2022
Chunghwa Telecom Co., Ltd.
Biodiversity Declaration

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Consultant Executor: Ernst & Young Taiwan

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Summary

The United Nations resolution formulated the "Post-2020 Global Biodiversity Framework" (Post-2020 Global Biodiversity Framework), which aims to promote global biodiversity tasks and contribute to the "2030 Agenda for Sustainable Development" (2030 Agenda), and strive to achieve "to 2050 VISION: Living in Harmony with Nature". Chunghwa Telecom, as a leading company in the domestic telecommunications industry, takes "becoming the most valuable and trustworthy information and communication company" as our vision. Therefore, the company launched biodiversity and natural capital projects, taking the lead in domestic industries to take pioneering actions to practice The brand spirit of "ALWAYS AHEAD".

In accordance with the guidelines of the World Business Council for Sustainable Development (WBCSD), "Nature readiness assessment", Chunghwa Telecom established our own evaluation framework and process for implementing biodiversity projects, and carried out seven major steps and produced results at each stage. Through the output, Chunghwa Telecom understands the high-risk projects in terms of dependencies (climate adjustment categories and protection from floods and rainstorms) and impacts, and further evaluates and calculates the impact of natural capital due to our operations.

To this end, Chunghwa Telecom has launched management actions against three major impact sources: 1. greenhouse gas emissions, 2. water consumption and 3. waste, especially high-risk impact projects - greenhouse gas emissions, and strives to reduce Chunghwa Telecom's dependence on natural capital issues and avoid the impact of operational activities. At the same time, Chunghwa Telecom will also actively invest in and maintain biodiversity tasks. At the same time, we will establish a low-carbon economy and a resilient business model not only to drive my country and the industrial chain to transform towards a low-carbon economy and jointly reduce greenhouse gas emissions, but also can help biodiversity conservation and strive to achieve the goal of net positive impact on biodiversity by 2040.

I. About the Biodiversity Declaration

1. About CHT

Chunghwa Telecom is the largest integrated telecommunication service provider in Taiwan, with leading offerings in domestic and international fixed communication, mobile communication, broadband, and internet services.

In addition to these traditional services, the Company also provides information and communication technology services to enterprise customers with big data, information security, cloud computing and IDC capabilities, and is expanding businesses into innovative technology services such as IoT, AI, etc. All of these capabilities and offerings aim to create an optimal communication environment to enable wonderful and convenient digital life-style, as well as to serve as a key partner for other international telecommunication service providers.

Table 1. About CHT

Company Name	Chunghwa Telecom Co., Ltd.
Chairman	Shui-Yi Kuo
Address	No.21-3, Sec. 1, Xinyi Rd., Zhongzheng Dist., Taipei City 100
Stock symbol	2412.TW

2. CHT’s Visions and Goals

Chunghwa Telecom has followed with the United Nations policy since 2022 and put forward the "Chunghwa Telecom Biodiversity and Non-Deforestation Commitment". Carry out action measures related to biodiversity and non-deforestation, and strive to achieve the goal of net positive impact on biodiversity by 2040. Realize the vision of "living in harmony with nature by 2050" of the Convention on Biological Diversity with our country by 2050.

3. Biodiversity assessment subjects and methodology

Following the recommendations of the United Nations, Chunghwa Telecom will consider two key factors, dependencies and impacts, in the assessment of biodiversity and further refer to the United Nations' partner in the field of sustainable development - the "Nature readiness assessment", the World Business Council for Sustainable Development (WBCSD), established Chunghwa Telecom's self-own assessment framework and process for implementing biodiversity.

Chunghwa Telecom Nature Readiness levels			
Started the journey	**Developing**	**Advanced**	**Leading**
Chunghwa Telecom identifies nature-related issues and/or presents stand-alone actions for nature.	Chunghwa Telecom assesses its impacts and/or has set a high-level ambition or targets for nature.	Chunghwa Telecom integrates nature into strategy, sets measurable commitments for nature and implements strategic actions.	Chunghwa Telecom assesses impacts and dependencies for all realms, and is redefining industry business models and driving value chain mobilization.

DASHBOARD CATEGORIES	WHAT ARE WE ASSESSING?	METHODOLOGY REFERENCES
STEP1: REALMS	What are the key nature-related issues/topics that companies are identifying in their public disclosures?	Following the materials developed by **Natural Capital Protocol** and the **ENCORE** tool to better understand, assess and integrate natural capital risks
STEP2: ASSESS & PRIORITIZE	What steps are companies taking to assess their impacts and dependencies on nature?	Following the guidance provided by **Business for Nature Steps to Nature Positive**
STEP3: COMMIT	What nature-related commitments are companies disclosing?	Following **SBTN Initiative Guidance** step 1.4 Scope of SBTs for Nature as key reference
STEP4: MEASURE & VALUE	What indicators have companies developed to measure nature outcomes that inform decision- making?	Following the **Natural Capital Protocol** steps 4 to 7 to inform decision-making
STEP5: ACT	What actions are companies taking within and beyond corporate operations to reduce pressures and have positive contributions?	Building on **WBCSD Vision 2050** Evolving Toward a regenerative mindset
STEP6: TRANSFORM	How are companies engaging at multistakeholder-level to speed up further business action, and contributing to system-wide change?	Inspired by **Business for Nature Steps to Nature Positive** and **SBTN Initial Guidance**
STEP7: DISCLOSE & REPORT	How are companies operating at the highest level of transparency?	Based on **GRI**

Figure 1. Biodiversity Assessment Framework and Process - WBCSD Nature readiness assessment

4. Scope Setting

The assessment scope is set to Chunghwa Telecom company and key suppliers.

Table 2. Chunghwa Telecom Biodiversity Assessment Scope

	Upstream	Operations of Chunghwa Telecom
Boundary	Key suppliers with a transaction volume exceeding 100 million yuan in 2022	The five major operating locations of base stations, computer rooms, stores, offices buildings and comprehensive offices in Taiwan
Period	01/01/2022 ~ 31/12/2022	
Impact Factor	Greenhouse gases, pollution from water usage, waste	
Impact Cost	N.A.	The Social Cost of Carbon Emissions and Human Health Cost

The value chain of Chunghwa Telecom company can be divided into upstream supply chain, company operations, and downstream customers. Chunghwa Telecom's natural capital assessment covers key upstream suppliers and operations of the Chunghwa Telecom company. Its operations cover all operating activities of Chunghwa Telecom, including computer rooms, base stations, comprehensive offices, office buildings, and stores.

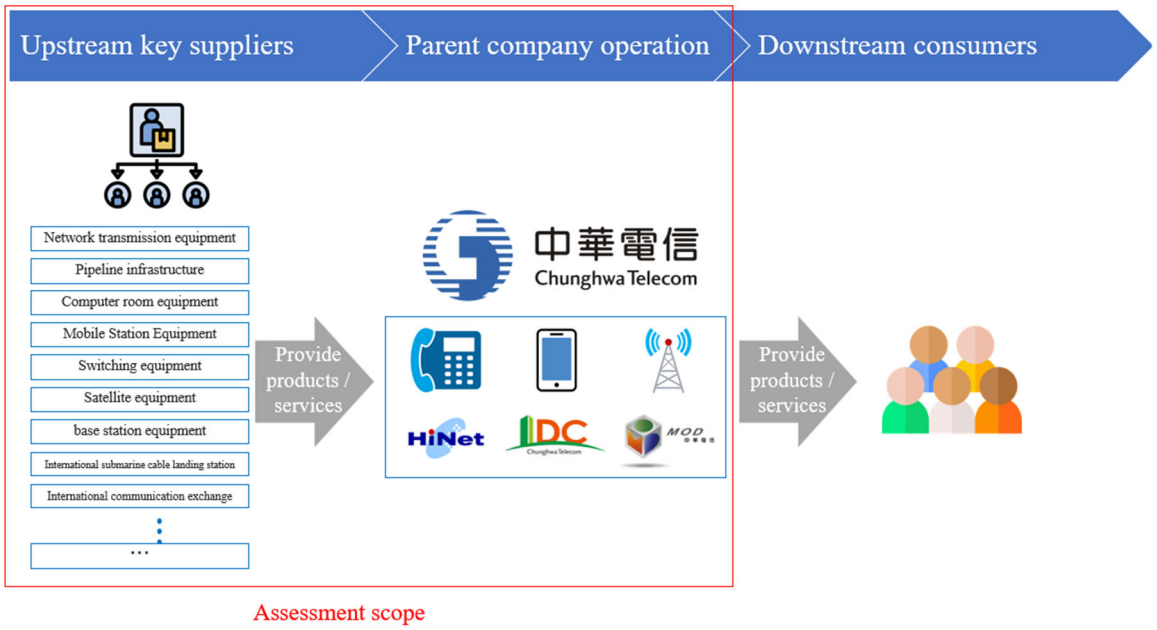

Table 3. Chunghwa Telecom's Value Chain and Assessment Scope

5. Biodiversity Assessment Steps [GRI 304-2]

Step 1 and Step 2: Fields and Analytical Methods [GRI 304-2]

Chunghwa Telecom uses the ENCORE tool for risk analysis of dependencies and impacts. ENCORE was initiated by the Natural Capital Finance Alliance and developed in cooperation with the United Nations UNEP-WCMC (United Nations Environment Program-World Conservation Monitoring Center). ENCORE aims to assist organizations to better understand, assess and integrate natural capital risks in their activities, and also examines how this information can be applied to screen their portfolios for natural capital risks and assist in the integration into the existing risk management processes.

After implementation, the dependence and impact results of more than 11,000 operating sites in the six major categories in Taiwan are as follows:

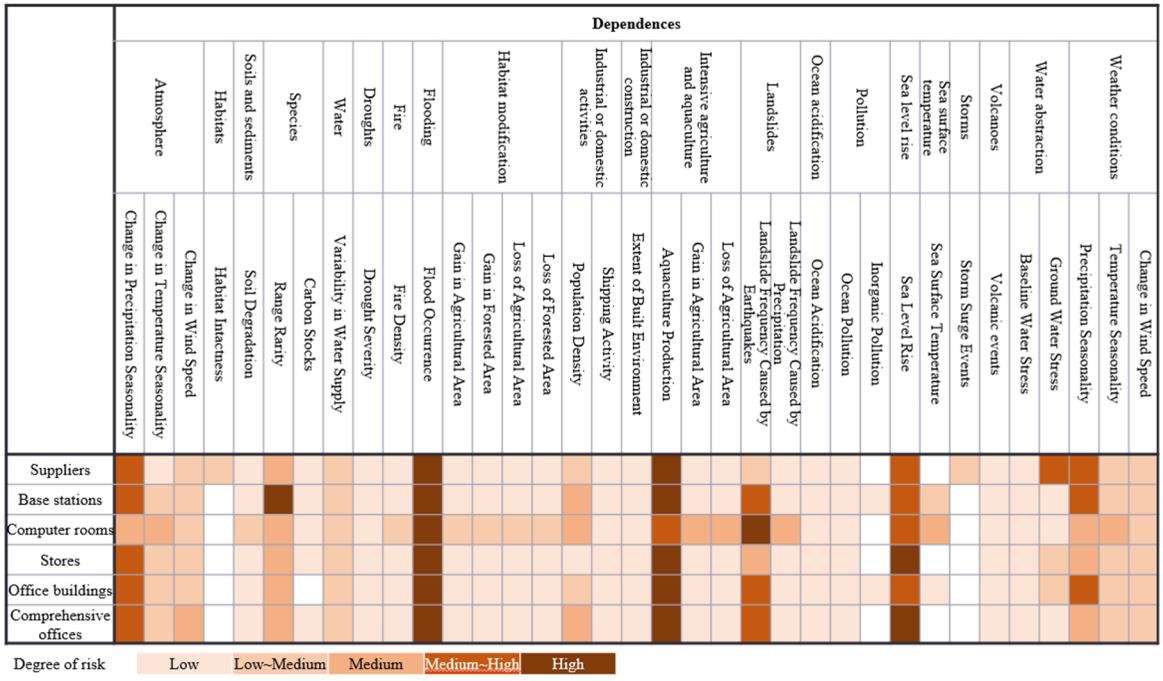

Figure 2. Dependences- Climate regulation: Risk map of natural hazards that may result from dependence on natural resources

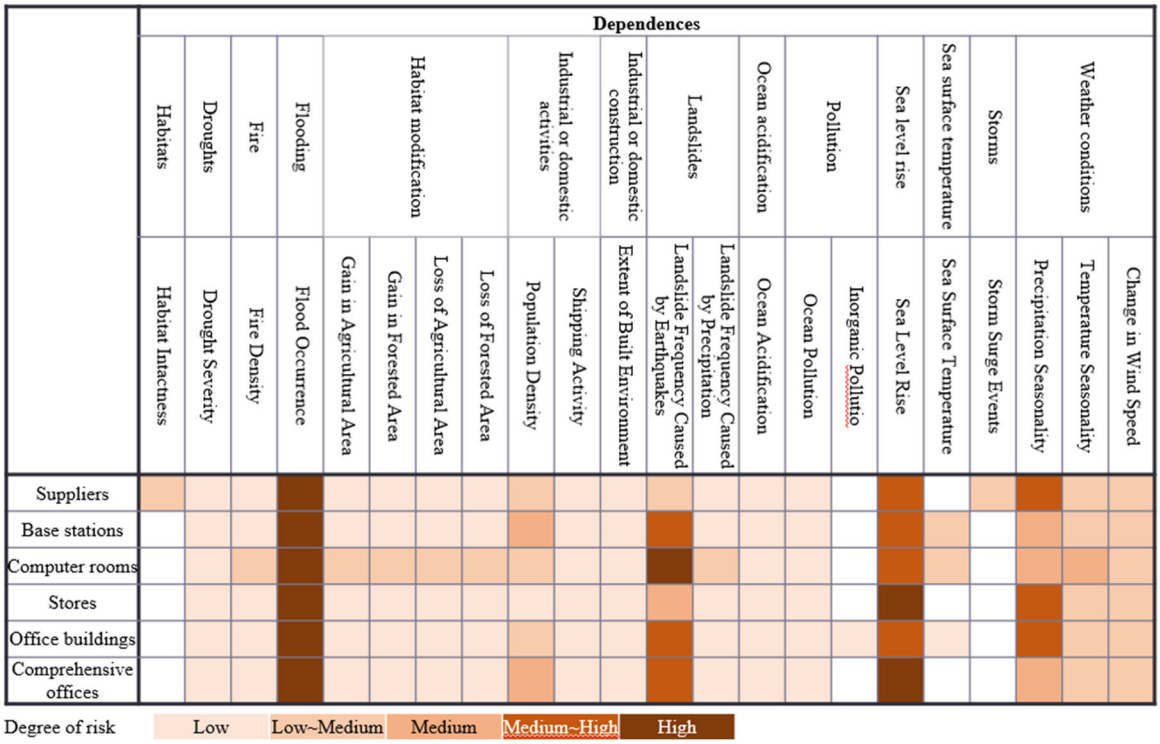

Figure 3. Flood and storm protection: Risk map of natural hazards that may result from dependence on natural resources

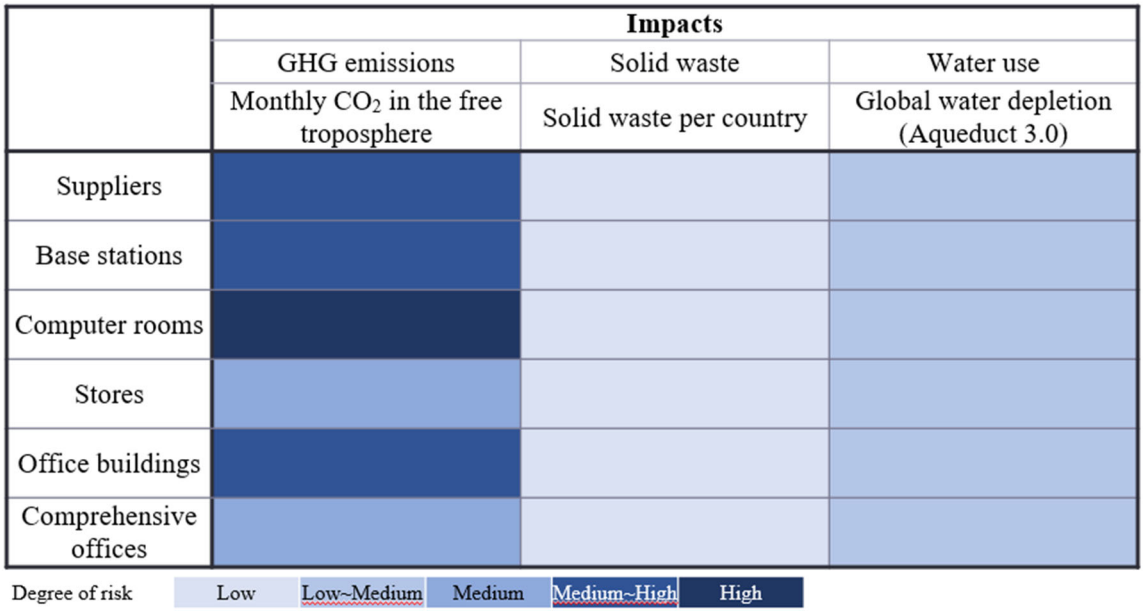

Figure 4. Impacts-Risk Map of Nature-Generated Impacts from Telecommunications Industry Operations

	Dependences-Climate regulation				Dependences-Flood and storm protection			Impacts		
	Species - Range Rarity	Flooding - Flood Occurrence	Intensive agriculture and aquaculture	Sea level rise	Flooding - Flood Occurrence	Landslides - Landslide Frequency Caused by Earthquakes	Sea level rise	GHG emissions	Waste	Water use
Base stations	✓	✓	✓		✓					
Computer rooms		✓			✓	✓		✓		
Stores		✓	✓	✓	✓		✓			
Office buildings		✓	✓		✓					
Comprehensive offices		✓	✓	✓	✓		✓			
Key Suppliers		✓	✓		✓					

Figure 5. Chunghwa Telecom Biodiversity Assessment: High Risk Table

High Risk Management：

Chunghwa Telecom has now recognized the ecosystem risks that are indirectly caused due to operational needs and high dependency on ecosystem resources! Chunghwa Telecom will look for alternatives (such as: restoration of biodiversity in the ecosystem) to gradually slow down and restore the damage caused by operations: Chunghwa Telecom will also try to slow down the direct and indirect impacts caused by operations and reduce the negative impacts on the ecosystem (such as the use of renewable energy to reduce greenhouse gas emissions).

Step 3: Commitment to Biodiversity

Chunghwa Telecom understands the degree of dependence and impact that the telecommunications industry may cause. We follow the goals of the United Nations post-2020 global biodiversity framework to set our commitments, and disclose information on the official website.

Step 4: Evaluation Method [GRI 304-2]

Chunghwa Telecom adopts the relatively well-developed Natural Capital Protocol guidelines as the main methodological reference. Therefore, Chunghwa Telecom decided to adopt the Natural Capital Protocol as a biodiversity assessment framework to understand the natural capital risks Chunghwa Telecom faces and quantify its impact. According to the recommendation of WBCSD Nature readiness assessment, Chunghwa Telecom refers to the Natural Capital Protocol Step 4: Determine the impacts and dependencies, Step 5: Measure impact drivers or dependencies, Step 6: Measure changes in the state of natural capital and Step 7: Value impacts or dependencies.

(1) Natural Capital Protocol Step 4: Determine the impacts and dependencies [GRI 304-2]

Based on the methodology of life cycle impact assessment, Chunghwa Telecom established an biodiversity impact path map, as shown in the figure.

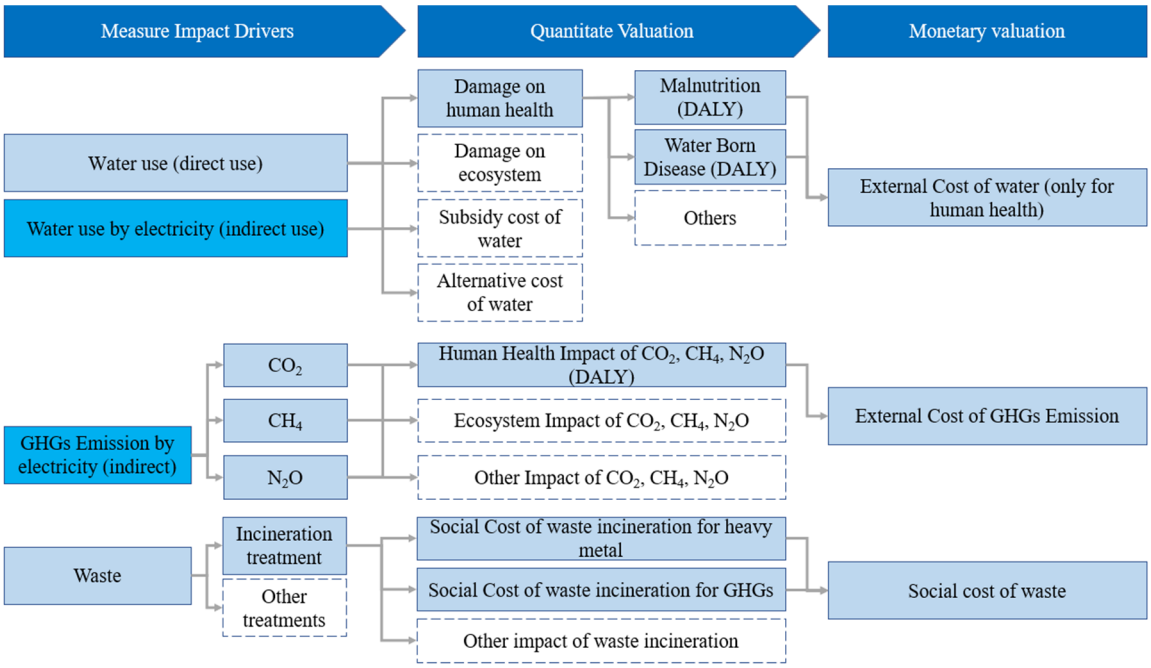

Figure 6. The Analyzing Process for Natural Capital Impacts

Table 4. CHT: Summary of potentially material natural capital impact and dependency pathways

Issue	Impact driver / dependency	Change in natural capital	Value to business / society
Operating impact (on society): GHG emissions	GHG emissions	Increased carbon in the atmosphere	Contributing to climate change and increasing social costs
Operating impact (to the business): GHG emissions	GHG emissions	Increased carbon in the atmosphere	Contributing to climate change and increasing social costs
Operating impact (on society): water consumption	Business consumption of water	Hazard to human health	Health cost to people associated with use of dirty water
Operating impact (to the business): water consumption	Business consumption of water	Hazard to human health	Health cost to people associated with use of dirty water
Operating impact	Generation of industrial	Hazard to human health	Incineration of waste is

Issue	Impact driver / dependency	Change in natural capital	Value to business / society
(on society): waste	waste and municipal solid waste		not conducive to environmental quality and increases social costs
Operating impact (to the business): waste	Generation of industrial waste and municipal solid waste	Hazard to human health	Incineration of waste is not conducive to environmental quality and increases social costs

(2) Natural Capital Protocol Step 5: Measure impact drivers and/or dependencies [GRI 304-2]

Table 5、Chunghwa Telecom's Operating Activities Natural Capital Impact driver / dependency Correspondence Table

Chunghwa Telecom focus	Value-chain boundary	Material natural capital impact drivers and/or dependencies
Product/ Service	Upstream (raw material / oil extraction, refining, and processing)	Impact drivers ● GHG emissions ● Fresh water consumption ● Waste Pollutants Dependencies ● Water filtration
Product/ Service	Operations (provide telecommunications services and sell retail products)	Impact drivers ● GHG emissions ● Fresh water consumption ● Waste Pollutants Dependencies ● Low flood risk ● Stable climate
Product/ Service	Downstream (use and disposal)	Impact drivers ● Electronic waste Dependencies ● Waste assimilation

Table 6. Explanation and reference of quantitative calculation and financial calculation

Impact drivers	Quantitative calculation		Financial calculation	
	Explanation	**Reference**	**Explanation**	**Reference**
GHG emissions	Use GHG Protocol/ISO 14064-1 standard to inventory Chunghwa Telecom's CO_2e	GHG Protocol/ ISO 14064-1	Using the social cost of carbon, choose the average value of 2% social discount rate	US EPA, 2023
Waste (incineration disposal)	Hazards to human health caused by unit waste incineration discharge	ReCiPe 2016	DALY evaluation with reference to the 2022 United Nations Human Development Index report	Cost per DALY averted in low, middle- and high-income countries,2021
Water	Consider the loss of human health such as water-borne diseases	ReCiPe 2016		

Table 7、Chunghwa Telecom's estimation method of impact and dependence

Category	Subcategory	Emission value	Unit	Biodiversity calculation (US$)
GHG emissions	Scope1: CO_2	13,352.33	tonnes CO_2	3,070,400.24
	Scope1: CH_4	71.2332	tonnes CH_4	173,442.67
	Scope1: N_2O	1.199	tonnes N_2O	79,683.71
	Scope2: CO_2e	694,912.72	tonnes CO_2eq	159,796,834.75
Waste (incineration disposal)	D-2601 Waste wire and cable (processed by physical treatment)	1,177,111	kg (recycled, including auction)	N.A.
	D-2603 waste fiber optic cable	Recycled, including auction: 63,129.2 Incineration: 252,516.8	DALY	96,603.61
	E-0220 Waste communication equipment (excluding mechanical)	1,065,803 kg (recycled, including auction)	kg	N.A.
	municipal solid waste	1,986,496	DALY	239,076.56
Water resources	Enterprise water consumption	2,111,005	tonnes	
	TAP WATER-total	11.43	DALY	794,373.57
	Global warming, Human health	1.52	DALY	
	Stratospheric ozone depletion	0.000657	DALY	
	Ionizing radiation	0.00208	DALY	
	Ozone formation, Human health	0.00342	DALY	
	Fine particlate matter formation	2.2	DALY	
	Human carcinogenic toxicity	2.91	DALY	
	Human non-carcinogenic toxicity	0.414	DALY	
	Water consumption, Human health	4.38	DALY	
Total				164,250,415.10

GHG account for all the external costs as the most important reason. The main reason is that the cost of GHG is based on the analysis results of the US Environmental Protection Agency. The analysis refers to three main social cost economic models that simulate climate change. The model considers several economic impacts, including agricultural losses, natural disasters, and industries, etc., so the scope of its monetization factor is different from other impacts considered by Chunghwa Telecom. Since this is the first year of assessment, Chunghwa Telecom only considers most of the impacts on human health, and does not consider the loss of ecosystems and other social economies.

GHG emissions were part of Chunghwa Telecom's net-zero carbon emissions policy. If we exclude GHG and focus on the rest of impact on biodiversity, water resources account for about 70% and waste accounts for about 30%.

(3) Natural Capital Protocol Step 6: Measure changes in the state of natural capital

Table 8. Changes in natural capital influencing Chunghwa Telecom's dependencies

Dependencies	**Changes in natural capital influencing Chunghwa Telecom's dependencies (examples)**
Energy	Siltation of a hydropower reservoir
Regulation of waste and emissions	Loss of vegetation cover and natural dust suppression
Water	Diversion or desiccation of a river that provided a source of process water

(4) Natural Capital Protocol Step 7: Value impacts and/or dependencies [GRI 304-2]

Table 9. Valuation technique

Issue	Consequences of impact or dependency on chosen Component (business or society)	Chosen valuation technique
Operating impact (on society): GHG emissions	Contributing to climate change and increasing social costs	Using the social cost of carbon, choose the average value of 2% social discount rate
Operating impact (to the business): GHG emissions	Contributing to climate change and increasing social costs	
Operating impact (on society): water consumption	Health cost to people associated with use of dirty water	DALY evaluation with reference to the 2022 United Nations Human Development Index report
Operating impact (to the business): water consumption	Health cost to people associated with use of dirty water	
Operating impact (on society): waste	Incineration of waste is not conducive to environmental quality and increases social costs	
Operating impact (to the business): waste	Incineration of waste is not conducive to environmental quality and increases social costs	

Step 5: Act

Chunghwa Telecom has launched management actions against three major impacts, which are GHG emissions, water consumption and waste, and strives to reduce Chunghwa Telecom's dependence on natural capital to avoid impacts on operating activities. At the same time, Chunghwa Telecom will also actively invest in and maintain biodiversity, such as promoting the planting of native tree species in various places, from alpine virgin forests to shallow mountain ecological afforestation, as well as coastal windbreak forests, to create a better base for the ecology and maintain Taiwan in a way that is suitable for the land and trees, to achieve the goal of Net Positive Impact on biodiversity by 2040.

1. GHG emissions reduction

According to the new SBT ICT GHG emissions reduction scenario and target (i.e. IEA NZE scenario), Chunghwa Telecom proposed to reduce emissions by 50% in 2030 compared to 2020, and set a reduction roadmap for 2020-2030, and the target is higher than the 5% reduction target from SBT ICT. According to SBT ICT requirements, Chunghwa Telecom has set emissions reduction targets covering the entire company. In addition, Chunghwa Telecom proposed a net-zero emission target, so Chunghwa Telecom took the initiative to join the "Taiwan Net-Zero Action Alliance" as its founding member, and promised to achieve net-zero emissions for the organization's headquarters and offices by 2030, and to achieve net-zero emissions for the entire company by 2050. Consider zero emissions as the company's long-term carbon reduction vision and goal.

2. Water consumption reduction

We benchmarked the 2012 water usage as the standard, and now control the annual growth of water usage to no more than 2%. In addition to a new water leakage detection feature in products, we have also included Company water consumption in the EARTH system. Managers can also review the situation of water usage according to trend charts and reports, reduce expenses in water, and improve the efficiency of management. The management and analysis information interface can be used to promote water conservation measures and set concrete management goals.

3. Waste reduction

In response to the UN SDG 12: Responsible consumption and production and the circular economy promotion in Taiwan's 5+2 Industrial Innovation Plan, we drive the transition to a circular economy as well as exercise our industrial influence, facilitate the value chains as a whole, and collectively usher in the age of circular economy with zero waste and zero carbon emissions. We proposed five commitments with the 5R Principle (REDUCE, REUSE, REPAIR, REFUSE, RECYCLE) higher than the statutory requirements at home and abroad

Step 6: Transform

Chunghwa Telecom is a leading enterprise in the telecommunications industry in Taiwan. Therefore, Chunghwa Telecom's business activities have attracted the attention of various stakeholders, and they expect Chunghwa Telecom to take the lead in implementing sustainable work. Therefore, Chunghwa Telecom uses core expertise, technology, resources, capabilities and features, actively invest in technology and energy conservation, through green power procurement and self-construction, and innovative research and development of efficient and intelligent energy-saving management systems, effectively reduce energy consumption and carbon emissions, implement environmental protection concepts, and transform towards a green and sustainable operating model. For example, in 2022, Chunghwa Telecom announced the “Winning Matches, Planting Trees” three-year afforestation project, to recreate habitat of endangered endemic species in Taiwan and protect biodiversity ecosystem

Step 7: Report

Chunghwa Telecom referred to Global Reporting Initiative (GRI), GRI 304: Biodiversity and disclosure the Biodiversity Declaration. Chunghwa Telecom classified Biodiversity Declaration in the chapter titles, so that stakeholders can quickly understand the company Relevance to GRI Guidelines.

6. Chunghwa Telecom's sites management [GRI 304-1]

According to Chunghwa Telecom's assessment of natural capital risk results, only GHG emissions are listed as high-risk, while waste and water use are listed as low or low-medium risks. The main reason is that Taiwan, where Chunghwa Telecom is located, is an island, compared with GHG emissions, the risks of waste and water use are relatively low. What needs attention is the impact of GHG on islands, such as sea level rise, and climate change issues cause by GHG, such as floods.

First, Chunghwa Telecom will step by step and assess how to avoid business activities affecting biodiversity, including operating activities, raw material procurement, use and disposal of products/services, investment and financing activities, new sites, etc. Protected areas designated by UNESCO and local governments are given priority; if negative impacts are unavoidable, Chunghwa Telecom plans to propose methods for potential impact assessment and mitigation (including offset or restoration) in the future , and work with external partners to protect the ecosystem.

In addition to the implementation of ecological protection work, green transformation will be implemented for sites with high GHG emissions. For example, Chunghwa Telecom’s IDC computer room has a high demand for electricity, so the scope 2 emissions from the IDC computer room are also high. Considering the overall GHG reduction strategy, Chunghwa Telecom set the PUE (Power Usage Effectiveness) of the IDC computer room to drop to 1.5 in 2030, it means that the power consumption of air conditioners, lighting and other power-consuming equipment in the IDC computer room will decrease, which will help the company reduce GHG emission. Chunghwa Telecom reduces the PUE and power demand of the IDC computer room. At present, the implementation of the energy-saving plan for the IDC computer room of the Power Operation Supervisory System (POSS) has been implemented, conduct dynamic energy management through the network, and give full play to the benefits of technology in energy saving, GHG reduction, and environmental protection. In addition, Chunghwa Telecom requires that the PUE value of the newly built IDC computer room be less than 1.5, and the other energy-saving plans for the IDC computer room, it is expected that the goal of reducing the PUE to 1.5 will be achieved in 2030.

II. Result

1. Chunghwa Telecom result

According to the results of this year's biodiversity assessment and natural capital impact, the high-risk mainly come from GHG emissions, which will extend the risk of dependence on other ecosystem services. Therefore, Chunghwa Telecom will focus on the management and reduction of GHG emissions.

Chunghwa Telecom has set a company-wide goal of net-zero emissions in 2050, and set a medium-term targets of reducing the scopes 1 & 2, and scope 3 by 50% from 2030 to 2020. These targets are being submitted to international organizations, Science-Based Target initiatives (SBTi) for validation. Therefore, Chunghwa Telecom will carry out corresponding GHG reduction work on its own operations and suppliers in the future.

2. Direction of future efforts

As GHG are high-risk impact, it will lead to the climate change issues and affect the ecological environment. Therefore, managing and reducing GHG will help Chunghwa Telecom to promote biodiversity. Chunghwa Telecom has established a climate change management tool - Task Force on Climate-Related Financial Disclosures (TCFD), and will conduct climate-related risk and opportunity analysis on the value chain to fully grasp the risks and opportunity brought by climate change, advance deployment and reduce its operational and financial impacts will prompt Chunghwa Telecom to establish a low-carbon economy and a resilient business model, drive Taiwan and the industrial chain to transform towards a low-carbon economy, jointly reduce GHG emissions, and benefit biodiversity conservation work.

III. Referrence

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3. Natural Capital Finance Alliance, Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE)
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