide faster warnings for climate change disasters and reduce the risk of us being significantly impacted. (such as the Earthquake Public Warning Cell Broadcast Service)	● The Company has launched scientific research projects on climate change in collaboration with government and public agencies for disaster analysis. For example: the Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (http://tccip.ncdr.nat.gov.tw). In the future, the Company may integrate and collaborate with industry-academia-government organizations, and apply climate change disaster analysis data to develop technologies for preventing these disasters, reducing the impact of climate change risks.
(2) Climate Change Adaptation Action Plans for Network Facilities	
Short-term adaptation plans (1-3 years)	
Underground data center infrastructure: Continue making improvements and inspections (such as to drainage systems), gradually replace older equipment to prevent accidents from occurring due to aging equipment.	● Conducted regular maintenance inspections based on the specific requirements for different buildings and equipment, and conduct regular (quarterly/annually) inspections of the Xing Tong Building's facilities, such as its electrical system/miscellaneous facilities/plumbing system. Based on the inspection results, a rolling management approach was adopted to implement continued improvements and inspections. ● Established the "Operating Guidelines for Underground On-Site Self Inspections" pursuant to the "Chunghwa Telecom Main Criteria for Assessing External Network Equipment Maintenance". Inspection items include 20 operations and equipment categories, including network equipment and disaster prevention and rescue operations. These inspections are focused on maintaining the safety of our underground cables, preventing disasters from happening and ensuring that rescue operations are sound. ● Conducted regular self-inspections each quarter, and inspections and performance assessments during the

Adaptation plans	2022 Operational Results/Progress
	annual Mid-Term Inspection and External Network Equipment Maintenance Assessment. ● In the 2022, "External Network Equipment Maintenance Assessment", 39 issues were discovered across 15 inspection items in the Company's overall underground system assessment (described in attachment). These issues have been corrected within 30 days.
Above ground telecommunications infrastructure: DJ box, distribution board, telecommunications enclosures, and other infrastructure supporting Fiber-to-the-Home (FTTH) connections shall continue to be built. Exchange equipment in existing cross connection cabinets shall be gradually phased out, preventing damaged equipment from causing internet outages.	● We have fully committed to building further facilities to improve Fiber-to-the-Home (FTTH) network coverage. The Company plans to increase Fiber-to-the-Home coverage to above 90% across all regions by 2026, and in 2022, we increased our total Fiber-to-the-Home facilities by 8.25%, achieving 81.39% network coverage. ● Removed V1 and V2 equipment used in consolidated cross connection cabinets. In 2022, we implemented plans to reduce 3,767 pieces of such equipment (removed 2,968 pieces of V1 equipment, and 799 pieces of V2 equipment), reducing the usage of cross connection equipment and reducing the probability of network obstructions. ● Worked together with our clients to change from V to H cable networks, reducing the use of cross connection cabinets.
Underground cable infrastructure: By optimizing the gas-filled cable software used for laying cables in manholes, handholes, and underground tunnels, we can discover and address problematic areas in advance.	● Continued to optimize filled gas monitoring software, and gradually update to smart gas filling machines. In 2022, we replaced 60 gas filling machines, and removed 57,391 detected cable obstructions. We plan to gradually replace 120 machines in the next 3 years, and improve our obstruction advance warning system to prevent cable obstructions.
Overhead cable infrastructure: Optimize the surveying software used for transmission towers and cables, in order to inspect any power cables or transmission tower equipment experiencing issues more effectively and make	● In 2022, we completed inspections and reporting data for our overhead cables, optimized software for surveying specific targets and GIS tracks, improved safety for our telecommunications equipment, recorded and archived survey data, and simplified the survey process, preventing climate-related disasters from becoming a major obstacle.

Adaptation plans	2022 Operational Results/Progress
improvements, preventing cable obstructions.	
Medium-term adaptation plans (3-8 years)	
Underground data center infrastructure: Update our network technologies, reduce the use of copper cables, and begin converting our cable systems to fiber-optic cable, with these technological updates allowing us to reduce the number of exchange points.	● Gradually began implementing plans to replace copper cables with fiber-optic cables. Reduce the use of copper trunk cables by adopting MSAN equipment and technologies in our cross-connection cabinets. Convened meetings when necessary to discuss strategies and plans for implementing these actions. As of 2022, our progress for our POC locations are as follows: As of 2022, our progress for our POC locations are as follows: Copper cable usage reduced by 9.96% for Taipei Business Office- North One Computer room, 10.70% for New Taipei Business Office- Fuhe Computer room, 5.01% for Taoyuan Business Office- International Airport Computer room, 2.79% for Taichung Business Office- Tianxin Computer room, and 4.78% Nantou Business Office-Fuliao Computer room. ● Continued operations to replace copper cables with fiber-optic cables, and to convert to MSAN. Reduced usage of exchange points and cross connection cabinets, reduced utilization rate of copper cables in cross connection cabinets, and, through adopting NGCO technology, reduced the number of exchange point server rooms. ● Continued implementing the POC project for reducing use of copper cables in server rooms. We plan to be able to complete consolidation operations for the Taoyuan International Airport server room by 2025, with current consolidation and conversion progress at approximately 35%.
Above ground telecommunications infrastructure: **Ac**celerate converting our DJ boxes, distribution boards, and telecommunications enclosures	● We have fully committed to building further facilities to improve Fiber-to-the-Home (FTTH) network coverage. The Company plans to increase Fiber-to-the-Home coverage to above 90% across all regions by 2026, and in 2022 we increased our total Fiber-to-the-Home facilities by 8.25%, achieving 81.39% network

Adaptation plans	2022 Operational Results/Progress
to use fiber-optic cable, gradually phasing out the use of copper cables and exchange equipment from cross connection cabinets.	coverage. ● Reduced V1 and V2 equipment in consolidated cross connection cabinets. Plans implemented in 2022 helped conserve 1.514 million kWh of electricity (Reduced V1 electricity consumption by 1.01 million kWh, and V2 electricity consumption by 504,000 kWh). Empty cross connection cabinets have been re-utilized. In the past 8 years, we have worked together with exchange points to reduce and consolidate our operations, and have worked together with our clients to continue converting older cables to fiber optic cables.
Underground cable infrastructure: **Accelerate** converting all cables laid in manholes, handholes, and underground tunnels to fiber-optic cables, reducing the number of copper cables used.	● Launched the server room's POC cable conversion and copper cable removal project, which plans to remove 2,611 km of copper trunk cable by 2026. ● Implemented project to replace copper cable with fiber-optic cable. Across all regions, established and implemented annual schedules for removing 66.9km of underground cables from 2022 to 2026. Continued implementing policies to reduce usage of copper cables, and reduce use of these cables in manholes, handholes, and underground tunnels.
Overhead cable infrastructure: Wireless networks shall gradually replace wired networks for our transmission towers and overhead cables. This replacement process shall begin being implemented in mountainous and more remote regions.	● Prioritized installing FWA in regions where fiber-optic cable cannot be easily laid, substituting fixed broadband networks with mobile networks, and reducing construction costs. In 2022, we installed 27 routes for MOD HD.
Long-term adaptation plans (More than 8 years)	
Implement plans to adopt the use of AI in our business operations. Transform our current decentralized system for managing traditionally manual operations into a more	● Cable maintenance has included internal and external cables, facilities, equipment and client terminal equipment. The Company has developed operational and maintenance management systems for managing the operational and maintenance functions required for each of these facilities and equipment. These

Adaptation plans	2022 Operational Results/Progress
systematic, automated, smart, and centralized system. This would allow us to stay on top of potential climate disaster risks at all times, improving our adaptation plans and ability to respond rapidly.	management and monitoring systems have also continued to be optimized, following the constant evolutions of network technology and equipment. We focused on making these processes more systematic, automated, smart, and consolidated as our development goals, in order to avoid having to re-invest resources into redundant efforts. ● In order to inspect, repair, and assign labor to address client equipment issues, we have collaborated to developed the iTRIS system as a replacement for the original eTRIS system. This new system is able to integrate inspection and repair operations for various different issues, and also possesses innovative new system functions that make it more consolidated and smart.
(3) Climate Change Adaptation Action Plans for Cellular Base Station Networks	
Short-term adaptation plans (1-3 years)	
Improve safety: Periodically inspect and repair our base station's cell towers / equipment / electrical supply equipment, and gradually replace older electrical equipment to prevent accidents from occurring due to aging equipment.	Established the Main Criteria for Assessing Mobile Communications Equipment. Inspected and repaired base stations every six months, with these procedures including an external alerts test, battery discharge test, firefighting equipment inspection, inspection of how the air-conditioning system is operating, and fan filter cleaning. We completed inspection and repair of all of our base stations in 2022, achieving a successful inspection and repair rate of 100% and completing all improvements.
Improve electricity supply: Convert base stations into C-RAN architecture, installed in data centers with a stable electricity supply and sufficient backup electricity sources.	● Adopted C-RAN architecture for 5G networks. When planning the construction of C-RAN server rooms, the Company has determined the server room requirements, including their electricity consumption/air-conditioning/space requirements, together with the fixed network planning office, electricity office, and the head office's administration and asset development office, confirming the electricity required for each server room and collaborating on other construction issues. We have also adopted a dual power supply to provide a reliable supply of power to our base stations.

Adaptation plans	2022 Operational Results/Progress
	● At the moment, we have already constructed 16,000 5G base stations across all regions. In line with plans to increase 5G network coverage in 2023, we have continued to build C-RAN server rooms to accommodate our base station. We plan to increase our proportion of C-RAN servers across our entire network to above 85%.
Reduce electricity demand: Natural ventilation/exhaust fans shall be incorporated into our base stations, and RU radio frequency equipment shall be installed outdoors, reducing our electricity consumption. We shall also halt support of our 3G systems, reducing electricity needs and operational and maintenance costs.	● Our electricity conservation measures have included gradually replacing old energy inefficient equipment, implementing measures to reduce electricity consumed for air-conditioning at our base stations, adopting the C-RAN architecture for our base stations, stopping use of 2G gateway switches, adopting night sleep mode for 4G, stopping provision of value-adding services, and adopting energy conservation measures in our building server rooms. In total, we saved 60.4 million kWh of electricity in 2022.
In line with the construction of our 5G N2100 base stations, shut down 3G F2 cells, and effectively utilize the 3G U2100 frequency. Extend 5G signal coverage to achieve the twin goals of reducing our electricity requirements and our maintenance and operational expenses.	● In line with the construction of our 5G N2100 base stations, we have shut down 3G F2 cells, effectively utilizing the 3G U2100 frequency. From 2021 to 2022, after shutting down our 3G F2 cells, we have managed to save 3.7 million kWh of electricity. In the future, we shall continue to follow our 3G Sunset timeline and implement these measures on a larger scale in order to reduce the energy consumed by our base stations.
Medium-term adaptation plans (3-8 years)	
Implement plans to adopt the use of AI in our business operations. Transform our current decentralized system for managing traditionally manual operations into a more systematic, automated, smart, and centralized system. This would allow us to stay on top of	● Relying on the multi-band properties of 4G, we have implemented smart electricity-conserving measures for our 4G base station cells (reducing the number of usable frequencies) during the low-traffic nighttime hours. In 2022, these measures were in place for 5 million cell hours, saving us 1.05 million kWh of electricity. We plan to implement these efforts on a larger scale in the future in order to reduce our energy consumption.

Adaptation plans	2022 Operational Results/Progress
potential climate disaster risks at all times, improving our adaptation plans and ability to respond rapidly.	
Long-term adaptation plans (More than 8 years)	
Improve the ability of our base stations to survive disasters, with a primary focus on maintaining electricity supply. A secondary concern is the stability of our transmission cables, and strengthening our backup systems. Establish systems for protecting our transmission cable networks, such as by establishing backup routing and equipment redundancy.	● Promoted green base stations, utilized renewable energy sources such as wind and solar to improve base station backup. ● 4G base stations are already protected by automatic multiple route switching while transmitting across the OTN network. Electrical systems for 5G base stations have also gradually been converted to MSER circuits, and also provided with backup and protection systems. ● 5G Mobile network Adopt the C-RAN architecture for base stations, and the modules and routes important for MBH (Mobile Backhaul) transmission aggregation equipment are to be protected by backup recovery mechanism. Continue to develop maintenance and operational tools to promote smart management and maintenance, improve the network monitoring system, and Access network Cyber resilience. ● In order to ensure reliable transmissions from our base stations, we have not only considered the appropriate adoption of FSO (Free-Space Optical Communication) to replace the older narrowband microwaves that cannot be used for 4G or higher transmissions, but may also in the future adopt the use of commercial low earth orbit satellites, using the properties of these broadband signals to serve as an important backup transmissions method for our base stations.

(III) Supply Chain Carbon Reduction Management Strategies

With the Paris Agreement in place, we are heading towards an era of low-carbon economy. As part of the IT&C industry, CHT has to understand and respond to the potential impact of climate change issues and formulate appropriate response strategies and actions in a timely manner.

CHT's supply chain carbon management has three targets: 1. Improving suppliers'

knowledge of climate change 2. Collecting information on GHG emissions 3. Communication and incentives (to change supplier behavior). First of all, CHT took the lead in joining the CDP Supply Chain program in 2017, allowing suppliers to start from understanding climate change and move towards effective carbon management. The "Sustainable Partner Certification" was launched at the same time to grade suppliers into 4 levels based on their category and importance according to the audit results, including gold, silver, bronze and participation. Those who fail to qualify will receive guidance by way of the improvement mechanism within a certain period of time. Graded suppliers can obtain corresponding labels, which bring additional points during future tenders. We will also promote incentive mechanisms in the future to encourage suppliers to develop products and services that mitigate climate impacts.

In addition, CHT plans to introduce product carbon footprints with the ultimate target of drawing attention to the Company's products with reduced carbon. The product carbon footprint life cycle includes carbon emissions of the supply chain. Therefore, in order to quantify the product carbon footprint and promote carbon reduction, CHT needs to work with suppliers to promote the Company's business opportunities for low-carbon products.

In addition, CHT clearly understands that big suppliers have to be targeted first before the scope is expanded to include all suppliers year by year in order to promote energy conservation and carbon reduction in the entire industrial chain. To this end, we target suppliers with a high proportion of purchase amount and include them in the Scope 3 GHG inventory. While conducting Scope 3 GHG inventory, CHT provides guidance and explanations to all selected suppliers to ensure that suppliers are capable of providing data on GHG, indirectly assisting suppliers in understanding GHG inventory requirements and building inventory capabilities. In the future, CHT will continue to expand the scope of supplier inventories and hold individual meetings for guidance and explanations.

A Quick Look at CHT's CDP Supply Chain Program in 2021

(1) 49% of suppliers responded to CHT's CDP questionnaire (with a global response rate of 49%)
(2) The total carbon reduction of CHT's supply chain is about 48.14 million tCO2e
(3) 59% of suppliers have engaged in actions towards energy saving and carbon reduction
(4) 79% of suppliers incorporate climate change into long-term business strategy planning (with a global average of 83%)
(5) 62% of suppliers have set carbon reduction targets
(6) 72% of suppliers already have a process for risk assessment related to climate change

(IV) Opportunities for Innovating Climate Products

Analysis of Significant Climate Opportunities

According to the results of CHT's assessment of climate change risks and opportunities, energy sources have the highest weight among all opportunities as material opportunities. After the UN passed the Paris Agreement, countries and companies have paid increasing attention to climate change issues and set carbon reduction targets. International companies have further included upstream suppliers to take actions towards carbon reduction. For example, Microsoft has set the target of achieving negative carbon emissions by 2030 by including suppliers in the scope. Therefore, for IDC services CHT provides, some customers have expressed the demand for IDCs to use renewable energy.

To respond to the needs of all stakeholders, CHT set the target of fully adopting renewable energy in IDCs by 2030. This will help CHT stabilize or improve the business of IDC services. According to the international organization Statista, the projected Compound Annual Growth Rate (CAGR) for the IDC market between 2023 and 2027 is 4.66%.

In view of the fact that all countries and key international customers have set net zero emission targets, CHT can realize the growth of IDC business through reaching the target of fully adopting renewable energy in IDCs by 2030 under the IEA STEPs and IEA NZE climate scenarios. The analysis and calculation shows that CHT can expect to increase its net profit by approximately NT$1.2 billion in 2027.

To achieve this target, CHT adopts two major carbon reduction proposals from the IEA, namely improving energy efficiency and adopting renewable energy. Projects that can improve energy efficiency and reduce power consumption from the source include but are not limited to improving the energy efficiency of IDCs, replacing old equipment, repairing and optimizing existing equipment and facilities, actively sourcing renewable energy, including the construction and purchase of renewable energy fields, pure green energy procurement, renewable energy certificates, energy storage equipment development and other projects to gradually increase the proportion of renewable energy.

Table 13. Metrics for Climate Opportunities

Corresponding Material Opportunity	Metrics	Description
Energy Source	Proportion of renewable energy in IDCs	Since enterprises are paying more and more attention to carbon reduction results of upstream suppliers, CHT's IDC service customers have expressed the demand for using renewable energy in IDCs. Therefore, the Company has set the

		target of adopting 100% of renewable energy in IDCs by 2030, which will help maintain or enlarge the IDC market.

2. Green Products and Services

With governments and companies around the world setting net zero emission targets, the low-carbon economic transition has been placed in the spotlight. To speed up industrial transformation and upgrading, the Taiwanese government proposed the 5+2 Industrial Innovation Plan, including building an innovative IoT ecosystem, which is one of CHT's core businesses. CHT complies with national policies and combines forward-looking ICT technologies to propose low-carbon solutions, including engaging in the energy-saving transition of smart cities/factories/buildings by taking advantage of ICT technologies such as 5G, IoT and data innovation, effectively assisting customers in moving towards the low-carbon economic transition and realizing revenue growth for CHT.

CHT has set the target for green products and services taking up its total revenue at 20%. In recent years, CHT has invested considerable resources into the research and development of emerging technologies such as 5G, AI, big data analysis, and the Internet of Things to master key technologies in the ICT industry and enhance the competitiveness of its core products. In 2021, CHT invested NT$3.687 billion in R&D, accounting for approximately 1.75% of consolidated revenue.

CHT has formulated long-term business development plans as follows:

(1) Actively expanding emerging businesses, making good use of the R&D resources of Chunghwa Telecom Laboratories and the capacity of strategic partners to build the industrial ecosystem, promoting smart services and solutions for corporate customers and consumers, improving the operational efficiency of corporate customers, enhancing the well-being of consumers , expanding domestic and overseas markets to become the leader of smart life and the enabler of the digital economy.

(2) Simultaneously strengthening the Company's operating costs and procurement benefits through smart technologies, digitalization, network virtualization, software-defined networking and other similar technologies, increasing the output/input ratio of resources, and effectively optimizing investment and cost of construction.

In 2020 and 2021, the revenue of CHT's main green products was NT$6.074 billion (about 3% of total revenue) and NT$8.622 billion (about 4% of total revenue), including cloud, IoT (including iEN, IVS, ITS and smart buildings). It is estimated that in the next three years, the average annual growth rate will be greater than 3%, with the cumulative revenue reaching NT$26.6 billion.

2. Low-carbon Products

(1) IDCs and cloud services

CHT's IDCs are green data centers with high energy efficiency (PUE 1.657), and its power consumption efficiency is much higher than that of traditional data centers (PUE 1.9). The Company manages more than 9,000 cabinets for users, many of which are international brands, and some which have set Scope 3 reduction targets. Therefore, the Company will help customers reduce Scope 3 GHG emissions by improving the energy efficiency of IDCs.

As the leading service provider Taiwan's telecommunications industry and IDCs, CHT insists on providing excellent service quality. To this end, it obtained a number of domestic and foreign professional certifications such as TIA-942 Rated 3, Uptime Institute M&O, ISO 27001, ISO 45001, ISO 50001 and ISO 14001, covering data center design/maintenance/safety management, environment, safety and health, energy conservation and environmental protection, payment card security, cloud services, etc. In the meantime, it continues to plan multiple data centers across the country, adhere to the service philosophy of "achieving excellence with professional expertise," so that the customers can concentrate developing their business, accelerating business development, staying updated with business opportunities and achieving excellence.

(2) MOD services

MOD provides customers with multimedia services such as on-demand video, applications and program channels provided by operators. CHT provide MOD set-top boxes with the subscription of MOD services, and the set-top boxes work as a medium that allows users to watch programs on different channels. The Company is actively improving the energy efficiency of MOD set-top boxes, which will reduce the power consumption at the user end. In addition, the number of MOD users reached 2.06 million in 2021. After multiplying the amount of energy saving by the number of all users, the carbon reduction would be substantial.

CHT introduced BS 8001 circular economy in 2021, with MOD service as the target. It passed the BS 8001 circular economy assessment in October 2021 as the first telecom operator in Taiwan to pass the circular economy assessment, hoping the industry chain can drive the development of the circular economy business model and move towards the vision of a sustainable cycle.

VII. Conclusion

As the leader of Taiwan's telecommunications industry, CHT shoulders the responsibility for the sustainable development of Taiwan and the industry chain. Climate change has become a topic that the industry, government, academia, and research circles need to face. The Secretary-General of the United Nations has also called on governments and enterprises around the world to step up their work on climate change.

CHT took the lead in calling for the telecommunications industry to introduce TCFD in 2018 and became a supporter of TCFD. In 2020, CHT introduced TCFD and became the first telecom operator in the world to obtain the TCFD conformity statement of the highest level), hoping to encourage Taiwan and the industry chain to attach great importance to the issue of climate change.

CHT will continue to implement the TCFD project this year by building up on the results already achieved from the ongoing TCFD project, reexamining and assessing risks and opportunities associated climate change CHT faces, before deciding material risks include policy and legal risks as well as acute ones, and climate opportunities come from energy source. Therefore, the Company must proactively manage the risks and opportunities to enhance CHT's financial performance. After the audit by a third-party international organization, the British Standards Institution, CHT once again obtained the conformity statement of the highest level (Level 5+: Excellence grade), showing that the Company's climate change management framework is in line with the recommendations and requirements of TCFD.

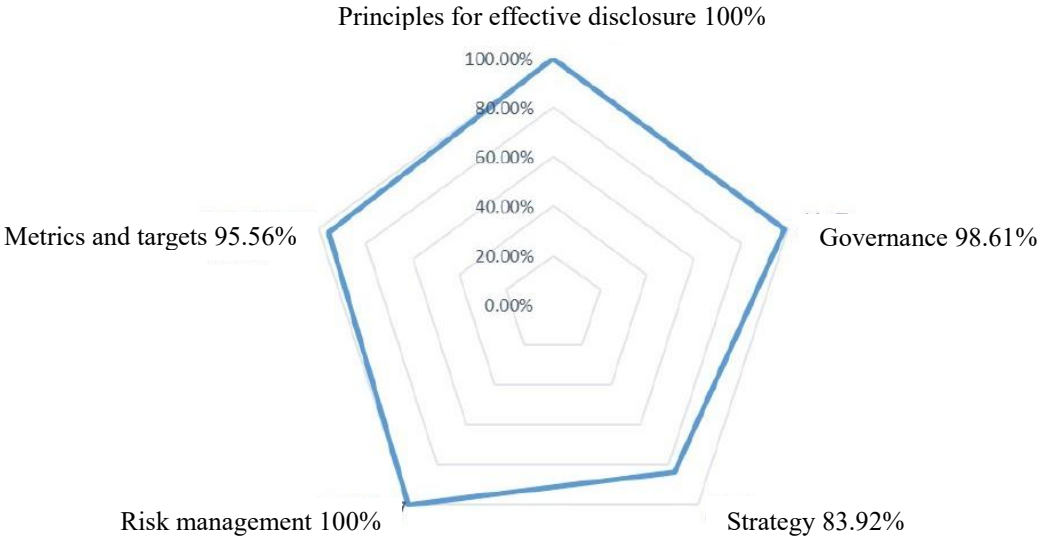

Figure 4. TCFD Maturity Map

CHT plans to incorporate the review of major capital expenditures into climate change issues in the future. For example, when purchasing data center equipment, energy efficiency and eco-friendly materials will also be included in the review of major capital expenditures. CHT will continue to optimize the TCFD management framework and conduct climate risk and opportunity analysis on the value chain to stay updated with the risks and opportunities brought about by climate change, plan in advance and reduce the operational and financial impact, helping CHT achieve a resilient business model as part the effort to transition towards a low-carbon economy. In addition, the introduction of TCFD also helps CHT communicate with internal and external stakeholders by disclosing information on climate change on the official website and CSR report, as well as filling in the international ESG questionnaire, etc. This allows stakeholders to understand CHT's climate change management policies and strategies to make it a transparent and reliable telecom operator.

Appendix I. TCFD Index

Core Element	Disclosure	Chapter	頁碼 Page Number
Governance	a） Describe the Board's oversight of climate-related risks and opportunities.	● III-(I) Board of Directors' Oversight of Climate-related Risks and Opportunities	6
	b） Describe management's role in assessing and managing risks and opportunities.	● III-(II) Assessment and Management of Climate-related Risks and Opportunities by the Sustainable Development Committee	6
Strategy	a） Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	● V-(II) Physical Risks ● V-(III)Transition Risks	19 21
	b）Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	● V-(II) Physical Risks ● V-(III)Transition Risks ● VI-(I) Climate change mitigation Management Strategies	19 21 23
	c） Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2° C or lower scenario.	● V Scenario Analysis for Climate Change Risks	19
Risk Management	a） Describe the organization's processes for identifying and assessing climate-related risks.	● IV-(I) Process for Identifying Climate-Risks and Opportunities ● IV-(II) Process for Assessing Climate-Risks and Opportunities	9 11
	b） Describe the organization's processes for managing	● IV-(III) Process for Managing Climate-Risks and	13

	climate-related risks.	Opportunities	
	c） Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization’s overall risk management.	● IV-(III) Process for Managing Climate-Risks and Opportunities	13
Metrics and Targets	a） Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	● VI-(I) Climate change mitigation Management Strategies ● VI-(II) Climate change adaptation Management Measures ● VI-(IV) Opportunities for Innovating Climate Products	23 32 44
	b）Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	● VI-(I) Climate change mitigation Management Strategies	23
	c） Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	● III-(II) Assessment and Management of Climate-related Risks and Opportunities by the Sustainable Development Committee ● VI-(I) Climate change mitigation Management Strategies ● VI-(II) Climate change adaptation Management Measures ● VI-(IV) Opportunities for Innovating Climate Products	6 23 32 44

Appendix II. Third-party Conformity Statement

bsi.

Conformity Statement

Climate related Financial Disclosure
Conformity Statement

Issued to:

Chunghwa Telecom Co., Ltd.
No. 21-3, Sec. 1,
Xinyi Rd.,
Zhongzheng Dist.,
Taipei City
100012
Taiwan

中華電信股份有限公司
臺灣
台北市
中正區
信義路一段21-3號
100012

Holds Statement No: CFD 783789

As a result of carrying out conformity check process based on TCFD requirement, BSI declares that:

- Chunghwa Telecom Co., Ltd. follows Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) to disclose climate-related financial information which is clear, comparable and consistent about the risks and opportunities and its financial impact. The disclosures cover four core elements and have been prepared by seven principles for effective disclosures.
- 依據TCFD準則要求及中華電信股份有限公司氣候相關財務揭露報告書，進行符合性及成熟度查核其結果分析展示如下：
  中華電信股份有限公司遵循氣候相關財務揭露（TCFD）相關建議與要求，揭露與氣候相關的財務訊息，這些訊息在風險和機會及其財務影響方面清晰，可比較且一致。揭露內容涵蓋四個核心要素，並已根據有效揭露的七個原則進行了準備。
- The maturity model for the Climate-related Financial Disclosures is Level 5+: Excellence grade.
- 與氣候相關的財務揭露的成熟度模型為[第五級Plus：優秀]等級。

For and on behalf of BSI:

Managing Director BSI Taiwan, Peter Pu

Latest issue: 2023-03-06 Expiry date: 2024-03-05

Page: 1 of 2

...making excellence a habit.™

Conformity Statement Number: CFD 783789

Location	Conformity Check Overall Result
Chunghwa Telecom Co., Ltd. No. 21-3, Sec. 1, Xinyi Rd., Zhongzheng Dist., Taipei City 100012 Taiwan	The maturity model for the Climate-related Financial Disclosures is **Level 5+: Excellence** grade.
中華電信股份有限公司 臺灣 台北市 中正區 信義路一段 21-3 號 100012	與氣候相關的財務揭露的成熟度模型為[第五級 Plus：優秀]等級。

Latest issue: 2023-03-06 Expiry date: 2024-03-05