



GPSC IFRS S2 Sustainability Disclosure Standard 2024

Climate-Related Disclosures

June 2024

Table of Content

IFRS S2	Document Page
1. Introduction	4
2. Governance	6-10
3. Strategy	12-33
4. Risk Management	35-39
5. Metric and Targets	41-48
6. IFRS S2 Index	50-60



IFRS S2: Introduction

GPSC Embraces Sustainability with Renewable Energy Focus

Global Power Synergy Public Company Limited (GPSC) acknowledges the urgent threat of climate change and its potential to disrupt business operations. In response, the company is taking proactive measures to address this challenge through decarbonization efforts, as outlined in Corporate Strategy S2: Scale-up Green Energy to expand our clean energy portfolio, focusing on solar, wind, and integrated renewable projects alongside energy storage systems (ESS). Currently, GPSC invests in producing and distributing electricity on 7 types of power plants, comprising Cogeneration, Combine Cycle, Thermal, Solar, Hydro, Wind, and Waste Energy Power Plants.

By 2030, GPSC aims to generate at least 50% of our total capacity from renewables, primarily focusing on solar power. Additionally, the company is committed to reducing GHG intensity by 35%, laying the foundation for a low-carbon future. In 2023, GPSC achieved a remarkable 45.45% increase in renewable energy capacity, reaching 4,884 MW, which now accounts for 52% of our overall capacity, as depicted in **Figure 1**. This achievement was driven by the strong performance of GPSC's Solar Power Plant, demonstrating the efficacy of sustainable energy practices without reliance on volatile fossil fuels. It underscores our commitment to becoming one of Southeast Asia's top three power companies, with over half of our capacity derived from green sources. Moreover, this aligns with our support of the [COP28 Global Renewables and Energy Efficiency Pledge](#), endorsed by 130 national governments, including Thailand.

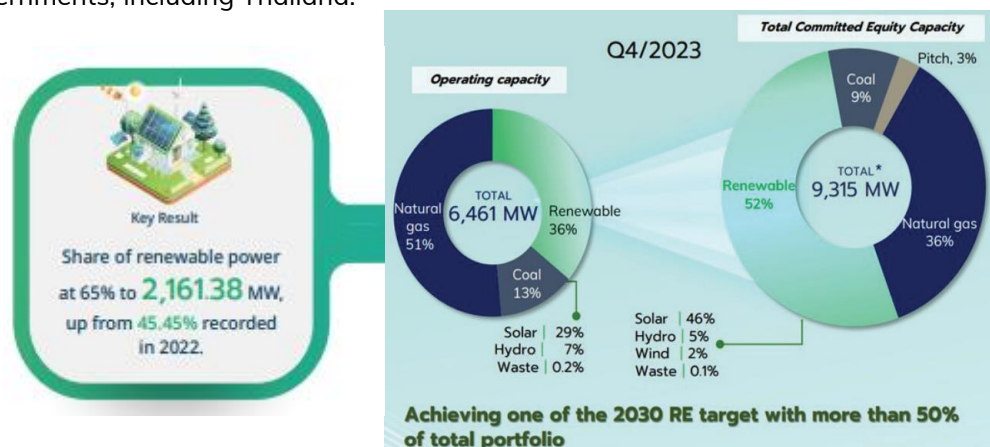


Figure 1: Capacity and total energy generated

Clean Energy Toward Net Zero

GPSC's Robust Climate Framework

To support the decarbonization pledge, GPSC has established a comprehensive climate framework. This framework encompasses four key elements:



Figure 2: Climate-related risks and opportunities disclosure

Transparency Through Reporting

GPSC demonstrates a commitment to transparency by voluntarily adopting the IFRS S2 standard for climate-related disclosures. This disclosure framework empowers stakeholders and investors to make informed decisions by clearly understanding GPSC's climate-related risks and opportunities. Furthermore, it aligns with GPSC's existing sustainability reporting efforts, as "Energy Management and Climate Change" is GPSC's core ESG materiality issue. This IFRS S2 report integrates recommendations from the Task Force on Climate-related Financial Disclosures (TCFD) and incorporates industry-specific requirements derived from SASB Standards. By adhering to these rigorous standards, GPSC ensures that the company has governed climate-related risks and opportunities in accordance with IFRS S2 standards, as illustrated in **Figure 2**.

2 IFRS S2: Governance

GPSC Climate Change Governance Structure

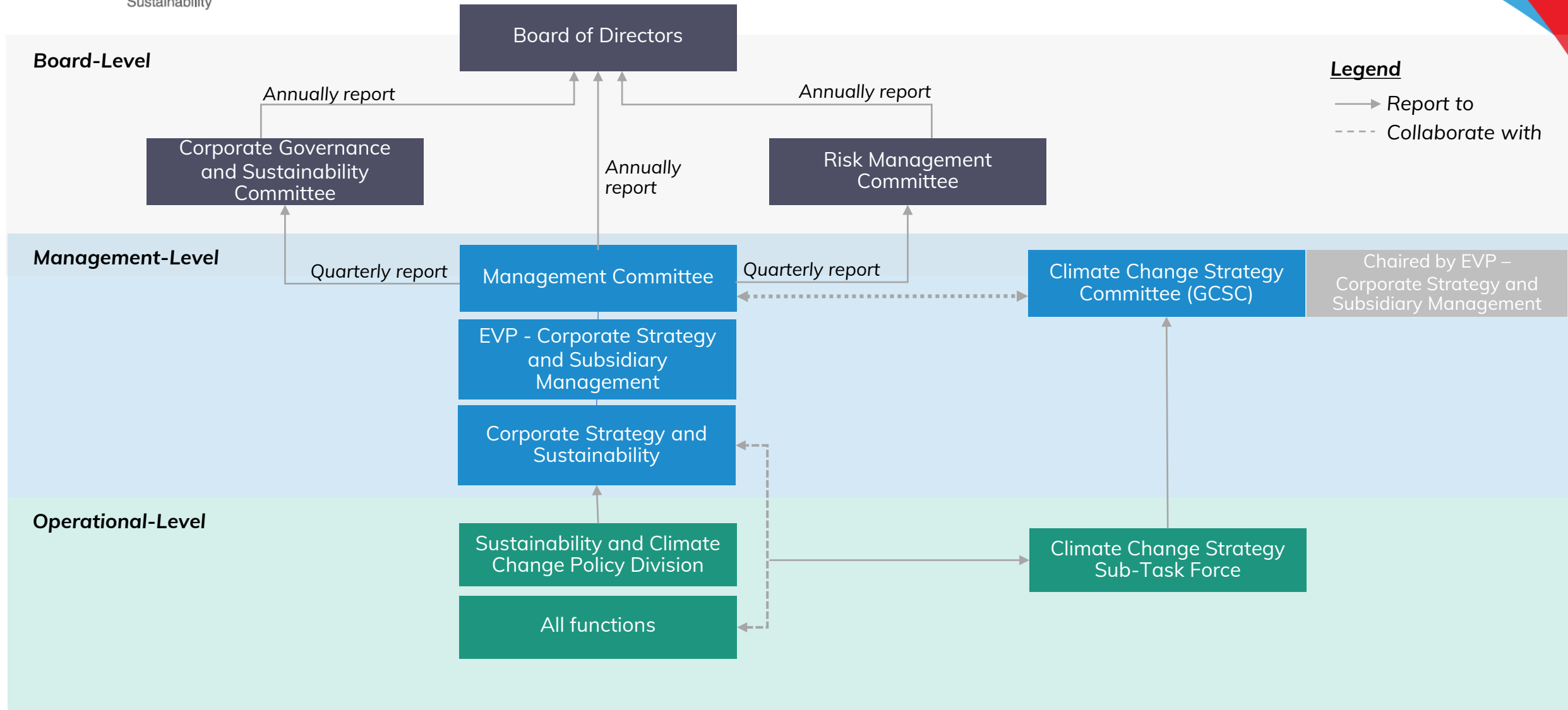
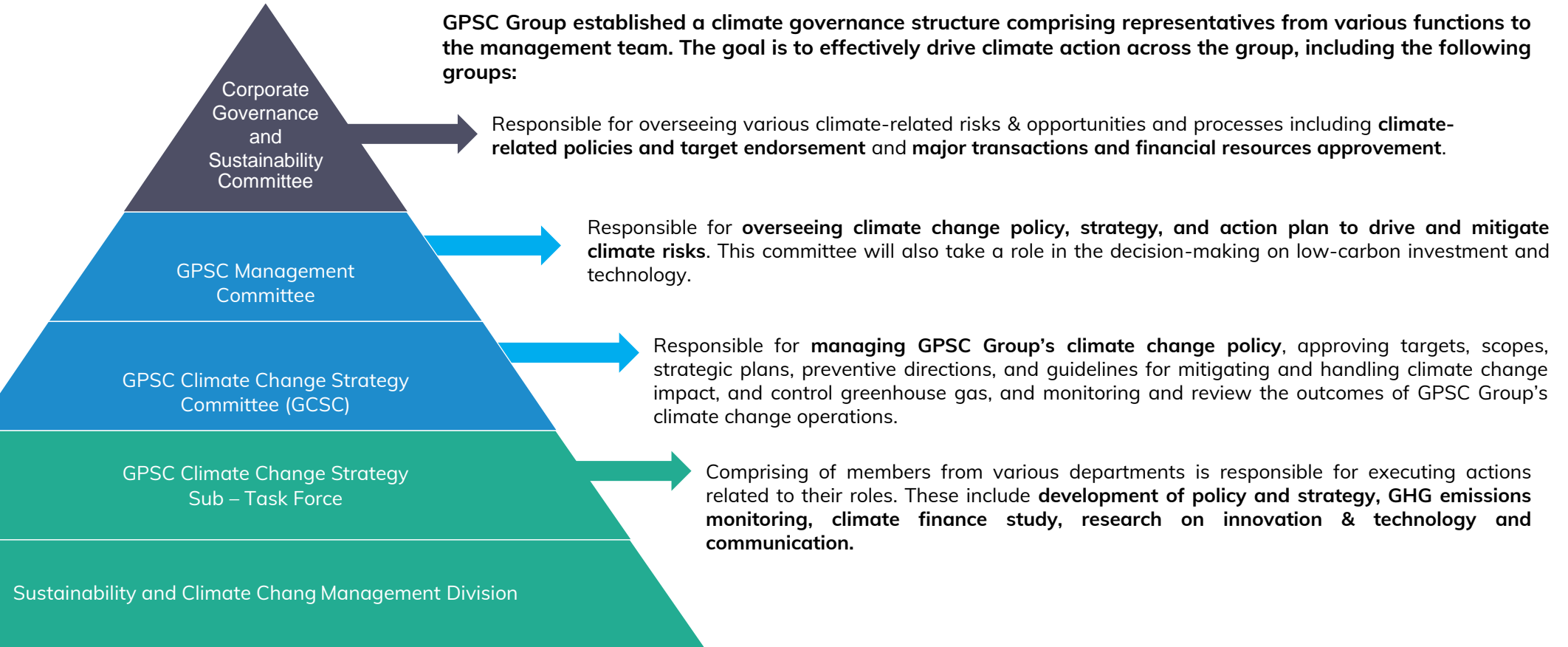


Figure 3: Climate governance structure

GPSC Climate Change Task Force Structure

GPSC Group established a climate governance structure comprising representatives from various functions to the management team. The goal is to effectively drive climate action across the group, including the following groups:



The **Sustainability and Climate Change Management Division** recommends and communicates the company's sustainability strategy, action plans, and policies to all employees. They monitor compliance and audit business units to confirm effective implementation. The Department fosters a culture of sustainability among employees and suppliers to achieve sustainable development, as described in [Climate Change Policy](#).

Figure 4: Climate change climate change task force structure

Climate Governance Structure

1. Board-Level

1.1 The Roles and Responsibility

1.1.1 Board of Directors

The Board of Directors is responsible for approving climate change policies, strategies, and targets across various time horizons – short, medium, and long-term, and approving major transactions and/or financial resources to conduct business activities. These decisions are informed by the findings and financial considerations of the climate risk assessment process from the Corporate Governance and Sustainability Committee and Risk Management Committee, empowering the Board of Directors to allocate funds and resources to ensure the successful and timely implementation of climate mitigation and adaptation measures.

1.1.2 The Corporate Governance and Sustainability Committee and Risk Management Committee

The Corporate Governance and Sustainability Committee and Risk Management Committee are responsible for overseeing various climate-related risks & opportunities, and processes including:

1. Risk management policies and climate-related policies
2. Business plans, climate strategy, and action plan
3. Climate management objectives and targets
4. Progress on climate-related management against goals and targets.
5. Annual budget, capital expenditures, acquisitions, and divestitures

1.2 Report of Progress

The Corporate Governance and Sustainability Committee and Risk Management Committee conduct quarterly meetings to review and discuss the risks and opportunities associated with climate-related performance. They then report their findings to the Board of Directors at least once a year. This reporting structure is illustrated in Figure 3, which depicts the reporting line at each level.

For more details, see [Roles, Duties and Responsibilities of the Board of Directors](#), [Corporate Governance and Sustainability Committee Charter](#), and [Risk Management Committee Charter](#)

1.3 Skill Set and Competencies

The Board of Directors has formed two committees, the Corporate Governance and Sustainability Committee and the Risk Management Committee. Each committee consists of three directors with extensive knowledge and expertise in climate change, including power industry, innovation, and sustainability management. These committees have the skills necessary to effectively monitor and govern climate-related strategies, risks, and opportunities. By doing so, they aim to maximize the benefits of addressing climate-related issues. This is reflected in their [Board Skill Matrix](#).

GPSC encourages our directors to consistently enhance their performance efficiency by undergoing competency development training. This training encompasses climate-related strategies, risks, and opportunities, climate change-related trends and opportunities, carbon credits, and energy attribution certificates and is available for all committee members.

1.4 GPSC Prioritizes Climate Action Through Robust Governance

The Corporate Governance and Sustainability Committee and the Risk Management Committee (The Committee) are dedicated to actively promoting, strongly supporting, and decisively approving sustainable development initiatives. This commitment also includes endorsing outcomes derived from comprehensive climate-related risk and opportunity assessments, which include sturdy mitigation and adaptation plans.

1.4.1 Integrated Management Approach

Climate-related risks and opportunities are a core component of GPSC's risk management framework. The Committee regularly conducts assessments, integrating the results with enterprise risk management practices (ERM). Additionally, quarterly reports and monitoring ensure effective responses to these factors.

Climate Governance Structure

1.4.2 Strategic Alignment

The Committee plays a vital role in developing climate strategies that align with the company's objectives. This involves defining targets related to climate and tracking progress through quarterly meetings. Additionally, specific key performance indicators (KPIs) are established to encourage directors and assess their efficiency in managing climate issues. These KPIs are reviewed annually to ensure consistent enhancement and to maximize the benefits for GPSC.

2. Management Level

2.1 The Roles and Responsibilities

2.1.1 Management Committee

GPSC has established a Management Committee, with the Chief Executive Officer as the highest management position. This committee is responsible for creating climate change management guidelines, practices, and procedures. Supporting the Management Committee is the Group Climate Change Strategy Committee (GCSC), chaired by the EVP—Corporate Strategy and Subsidiary Management. Both committees work together with the Risk Management and Strategy Departments to assess and manage risks and opportunities related to climate change.

2.1.1 GPSC Climate Change Strategy Committee (GCSC)

The Group Climate Change Strategy Committee (GCSC) is an executive-level committee that is responsible for managing GPSC Group's climate change policy, developing climate and sustainability strategies, overseeing a comprehensive strategy that aligns with international standards, promoting greenhouse gas reduction, and aligning climate operations with the company's overall goals. The committee actively monitors progress, prepares reports for external verification, and fosters knowledge sharing internally and externally. They also have the authority to adjust task forces and invite employee input to ensure a dynamic and effective approach to climate change mitigation and adaptation.

2.2 Progress Reporting to the Committee

The Management Committee and the GPSC Climate Change Strategy Committee (GCSC) report progress updates regarding sustainability and climate change issues to the Corporate Governance and Sustainability Committee and Risk Management Committee at least quarterly and annually to the Board of Directors, as illustrated in Figure 3, which depicts the reporting line at each level.

3. Operational Level

3.1 The Roles and Responsibility

3.1.1 Climate Change Strategy Sub-Task Force

The GCSC has established a sub-task force known as the Climate Change Strategy Sub-task Force. The members of this subtask force come from various departments and are responsible for supporting the action plans of the main task force and executing actions related to their roles. Their responsibilities include developing policies and strategies, monitoring GHG emissions, conducting climate finance studies, researching innovations and technology, studying business potential and customer demands tied to the Green Certificate, and facilitating communication.

In addition, the Climate Change Strategy Sub-Task Force comprises six sub-task forces. The roles and responsibilities of these entities are as detailed below.

3.1.1.1 Climate Policy & Strategy Sub-Task Force

- Analyze both physical and transitional climate risks and create comprehensive response strategies. This involves setting targets, outlining specific methods to achieve those targets, developing mitigation measures, closely monitoring progress, analyzing data, and pushing forward action plans while promoting stakeholder collaboration to ensure alignment with short- and long-term climate goals.

3.1.1.2 GHG Account Sub-Task Force

- Establish a strong foundation for GPSC's climate reporting by formulating guidelines for calculating greenhouse gas (GHG) emissions and compiling and managing GHG data sources. Ensure transparency through preparing GHG accounts and ESG data that adhere to the GRI Standard.

3.1.1.3 Climate Finance Sub-Task Force

- Proactively assesses the financial implications of climate change by developing future scenarios, forecasting potential impacts, and exploring mitigation strategies, including studying financial instruments designed to reduce GHG emissions and analyzing carbon tax policies. This comprehensive approach ensures that GPSC is well-positioned to navigate the evolving financial landscape associated with climate change.

3.1.1.4 Innovation & Technology Sub-Task Force

- Analyze suggestions and gather data on emerging climate technologies. This data is then strategically shared and coordinated across various departments to inform the development of policies and strategic plans focused on greenhouse gas emission reduction.

3.1.1.5 REC and Carbon Credit Management Sub-Task Force

- Monitor, investigate, and analyze the effects of trends and changes in REC certificate registration and carbon credit trading. Prepare information for REC certificate registration and trade of RECs and carbon credits. Investigate the company potential and customer needs associated with various green certificates. Summarize and report performance data.

3.1.1.6 PR & Communication Sub-Task Force

- Support and lead initiatives to educate and engage employees on climate change issues and promote and disseminate information about GPSC's climate projects and performance, both internally and externally.

More details about GPSC' Climate Change Management Structure can be found at [Clean Energy Towards Net Zero | Global Power Synergy Public Company Limited \(GPSC\) \(gpscgroup.com\)](#)

4. Monetary Incentives

The GHG intensity reduction indicator has been incorporated as a key performance indicator (KPI) for the President, Chief Executive Officer (Executive Director), Executive officer, and employees of GPSC Group. This KPI aims to reduce GHG intensity in operations compared to industry peers, with an annual target of achieving a 35% reduction in GHG emission intensity by 2030 and reaching net zero emissions by 2060. Additionally, a KPI for renewable MWe growth has been introduced to the Executives Officer. The company has developed a "S2-Scale-up Green energy" strategy to expand renewable energy production capacity, aligning with low-carbon operations and GHG emission reduction targets, and in line with the PTT Group's growth objectives. These KPIs are monitored annually through indicators linked to the company's transformation target of increasing renewable energy in its portfolio to over 50% by 2030 and expanding investments in international countries, particularly in target countries such as Taiwan, Vietnam, and India.

GPSC rewards employees associated with managing climate change issues, including attainment of targets. This ensures that climate-related ambitions and goals are embedded throughout the company and that management is held accountable for the achievement of these goals as shown in the table below:

Table 1: Monetary Incentives

Employee Level	Type of Incentive*	Incentivized KPIs
Chief Executive Officer (CEO)	Monetary	<ul style="list-style-type: none"> Eco-efficiency improvement (Emissions reduction) Renewable MWe Growth Domestic renewable energy project development
Executive Officer	Monetary	<ul style="list-style-type: none"> Eco-efficiency improvement (Emissions reduction) Solar business control enhancement (Emissions reduction) Renewable MWe Growth
Employee	Monetary	<ul style="list-style-type: none"> GPSC Group GHG reduction (Emissions reduction) Development of short- & long-term action plans to ZET ZERO (Emissions reduction)

Note: * types of incentive consist of monetary, recognition (non-monetary), and other (non-monetary rewards)

3 IFRS S2: Strategy

Climate-Related Risks & Opportunities

1. GPSC Climate-Related Risks and Opportunities

GPSC Prioritizes Climate Action Through Comprehensive Assessment

GPSC recognizes the importance of climate change management and has identified it as a key materiality topic. Consequently, the company conducted a comprehensive climate-related risk and opportunity assessment analysis of all business activities along the value chain, including both core and support activities, upstream and downstream. This process aimed to gather relevant data to assess the impact on all stakeholders involved in the value chain.

Climate-related risks can be grouped into physical and transition risks. In order to evaluate the level of impact of each risk across GPSC's operations and value chain, a third-party experts was consulted. This evaluation was done for different scenarios that align with Shared Socioeconomic Pathways (**SSP1-2.6 and SSP5-8.5**) for physical risks. The assessment includes value chain activities in Thailand, India, Lao PDR, and Taiwan. Transition risks were evaluated by identifying potential low economy transition risks and analyzing their impact on GPSC's business areas and value chain impacts. All transition risks were assessed under two scenarios, **IEA STEPS and NET Zero 2050**. Both physical and transition risks were projected for **two timeframes: medium-term 2030 and long-term 2050**. The dataset that supports the physical and transition risk assessments includes information about **current conditions** and **forecasts of future conditions**, specifically for GPSC businesses. The results of GPSC's climate-related risks and opportunities were assessed **according to the Industry-based Guidance on Implementing IFRS S2 – Volume 32 Electric Utilities & Power Generators**.

The risks and opportunities related to climate change were discussed with internal stakeholders with the necessary expertise to provide a well-rounded perspective in the context of GPSC's businesses. The climate change strategy was then consulted to connect the ideas throughout the business and identify the risks and opportunities. Strategic decisions were made using the linkage between the climate-related risks and opportunities for planning, such as risk management systems, target setting, work plans, etc.

1.1 Physical Risks and Opportunities

GPSC identified climate-related physical risks and impacted areas of GPSC by conducting a high-level 'hotspot' qualitative assessment of potential business implications of each risk utilizing specialized tool and consulting with external experts. Additionally, GPSC has developed measures that can be taken to address identified risks and seize opportunities. Physical risk assessment covered **nine climate hazards** related to climate change impacts: Extreme Heat, Extreme Cold, River Flooding, Extreme Rainfall Flooding, Water Stress, Drought, Coastal & Offshore, Extreme Winds & Storms, and Wildfire, as described in **Table 6** and **Figure 5**.



Figure 5: Nine climate hazards covered in physical risk assessment

1.1.1 Scope of Assessment

The scope of the assessment covers the assets of GPSC Group's own operations for **6 types of power plant technologies: 1. Cogeneration, 2. Coal-Fired, 3. Solar, 4. Wind, 5. Hydro, and 6. Waste-to-Energy (WtE) Power Plants**. These assets generate high revenue and have a significant financial impact on the business. The assessment also includes upstream assets (Natural Gas and Coal) and downstream assets (Key Customers).

The assessment analyzed total **54 assets** comprising **51 GPSC Group's operation assets in Thailand and overseas**, along with **2 upstream assets and 1 downstream asset** with a significant financial impact on the business. The names of these assets are listed in **Tables 2, 3, and 4**, respectively.

Climate-Related Risks & Opportunities

Table 2: GPSC's own operation assets covered by climate-related risk assessment.

(Number) Type of Asset	Name	Location
26 Cogeneration Power Plants	Central Utility Plant 1, 2, 3, 4 (CUP1, CUP2, CUP3, CUP4)	Rayong
	Glow SPP 11 Project 1, Project 2, Project 3	
	Glow Energy Phase 1, Phase 2, Phase 4, Phase 5	
	Glow Energy CFB3	
	Glow SPP2, SPP3*	
	IRPC Clean Power Company Limited (IRPC-CP) Phase 1, Phase 2	
	Electricity Generating Unit ERU (Under Construction)	Chon Buri
	Sriracha Power Plant (SRC)	
	Glow IPP Power Plant (GIPP)	
	Nava Nakorn Electricity Generating Company Limited (NNEG)	Pathum Thani
	NNEG Expansion and Expansion 2	
	Combined Heat and Power Producing Company Limited (CHPP)	Bangkok
	Bang Pa-In Cogeneration Company Limited (BIC-1, BIC-2)	Ayutthaya
2 Coal-Fired Power Plant	Ratchaburi Power Company Limited (RPCL)	Ratchaburi
	GHECO-One	Rayong
17 Solar Power Platforms	Glow Energy CFB3	
	Combined Heat and Power Producing Company Limited (CHPP) Solar	Chanthaburi
	Siam Solar Energy 1 Company Limited (SSE1)	Kanchanaburi

Type of Asset	Name	Location
	Siam Solar Energy 1 Company Limited (SSE1)	Suphan Buri
	N.P.S. Stargroup Company Limited (NPS2)	
	Glow Energy Solar Power Plant	Rayong
	N.P.S. Stargroup Company Limited (NPS1) World X Change Asia Company Limited (WXA1, WXA2, WXA3)	Phichit
	N.P.S. Stargroup Company Limited (NPS3)	Lop Buri
	P.P. Solar Company Limited (PPS1, PPS2, PPS3)	Khon Kaen
	Sheng Yang Energy Company Limited (SYE)	Taiwan
	Avaada Energy Private limited (AEPL) 1-7	India
3 Hydro Power Plants	Houay Ho Power Company Limited (HHPC)	Lao PDR
	Nam Lik 1 Power Company Limited (NL1PC)	
	Xayaburi Power Company Limited (XPCL)	
1 Wind Power Plant	CI Xidao Limited (CFXD)	Taiwan
2 Waste-to-Energy Power Plants (WtE)	Rayong Waste-to-Energy (WTE) Plant	Rayong
	Chonburi Clean Energy Company Limited (CCE)	Chon Buri

Remark:

*Glow SPP3 is a hybrid natural gas and coal-fired combined-cycle cogeneration, which is different from GPSC's other cogeneration power plants that mainly use natural gas.

Climate-Related Risks & Opportunities

Table 3: GPSC's Upstream (Raw Material Suppliers) assets covered by climate-related risk assessment

Upstream (Raw Material Suppliers)	Location
PT. Kaltim Prima Coal (KPC)	Indonesia
PTTEP (S1 Project (Sirikit))	Kamphaeng Phet

Table 4: GPSC's Fossil Fuel Power Plant & Downstream assets covered by climate-related risk assessment

Fossil Fuel Power Plant & Downstream	Location
Map Ta Phut Industrial Estate, Rayong	Rayong

1.1.2 Climate Scenarios

GPSC conducted a physical risk assessment by utilizing two Shared Socioeconomic Pathways (SSPs) climate scenarios from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6, including SSP 1-2.6 and SSP5-8.5 (**Table 5**). The SSPs are formulated using the most recent climate science and incorporate qualitative predictions of societal features, quantitative economic development measures, and climate data to reflect potential changes in global GHG emissions, energy use, air pollution control, land use, and other related factors.

The assessment considers future time horizons, with the **medium-term and long-term** time frames defined as **2030 and 2050** respectively. These milestones are internationally recognized as key targets for managing climate change. The Enterprise Risk Management (ERM) and strategy formulation processes have integrated these timeframes, including the analysis of financial impacts.

Table 5: Climate Scenarios Used in Physical Risk Assessment

Climate Scenarios	Description	Estimated Increase in Temperature by 2100
SSP 1-2.6	A Low emissions scenario that stays below 2°C warming by 2100, aligned to current commitments under the Paris Agreement.	1.8°C
SSP 5-8.5	High-emissions scenario following a 'business as usual' trajectory, assuming no additional climate policy and GHG emissions are projected to triple by 2100.	4.4°C

Climate-Related Risks & Opportunities

1.1.3 Physical Risk Assessment Methodology

- 1. Asset Inventory:** Gather information on the location of assets across the value chain, including own assets, downstream assets, and upstream assets.
- 2. Climate Hazard Mapping:** Collect relevant climate hazard data for each asset location and standard to ensure consistency and allow for comparison across different locations.
- 3. Exposure Assessment:** Assess vulnerability of each asset to different climate hazards, considering the specific business activities that occur at each location and how these activities may be affected by climate-related events. Assets that are highly susceptible to a particular hazard should be given a higher "exposure rating."
- 4. Risk Scoring:** Utilize a risk-scoring approach that combines climate hazard data with exposure ratings to determine the susceptibility of specific business activities at each asset location. By calculating aggregated scores, GPSC gains a broader understanding of the overall portfolio risk. This approach is applied across different timeframes to gain valuable insights into how climate risks might evolve in the future.

Table 6: Climate Hazards and Associated Indicators and Units

Climate Hazard	Scenario Indicator(s)	Unit	Data resolution
Extreme Cold	Cold Spell Duration Index	Days	~55 km
Extreme Heat	Warm Spell Duration Index (WSDI)	Days	~55 km
River Flooding*	Riverine Flooding Inundation Depth	Metres	90m

Extreme Rainfall Flooding	Pluvial Flooding Inundation Depth	Metres	90m
Coastal Flooding	Coastal flooding inundation depth	Metres	1 km
Extreme Winds & Storms	Maximum tropical cyclone wind speed	Knots	~25 km
Rainfall-induced Landslides	Rainfall-Induced Landslides Index	Number of days with a potential chance of a landslide event	~1 km
Water Stress & Drought	Water Stress**	By category	HydroBASINS sub-basins
Wildfires	Forest Fire Danger Index (future)	Number of days with fire-permitting climatic conditions	~55 km
	Maximum burned area (historical)	Square kilometers	~5.5 km

Remark:

*The riverine (fluvial) hydraulic models use estimates of extreme streamflow (discharge) for every river, whilst the extreme rainfall (pluvial) model uses estimates of extreme rainfall.

**Definition of water stress based on WRI Aqueduct 4.0: an indicator of competition for water resources and is defined informally as the ratio of demand for water by human society divided by available water.

Climate-Related Risks & Opportunities

1.1.4 Physical Risk Assessment Result- Qualification Analysis

The initial outcomes of the physical risk assessment indicate that Cogeneration, Coal, Solar, and Waste-to-Energy Power Plants are significantly affected by water stress, drought, and extreme heat across all time horizons. This impact is notably pronounced for facilities located in the Rayong and Chon Buri regions, where limited access to alternative freshwater sources and potential saltier water intrusion in coastal areas present challenges. Moreover, heightened competition for water resources due to increased industrial water usage in Map Ta Phut industrial estate regions poses significant obstacles. Additionally, the escalating global mean temperatures resulting from climate change have substantially altered precipitation patterns in Thailand and globally, exacerbating water evaporation and reducing freshwater availability.

Plant Technology	Climate Hazards (Max of all time horizon)								
	Extreme Heat	Extreme Cold	River Flooding	Extreme Rainfall Flooding	Coastal & Offshore	Extreme Winds & Storms	Rainfall-Induced Landslide	Water Stress & Drought	Wildfires
Cogeneration	Very high	Low	Moderate	Low	Low	Low	Low	Very high	Moderate
Coal-Fired	Very high	Low	Low	Low	Low	Low	Low	Very high	Moderate
Hydro	Very high	Low	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
Solar	Very high	Low	Low	Low	Low	Low	Low	Very high	Very high
WtE	Very high	Low	Low	Low	Low	Low	Low	Very high	Moderate
Wind	Moderate	Low	Low	Low	Low	Very high	Low	Low	Low

Legend

Very high
High
Moderate
Low
Minimal

Figure 6: Hotspots of physical risks for GPSC assets

Summary of Key Findings

1. Water stress, drought, and extreme heat are significant climate hazards that pose substantial risks to **Cogeneration, Coal, Solar, and Waste-to-Energy power plants**. These plants, shown in red and burgundy in **Figure 6**, are mainly located in Rayong and Chonburi, where there is limited access to alternative freshwater sources, potential for saltwater intrusion, and high competition for water resources. Additionally, Solar Platforms in India are affected by more erratic monsoons, which cause shorter rainfall durations, leading to drought and limited water sources.
2. The **Cogeneration Power Plant and Coal-Fired Power Plant** are expected to face a significant risk from water stress, drought, and extreme heat due to limited water resources. This could result in operational challenges, particularly in the reduced cooling system capacity, which relies heavily on water as a coolant and may lead to potential downtime. Additionally, water stress and drought in industrial estate regions with high demand for industrial water may contribute to water scarcity and subsequent increases in water expenses.
3. **Solar Platforms'** operational efficiency and electrical output may be adversely impacted by drought and extreme heat due to the decreased water availability for panel cleaning. This is particularly concerning when the panels are soiled, as solar panels exhibit optimal efficiency in converting sunlight into electricity at moderate temperatures, typically around 25°C. Prolonged exposure to temperatures exceeding this optimal range can reduce power output by 10% to 25%.
4. **Waste-to-Energy (WtE)** plants require much less water than natural gas Power Plants, mainly using water for ash quenching, boiler steam cleaning, and flue gas scrubbing. The water used in WtE plants has no direct impact on electricity generation. Therefore, power output is less likely to be significantly reduced even with water restrictions. However, water stress can still pose challenges for WtE plants, as drought conditions and water source regulations may lead to higher costs for treating wastewater before discharge.

Climate-Related Risks & Opportunities

- For the **upstream asset in the value chain** (natural gas provider), the assessment indicates that PTTEP (S1 Project – Sirikit) in Kamphaeng Phet province can face high risk due to water stress, drought, and extreme heat. Natural gas exploration uses substantial water, particularly during hydraulic fracturing (fracking). Water stress and drought conditions could limit water availability for these activities, potentially slowing down exploration and development of new gas fields. Additionally, water is often injected back into the wells during natural gas production to maintain pressure and enhance extraction efficiency. Water scarcity could hinder this process, leading to reduced gas production or even temporary shutdowns. Ultimately, this could impact the natural gas supplied to GPSC Group's natural gas Cogeneration Power Plants, affecting electricity production processes.
- For the **value chain's downstream asset**, the Map Ta Phut Industrial Estate in Chon Buri and Rayong provinces is susceptible to water stress, drought, and extreme heat due to high industrial demands and its coastal location, which limits access to alternative water sources. Furthermore, many manufacturers in the estate rely on electricity from GPSC Group's natural gas power plants, which are also potentially affected by water scarcity. This situation may lead to increased electricity demand or even operational shutdowns due to electricity shortages.

Ultimately, water stress and drought present the most significant risk to the GPSC Group's business. As a result, the mitigation plans are detailed in the **"Management Approach"** section on page 18.

1.1.5 Quantification Analysis of Physical Risk

Financial Implication

The initial physical risk analysis indicates that Coal-Fired, Solar and Waste-to-Energy Power Plants are the most susceptible among the various power plant technologies. However, the identified risks may not substantially impact the financial implications of the GPSC Group. A comprehensive assessment, incorporating the equity percentage and revenue generation, reveals that the natural gas Cogeneration Power Plants, constituting the primary operations of the GPSC Group with the highest revenue generation –

(comprising 77% of total revenues generated from six types of power plants), will be adversely affected by water stress, drought, and extreme heat, in contrast to Coal-Fired (21%), Solar (0.17%) and Waste-to-Energy (WtE) (0.34%). Consequently, the physical risk assessment was recalibrated to consider GPSC's ownership (i.e. equity share) and revenues generated by plant types to ascertain the consolidated risk with the highest potential impact on the GPSC Group's financial implications. The aggregated findings are depicted in **Figure 7**.

Plant Technology	Climate Hazards (Max of all time horizon)								
	Extreme Heat	Extreme Cold	River Flooding	Extreme Rainfall Flooding	Coastal & Offshore	Extreme Winds & Storms	Rainfall-Induced Landslide	Water Stress & Drought	Wildfires
Cogeneration	Moderate	Low	Minimal	Low	Minimal	Low	Minimal	Moderate	Low
Coal-Fired	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Hydro	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Solar	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
WtE	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Wind	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal

Legend

Risk Rating Level

Very high
High
Moderate
Low
Minimal

Figure 7: Recalibrated hotspots of physical risks for GPSC assets considering

The reassessment results reveal that the Cogeneration Power Plant faces a moderate risk from water stress, drought, and extreme heat, as opposed to the initial evaluation. While the risk associated with extreme heat is comparatively lower than that of water stress and drought, these factors continue to exert the most significant impact on GPSC Group's operations when juxtaposed with other potential hazards. Consequently, a comprehensive financial assessment of the implications of water stress and drought on the Cogeneration Power Plant was conducted. The assessment considered the potential impact of limited water sources and anticipated drought, exacerbated by extreme heat, on the cooling system's operational requirements for electricity generation. Considering water scarcity, maintaining optimal cooling temperatures may prove challenging and could result in diminished electricity generation to counteract overheating.

Climate-Related Risks & Opportunities

In extreme circumstances, there is a plausible risk of a complete operational shutdown to mitigate potential damage. Furthermore, given the predominant location of GPSC Group's Cogeneration Power Plants in coastal regions of Thailand (Rayong and Chon Buri), water scarcity may lead to seawater intrusion, impacting the quality of water used in the plants. Consequently, expenses may be incurred to deploy seawater reverse osmosis (RO), a desalination technique utilizing specialized membranes to purify seawater and make it suitable for various applications.

Implication Cost for Management

The implication cost for management was evaluated to estimate the anticipated expenditure for GPSC in managing and mitigating the risks associated with water stress and drought. This assessment encompassed the heightened competition in water demand that may be encountered by major GPSC Group Cogeneration Power Plants, including GPSC CUP, and Glow SPP, situated in the industrial estate areas of Map Ta Phut in Rayong and Chon Buri. This is attributed to the substantial industrial water demand prevalent in these regions, leading to escalated water costs. Moreover, water scarcity can potentially affect GPSC's water supplier, resulting in inadequate water resources to provide for GPSC. Consequently, GPSC would need to seek alternative water suppliers. Furthermore, in ensuring the continuous operation of the cogeneration plant during emergencies, GPSC will be required to install backup electricity from PEA/EGAT, leading to increased expenditure on purchasing water and backup electricity and posing a risk of operational discontinuity that could ultimately impact GPSC's revenue.

Management Approach

A multi-pronged management approach can be implemented to ensure water security and continued operation during water shortage events. This can involve creating redundancy with a 3-day emergency water supply, installing backup electricity from PEA/EGAT to maintain capability during emergencies, securing alternative sources such as demineralized water from other suppliers, and considering long-term solutions such as constructing water storage ponds or rainwater harvesting systems.

Additionally, the plant can emphasize water conservation by reducing consumption or increasing water circularity through reuse and recycle techniques in accordance with the Energy Efficiency in Climate Strategy (see pages 28-29).

In extreme situations, temporary seawater desalination using mobile reverse osmosis (RO) systems can be utilized. Moreover, monitoring local water availability, collaborating with the government to expand the water supply infrastructure in the Map Tha Put Industrial Area, and even acquiring wastewater from other facilities for treatment and cooling purposes are all strategies that can contribute to a robust water management plan.

Moreover, as previously indicated, the upstream natural gas provider was identified as being highly susceptible to water stress and drought that detrimental impact on various facets of the natural gas production chain, which in turn could potentially affect the overall output and supply stability. Consequently, this situation may impede the electricity production of GPSC's Group natural gas Cogeneration Power Plant. As a result, GPSC may need to enhance the overall natural gas utilization rate through the implementation of advanced technologies and the expansion of operating capacity in renewable power plants, as delineated in the **S2 Scale-up Green Energy in GPSC Group's Business Strategy** (see pages 26 and 28-29) as well as **Energy Efficiency and Growth Renewables in Climate Strategy**.

Furthermore, to address the impact of water scarcity on GPSC's downstream operations, particularly the Map Ta Phut industrial estate, which relies on electricity supplied by GPSC Group, [GPSC has been actively engaging with key clients in this industrial estate area](#) through regular monthly or quarterly meetings. These meetings are designed to monitor and report on energy demand plans, readiness plans, and maintenance plans. Additionally, GPSC oversees the progress of problem-solving initiatives and utilizes the Energy Lens Application for real-time monitoring of energy and steam consumption, including record tracking. Moreover, these interactions encompass the handling of monthly expense reports and communication manuals.

See more details about the quantification analysis of physical risk in **Table 7**.

Climate-Related Risks & Opportunities

Table 7: Physical Risk Assessment Result- Quantification Analysis

Table 7: Physical Risk Assessment Result- Quantification Analysis										Risk Rating Level				
										Very high	High	Moderate	Low	Minimal
Physical Risks	Risk Rating Level*				Impact Areas	Business Implications	Financial Implication (Average estimated time frame: 6 years)	Management measure and adaptation plan (Less than 5 years of implementation timeline) (Existing and New Operations: 100% coverage)	Cost response and timeline to response					
	Time Horizon													
	2030		2050											
	SSP1-2.6	SSP5-8.5	SSP1-2.6	SSP5-8.5										
Water Stress & Drought					Cogeneration Power Plants and Upstream	<ul style="list-style-type: none">Water scarcity can constrain the plant's capacity to maintain optimal cooling temperatures, potentially resulting in reduced electricity generation to prevent overheating and in extreme cases, plants may be required to shut down entirely to prevent damage.Drought can intensify the competition for industrial water within the Map Ta Phut industrial estate, where GPSC's Cogeneration Power Plants are situated, resulting in escalated water expenses.Water scarcity may impact GPSC's water supplier, leading to insufficient water resources for GPSC and driving up the cost of alternative water sources.Water scarcity can result in seawater intrusion in coastal areas due to the lack of a freshwater barrier, leading to increased costs of seawater reverse osmosis (RO).	739 Million THB	<ul style="list-style-type: none">Install backup electricity from PEA/EGAT to maintain capability during emergencies.Secure alternative sources such as demineralized water from other suppliers and consider long-term solutions such as constructing water storage ponds or rainwater harvesting systems.Reduce water consumption.Increase water circularity (reuse/recycle) in line with Energy Efficiency in GPSC Group's Climate Strategy.Monitor local water availability and collaborate with the government to expand the water supply infrastructure in the Map Tha Put Industrial Area.Acquire wastewater from other facilities for treatment and cooling purposes are all strategies that can contribute to a robust water management plan.	27 Million THB					

Remark:

*Risk rating level based on recalibrated physical risk assessment considering percentage of equity share and revenues generated by plant types.

Climate-Related Risks & Opportunities

1.2 Transition Risks and Opportunities

To assess transition risk, GPSC has employed a high-level quantitative assessment that takes into consideration the factors linked to the transition towards a low-carbon economy, potentially impacting the corporate entity utilizing specialized tool with consulting with external experts. Additionally, measures aimed at addressing identified transition risks and seizing emerging opportunities have been formulated by leveraging datasets from the IEA Energy Outlook 2023.

1.2.1 Climate Scenarios

A transition risks and opportunities assessment was conducted using the International Energy Agency's (IEA) World Energy Outlook climate scenarios, including the **stated policies scenario (STEPS)** and the **net-zero emissions by 2050 scenario (NZE)** (Table 8). These scenarios provide a detailed analysis of the various levels of efforts that nations have made to transition towards a low-carbon economy. GPSC considered the risks and opportunities under the selected scenarios throughout our business value chain, including our own operations and upstream and downstream activities.

In alignment with the physical risk assessment, the **medium-term and long-term** time horizons for transition risk assessment are **2030 and 2050**, respectively.

Table 8: Climate Scenarios Used in Transition Risk Assessment

Climate Scenarios	Description	Estimated Increase in Temperature by 2100
NZE	Pathway for the global energy sector to achieve net zero CO2 emissions by 2050.	1.5°C
STEPS	More conservative benchmark for the future, as governments may not fully implement policies.	2.4-2.8°C

1.2.2 Transition Risk Assessment Methodology

- 1. Transition Driver Identification:** Determine drivers that exert pressure on or create opportunities for GPSC's transition to a low-carbon economy, as shown in **Figure 8**.

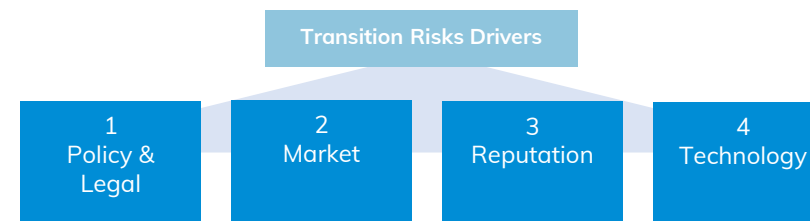


Figure 8: Four drivers considered in transition risk and opportunities assessment

- 2. Risk and Opportunity Weightings:** Assess the likelihood and impact levels on the company for each driver based on internal comprehensive judgment, which is then calculated into internal risk and opportunity weightings. Subsequently, transition drivers and associated risk and opportunity weightings are analyzed based on external data under climate scenarios across different timeframes to generate comprehensive risk and opportunity weightings.
- 3. Heatmap for Prioritization:** Create a heatmap by combining internal and external factors to identify key "hotspots" (areas with the highest potential risk or opportunity) that require further in-depth assessment and appropriate response measures.

Climate-Related Risks & Opportunities

1.2.3 Transition Risk and Opportunity Assessment Result- Qualification Analysis

The results of the transition risk assessment reveal that **mandatory carbon pricing** presents a **significant risk to GPSC across all time horizons**, with the highest level of risk projected for the year 2050 (**Figure 9**). This risk is particularly pronounced for the Cogeneration Power Plant, which predominantly relies on natural gas and consequently emits a greater amount of greenhouse gases (GHG) in comparison to alternative sources such as Solar, Hydro, Wind, and Waste-to-Energy Power Plants. This situation is a consequence of Thailand's Nationally Determined Contribution (NDC) that commits to reduce GHG emissions by 30% by 2030 in contrast to a business-as-usual scenario, marking an increase from the previous target range of 20-25%. Furthermore, Thailand has pledged to attain carbon neutrality by 2050 and achieve net-zero emissions by 2065, thereby reflecting a more ambitious approach to climate action. Notably, despite the relatively cleaner nature of natural gas compared to coal, it still results in the emission of GHG. Implementing a carbon price would effectively attach a cost to these emissions, thereby augmenting the variable operational costs of GPSC Group's Cogeneration Power Plants.

The assessment of transition opportunities highlights that **policy change, incentives and carbon market** can cause the potential for substantial revenue generation through the sale of electricity from a Cogeneration Power Plant utilizing natural gas (**Figure 9**). This opportunity arises from the increased demand for Natural Gas aligned with [the Thailand Natural Gas Management Plan 2018-2037](#), which advocates using natural gas to mitigate air pollution relative to coal. Furthermore, there is an avenue for selling electricity produced by WtE and Renewable Power Plants (Solar, Hydro, Wind) owing to the escalating utilization of renewable energy, as outlined in [the Thailand Alternative Energy Development Plan \(AEDP\) 2018-2037](#). The AEDP sets an ambitious target of attaining 30% of total final energy consumption from renewable sources by 2037.

Transition Risk/ Opportunity Description	Risk/ Opportunity	Renewable			Cogeneration and Coal-Fired			Waste-to-Energy			GPSC*		
		Risk & Opportunity (NZE – STEPS)**											
		2026	2030	2050	2026	2030	2050	2026	2030	2050	2026	2030	2050
Mandatory carbon pricing	Risk												
Policy change, incentives and carbon market	Opportunity												
Investment and business model	Risk												
Demand change	Risk												
Enabling clean energy technologies	Opportunity												
Technology modernization and operational risks	Risk												
Technology innovation and integration with other renewables	Opportunity												

Remark:

*Averaged transition risks and opportunities of Renewable (Hydro, Solar, Wind), Cogeneration, Coal-Fired, and Waste-to-Energy with weight factor based on revenues generated by each group of plant technology.

**Risk and opportunity score key presents the difference between NZA (best case) and STEPS (worst case).

Opportunity / Risk score key						
High Opp.	Mod. Opp.	Low Opp.	Limited	Low Risk	Mod. Risk	High Risk

Figure 9: Hotspots of transition risk and opportunity for GPSC assets

Climate-Related Risks & Opportunities

Summary of Key Findings

1. The significant impact of **mandatory carbon pricing** transition risk on GPSC is primarily attributed to the highest operating capacity derived from GPSC Group's Cogeneration Power Plants (e.g., GPSC CUP1-CUP2, Glow SPP) at all timeframes, mostly in long-term (2050), yielding over 77% of revenues compared to other plant technology groups. These plants also contribute relatively high GHG emissions, and the potential implementation of carbon pricing in Thailand would entail a cost on these emissions.
2. In addition, the subsequent high risk to GPSC across time horizons is **technological modernization and operational risk**, with the highest level of risk projected for the year 2050. This potential risk is poised to impact GPSC's Cogeneration Power Plants substantially. As market dynamics and consumer demands progressively shift to prioritize heightened efficiency and environmental standards, the outdated GPSC's Cogeneration Power Plant will likely encounter diminishing demand from industrial users and utility providers, leading to a potential decline in the plant's revenue.
3. In the medium term (2030), the GPSC Group's Cogeneration Power Plant, primarily reliant on natural gas, stands to benefit significantly from **policy changes, incentives, and the carbon market**. This alignment is consistent with Thailand's natural gas Management Plan 2018-2037, endorsing the deployment of natural gas to mitigate air pollution in comparison to coal. Looking forward to the long term (2050), the GPSC Group's Solar, Hydro, and WtE Power Plants are projected to capitalize upon Thailand's National Energy Plan (NEP) and the Thailand Alternative Energy Development Plan (AEDP). These strategic initiatives aim to realize a 30% share of total final energy consumption from renewable sources by 2037.
4. In the medium term (by 2030), the GPSC Group's Cogeneration Power Plant, which mainly relies on natural gas, is expected to benefit from energy **demand change** as a result of Thailand's final energy demand projected to increase by 25% in 2030 compared to 2023, according to [Thailand Energy Efficiency Plan 2018-2037](#). In this rapidly changing energy landscape, natural gas is emerging as the fastest-growing energy source, presenting a significant opportunity for GPSC Group's natural gas Cogeneration Power Plants.

Ultimately, transition risk regarding market carbon pricing and transition opportunities related to policy changes, incentives, and the carbon market pose the most significant impact on the GPSC Group's business. As a result, the mitigation and management plans are detailed in the **"Management Approach" section on page 23**.

1.2.4 Quantification Analysis of Transition Risk

Financial Implication

The mandatory carbon pricing risk was evaluated due to its substantial impact on the revenues of GPSC Group in comparison to other transition risks at all timeframes. This assessment is warranted as the majority of the company's operating capacity is derived from Cogeneration Power Plants. These plants contribute significantly to GPSC Group's revenue, accounting for 99% of the total generated revenue. However, they also emit a notable amount of greenhouse gas (GHG) emissions in comparison to alternative power plants such as renewable power plants and WtE (Waste to Energy) plants. Consequently, this leads to a high potential cost associated with carbon pricing should Thailand implement such policies.

The financial impacts of a carbon price on GPSC Group were thoroughly assessed. The cost of carbon price was considered based on the amount of GHGs (Scope 1 and Scope 2) that aligned with Thailand's NDC reduction target of 30% multiplied by GPSC Group's internal carbon price (540 THB/tCO₂e or 15 USD/tCO₂e).

Implication Cost for Management

The implication cost for management was evaluated to estimate the anticipated expenditure for GPSC in managing and mitigating the risks associated with the increased cost of the carbon price. This assessment encompassed the expenditures related to carbon-saving initiatives, such as the cost of participating in the Thailand Voluntary Emission Reduction Program (T-VER) program (**details on page 47**), and the cost of energy efficiency projects, such as the development and implementation of smart energy management systems in line with GPSC Group's Climate Strategy (**details on pages 26-27 and 30**).

Climate-Related Risks & Opportunities

Management Approach

To reduce the potential cost of carbon price, GPSC Group plans to contribute to Thailand NDC's ambitious climate goals by allocating the budget towards renewable energy expansion in line with GPSC Group's Business Strategy: S2 Scale-up Green Energy that aims to increase renewables-based electricity production capacity at least 50% by 2030 (**details on pages 26 and 28-29**), setting an internal carbon price at rate 15 USD/ tCO₂e (**details on page 47**), and reducing greenhouse gas intensity 35% by 2030. This multi-pronged approach includes incorporating more renewables domestically and internationally, utilizing high-tech upgrades for existing plants, and phasing out coal altogether, in accordance with GPSC Group's Climate Strategy (**details on pages 26-27 and 30**).

1.2.5 Quantification Analysis of Transition Opportunity

Financial Implication

The evaluation of **policy changes, incentives, and the carbon market** was conducted due to their significant impact on GPSC Group's revenues in comparison to other transition opportunities at all timeframes. This assessment is necessary because Thailand's Natural Gas Management Plan 2018-2037 promotes the use of natural gas to reduce air pollution as opposed to coal, which could greatly benefit the majority of the company's operating capacity derived from natural gas Cogeneration Power Plants. These plants contribute significantly to GPSC Group's revenue in the medium-term (2030). Additionally, in the long term (2050), the GPSC Group's Solar, Hydro, and WtE Power Plants are expected to benefit from Thailand's National Energy Plan (NEP) and the Thailand Alternative Energy Development Plan (AEDP). These strategic initiatives aim to achieve a 30% share of total final energy consumption from renewable sources by 2037, as well as to support Thailand's commitment to carbon neutrality by 2050 and to achieve net-zero emissions by 2065.

The financial implications of advocating for the use of natural gas in the mid-term, along with the increasing consumption of renewable energy, can be observed in the GPSC Group's revenue accrued from the sale of electricity generated by natural gas, solar, hydro, and WtE power plants.

Implication Cost for Management

The implication cost for management was evaluated to estimate GPSC's anticipated expenditure in managing and mitigating the risks associated with policy change, incentives, and the carbon market. The assessment encompassed analyzing the investment required for emission reduction technologies such as Carbon Capture and Storage (CCS) and Carbon Capture, Utilization and Storage (CCUS), as the expansion of natural gas cogeneration power plants could lead to excessive greenhouse gas emissions. The assessment also included an evaluation of the capital expenditure (CAPEX) necessary for investing in renewable power plants, encompassing solar, hydro, and waste-to-energy (WtE) technologies.

Management Approach

GPSC Group is strategically positioning itself in a changing energy landscape through a comprehensive approach. Its efforts include the expansion of renewable energy generation capacity to meet the growing demand for clean energy and leveraging this transition by certifying Renewable Energy Certificates (RECs) through EGAT in line with GPSC Group's Climate Strategy (**details on page 27**).

Moreover, GPSC is diversifying its revenue streams while recognizing the evolving needs of its customers. This entails adapting its business model to offer an expanded range of products and services. These renewable commitments extend beyond portfolio diversification, with the current renewable energy share standing at 50% in line with GPSC Group's Business Strategy: S2 Scale-up Green Energy (**details on pages 26 and 29**).

Furthermore, GPSC is exploring the installation of solar floating systems for its customers and conducting a feasibility study on implementing a smart grid in Thailand, which has the potential to revolutionize energy distribution. Finally, GPSC is contemplating applying RECs to all its renewable plants, thereby maximizing its environmental impact and potential revenue from clean energy sources.

See more details about the quantification analysis of transition risk and opportunity in **Tables 9 and 10**.

Climate-Related Risks & Opportunities

Table 9: Hotspot Transition Risk Assessment Result- Quantification Analysis

Transition Risks	Risk & Opps (NZE-STEPS)			Impact Areas	Business Implications	Financial Implication (Average estimated time frame: 6 years)	Management measure and adaptation plan	Cost response and timeline to response
	Time Horizon							
	2026	2030	2050					
Mandatory carbon pricing				Upstream & Direct operation & Downstream	<ul style="list-style-type: none">Cogeneration Power Plants, which have the highest operational capacity, contribute relatively high GHG emissions, and the potential implementation of carbon pricing in Thailand can increase these emissions' costs, leading to rising operating costs.	1,389 Million THB	<ul style="list-style-type: none">Study of carbon tax and carbon cap & trade mechanisms.Invest in CO2-saving initiatives by participating in the Thailand Voluntary Emission Reduction Program (T-VER) to contribute to approximately 582,370 verified credits available for trading on the market.Decarbonize business through renewable energy expansion, phasing down coal power.Implement Internal carbon price (15 USD/tCO₂e).Reduce GHG intensity by 35% in 2030 as compared to 2020.	16,071 Million

Opportunity / Risk score key						
High Opp.	Mod. Opp.	Low Opp.	Limited	Low Risk	Mod. Risk	High Risk

Climate-Related Risks & Opportunities

Table 10: Hotspot Transition Opportunity Assessment Result- Quantification Analysis

Transition Risks	Risk & Opps (NZE-STEPS) to GPSC			Impact Areas	Business Implications	Financial Implication Average estimated time frame: 5 years)	Management measure and adaptation plan	Cost response and timeline to response
	Time Horizon							
	2026	2030	2050					
Policy changes, incentives, and the carbon market				Upstream & Direct operation & Downstream	<ul style="list-style-type: none">The Cogeneration Power Plant using natural gas has the potential for substantial revenue generation through electricity sales. This aligns with Thailand's plans for increased natural gas use to reduce air pollution compared to coal.Opportunity to sell electricity from Waste-to-Energy and Renewable Power Plants due to the growing use of renewable energy, as outlined in Thailand's Alternative Energy Development Plan (AEDP) 2018, which aims for 30% of total final energy consumption from renewable sources by 2037.	64,517 Million THB	<ul style="list-style-type: none">Establish initiatives such as carbon capture utilization and storage (CCUS).Implement technology to enhance plant efficiency and lower GHG emissions.Collaborate with experts to exchange knowledge.Decarbonize business through renewable energy expansion, phasing down coal power.Introduce new renewable energy technology such as solar floating, energy storage systems, and smart grids.Apply for I-REC and carbon credit	36,380 Million THB

Opportunity / Risk score key

High Opp.	Mod. Opp.	Low Opp.	Limited	Low Risk	Mod. Risk	High Risk

Climate-Related Risks & Opportunities

2. Impacts of Climate-related Risks and Opportunities on Corporate Strategy

2.1 Business Strategy

Climate risks and opportunities have influenced various parts of GPSC's business strategy, from our core business operations to future strategic development. Climate opportunities shed light on future market expansion towards green electrification and a low-carbon society. This is reflected in our development of strategic products and services. In the same way, transition risks accelerate these business shifts to ensure regulatory compliance and avoid opportunity loss.

Regarding strategic enablers, 'operational excellence' is crucial in driving our process efficiency to cut GHG emissions. Adaptation plans for climate physical risks are integrated into the 'agile & resilient organization' element to uphold reliability. Moreover, 'partnerships' with suppliers, customers, and other partners were identified as a key to developing future products and services and decarbonizing our Scope 3 emissions across the value chain. Lastly, 'sustainability' is key to enhancing our climate management reputation and broadening our access to capital.

To advance decarbonization, GPSC is committed to increasing the proportion of renewable-based energy production, recognizing this as a key factor in reducing greenhouse gas emissions. In alignment with the S2: Scale-up Green Energy strategy, the company is actively expanding its clean energy projects, focusing on solar and wind energy, and integrating these resources with energy storage systems. GPSC aims to boost its renewable energy capacity to 7,236 megawatts, which would increase renewables-based electricity production capacity to 38% by 2025 and at least 50% by 2030. This strategic direction not only supports environmental objectives but also aligns with broader goals for sustainable development, as described in **Figures 11 and 12**.

More details about GPSC'S Business Strategy can be found in [GPSC's Integrated Sustainability Report 2023](#)

2.2 Climate Strategy

In response to clean energy trends, which have amplified the role of renewable energy in the electricity business, GPSC has established GPSC's Climate Strategies in response to climate change under the concept of 'Moving towards a Low-Carbon Electricity Business and Net Zero Greenhouse Gas Emissions' through technology and innovation development and the use of internal carbon pricing (ICP) to manage risks and seek new market opportunities to handle impacts of climate change. Besides, Furthermore, GPSC has set targets to achieve Carbon Neutrality by 2050 and Net Zero emissions by 2060 through four key action plans (**Figure 13**), as described below.

Reduce fossil fuel usage

This plan seeks to reduce GHG emissions from electricity production and consists of four sub-plans:

- Adoption of best practices for operational excellence
- Fossil-fuel plant retrofitting
- Fuel and energy consumption reduction
- Internal renewable energy consumption in place of fossil fuels

Grow renewables

This plan seeks to increase the production of renewable energy and consists of five sub-plans:

- Phasing down fossil fuel-based power plants, with priority on coal
- Investment in renewables through new projects or mergers and acquisitions both domestically and internationally, focusing on solar and wind energy, which are I energy sources.
- Fuel switching from fossil fuels to renewables.
- Considering green hydrogen (H₂) as an alternative source of energy
- The use of biomass with and without carbon capture, usage, and storage (CCUS) technology

Climate-Related Risks & Opportunities

Enhance infrastructures

This plan seeks to store and eliminate direct GHGs from fossil fuel-based power production and consists of two sub-plans:

- CCUS integration in existing blue and green hydrogen plants
- CCUS integration in coal/natural gas plants

Trading & Offset

This plan strives to offset excess carbons emitted from production or internal operations and consists of three sub-plans:

- Carbon sinks through nature-based solutions, such as reforestation.
- Obtaining Energy Attribute Certificates (EACs), including Renewable Energy Certificate (REC) trading and Carbon credit trading
- Studying internal carbon pricing to supplement investment decisions in low-carbon technology

For more details about GPSC's Climate Strategy, please visit [Clean Energy Towards Net Zero | Global Power Synergy Public Company Limited \(GPSC\) \(gpscgroup.com\)](https://www.gpscgroup.com/Clean_Energy_Towards_Net_Zero)

2.3 Net Zero Strategy

To deliver our Carbon Neutrality 2050 and Net Zero 2060 commitment, GPSC established a pathway towards a Net Zero strategy to guide our journey. Based on climate-related risk and opportunity assessment, the company developed a climate Strategy that is driven by four main strategic areas to deliver holistic outcomes not only to reduce GHG emissions but also to strengthen the business model (risk mitigation) and capture opportunities that may arise in the future (**Figures 10 and 15**), as described below.

Self-Reduction

Continuously implement processes of improvement & optimization to existing fossil-fuel power plants and reduce fuel and energy consumption.



Figure 10: Pathway towards Net Zero and climate strategy to guide journey

Business Model Transformation & Resilience

Phase down fossil-fuel power plants, switch to low-carbon energy sources and grow domestically and internationally renewable energy. Strengthen infrastructure and ensure business model resilience.

Decarbonizing Technology

Facilitate direct GHG removal from conventional power plants coupled with enablement technologies.

Key enabling factors have been identified to support these areas, including internal awareness and capacity building, GPSC Climate Governance, and external partnership through value. These key factors involve internal and external stakeholders to strengthen the organization's strategy for achieving Net Zero GHG emissions.

Business Strategy and Corporate Outlook

GPSC Corporate Strategy

Strategic Pillars



S1

Strengthen and Expand the Core

- Best in class operations
- Customer-centric utility
- Expansion into adjacencies (e.g., water)



S2

Scale-up Green Energy

- Solar power scale-up
- Wind power entry
- ESS-RE hybrid power



S3

S-curve & Batteries

- Energy storage systems
- EV & Mobility batteries
- New S-curves



S4

Shift to customer-Centric Solutions

- Distributed generation
- District cooling
- Energy Management services

Enablers



Partnerships



Financial discipline



Technology & Digitalization



Sustainability



Agile & Resilient Organization



Operational Excellence

Capitals impacted



Financial capital



Manufacture d capital



Intellectual capital



Human capital



Social and relationship capital

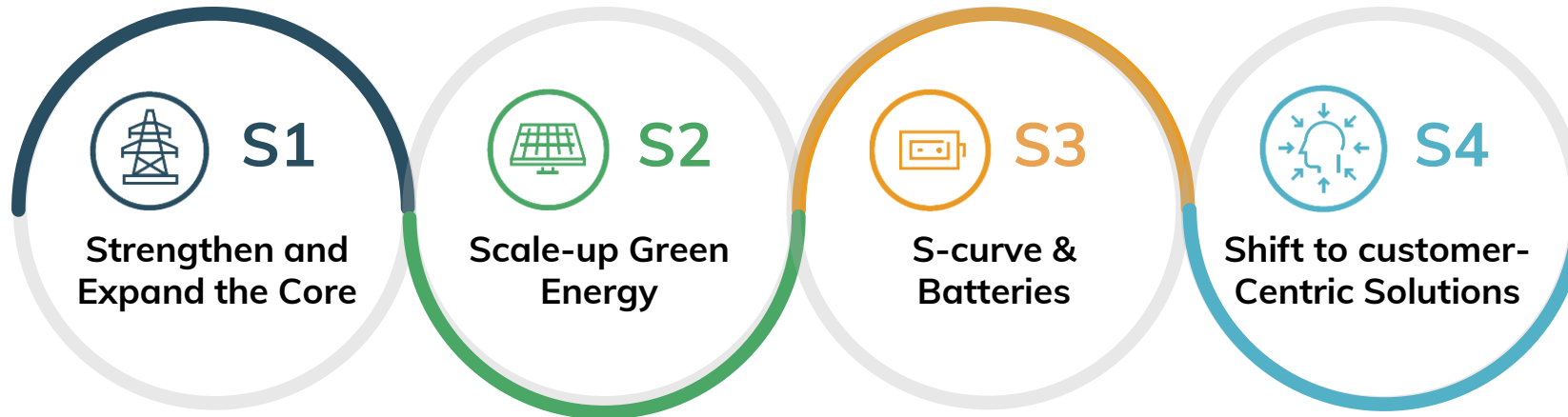


Natural capital

Figure 11: GPSC business strategy

Climate-Related Risks & Opportunities

GPSC Business Strategy



S1 Strengthen and Expand the Core

Promote and **develop our core business** with emphasis on maximum shareholders' satisfaction and appreciation of their needs while fostering customers' confidence with **operational excellence** to upgrade **safety, reliability, profitability, and sustainability** at international standards. To this end, GPSC relentlessly upgrades its people development and application of management standards as well as **digital technology** to drive and upgrade various aspects of operation together with growth to related businesses in and outside Thailand.

S2 Scale-up Green Energy

Raise the **proportion of clean-energy development (solar, wind, and integrated renewables)** together with energy storage systems (ESSs). Focus investment on target countries (India, Vietnam, Taiwan) to grow clean-energy projects as well as GHG intensity and GHG emission reduction. **GPSC's renewables generation goal is at least 50% of total capacity, and our GHG intensity reduction goal is 35% by 2030.**

S3 S-curve & Batteries

Invest in innovation to grow income from the **battery business** and **New S-Curve** businesses while accommodating transformation of the energy and power businesses. GPSC's goals are to join partners in driving the EV battery business and Energy Storage Systems (ESSs) and provide other services related to the value chain of the battery business. GPSC also values other New S-Curve businesses that would play key roles in the future power sector, namely the **renewables value chain, hydrogen energy business, and carbon capture, utilization & storage (CCUS).**

S4 Shift to customer-Centric Solutions

Strive for **energy management solutions** by focusing on distributed generation, district cooling, and energy management service to leverage energy service to meet customers' needs of for expense reduction, energy efficiency improvement, and greater energy stability, thus **leading Thailand toward a low-carbon society.** This strategy will be implemented in Thailand first

Figure 12: Description of GPSC business strategy

Climate-Related Risks & Opportunities

Vision

The global leading innovative and sustainable power company

Aspiration

To be top 3 power company in Southeast Asia with more than half of MW from green portfolio

Carbon intensity reduction 10% by 2025 & 35% by 2030

Net Zero Emission By 2060



Reduce Fossil Fuel Usage



Energy Efficiency

According to GHG Emission Reduction Plan, 1% by 2023

Continuously implement process improvement & optimization to existing fossil-fuel power plants, reduce fuel and energy consumption.

- Adopt best practice operational excellence
- Retrofit fossil-fuel plants
- Fuel & Energy consumption reduction
- Internal renewable energy consumption

Scope 1&2 Reduction

Grow Renewables



Growth Renewables

According to business plan, more than 50% by 2030

Phase down fossil-fuel power plant and grow renewable in both domestic and international.

- Phase down fossil-fuel based power plant (priority on coal)
- Invest renewables through new, M&A projects focusing on solar and wind energy
- Fuel switching from fossil fuel into renewables
- Green Hydrogen (new plants)
- Biomass with and without CCUS

Scope 1 Reduction/Avoided

Enhance Infrastructure



CCUS & Hydrogen Technology

According to CCUS Roadmap, by 2030

Facilitate direct GHG sink and removal from fossil-based operations.

- Blue and Green Hydrogen (existing plants) with CCUS
- CCUS integration (coal, natural gas with post combustion carbon capture)

Investing in permanent carbon removal

Scope 1 Reduction

Trading & Offset



Reforestation

According to Reforestation, 10,000 rai by 2030

Initiate nature-based solution and generate additional values through Environmental Attribution Certificates (EACs) participant.

- Carbon sink through nature-based solution
- EACs participation, including Renewable Energy Certificates (RECs) trading and Carbon Credit trading
- Internal Carbon Pricing (ICP)

Scope 1,2, 3 Reduction

Human Empowerment

Building performance of sustainability for our people

Intelligence Analytics

Enhance our capability of sustainability analytics

Sustainability Integration

Embedded sustainability for leverage our products, processes, and management

Figure 13: Description of GPSC Climate Strategy

Climate-Related Risks & Opportunities

3. Four Strategic Programs in Net Zero Emission Pathway

GPSC aims to achieve **Carbon Neutrality by 2050** and **Net Zero GHG emissions by 2060 for Scope 1 and 2**. Additionally, the company has set a target to reduce carbon intensity by 10% in 2025 and 35% in 2030 from the 2020 base year for GPSC's business in Thailand and overseas, where GPSC has equity shares. The targets align with Thailand's Nationally Determined Contributions (NDCs) to the Paris Agreement.

To reduce our greenhouse gas (GHG) emissions, GPSC has implemented strategic programs and activities aligning with Net Zero Pathway to decrease emissions from our business (Figures 14 and 15). The following projects have been conducted:

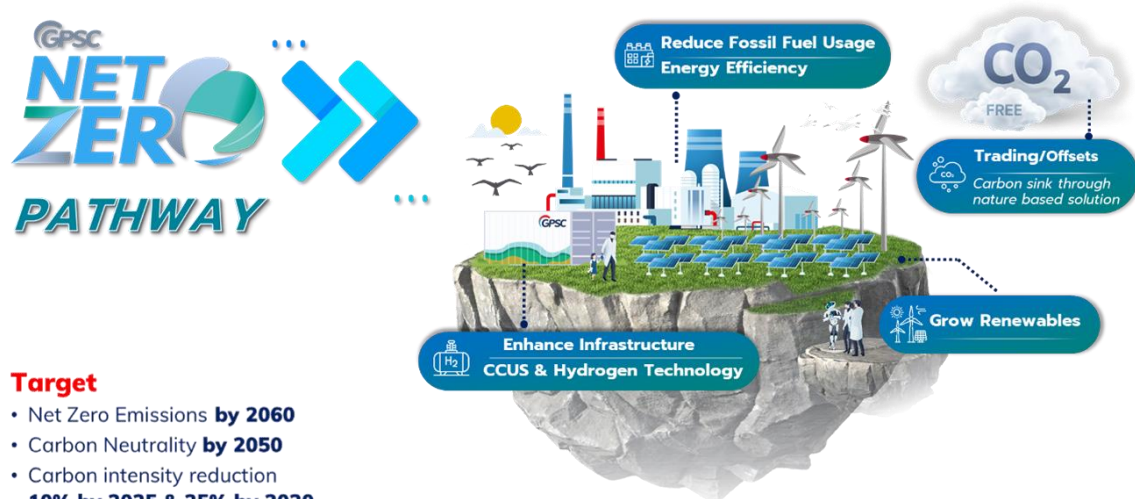


Figure 14: Net Zero Pathway

3.1 Renewable Technology

Investigation and Development of Green Hydrogen

In 2023, GPSC and Meranti Steel Co., Ltd. partnered to explore using Green Hydrogen for steel production. The project aimed to produce eco-friendly steel while reducing GHG emissions by investing in Thailand's green steel manufacturing plant. Meranti's advanced technology will reduce GHG emissions by up to 3 million tons of carbon dioxide annually. This is an excellent example of integrated GHG reduction that will significantly enhance national achievements.

Leverages India's Solar Potential for a Renewable Future

With high-potential solar power generation and available investment opportunities in India due to its high solar light intensity, GPSC has invested in Avaada Energy to support its business target. Currently, GPSC's solar power-generating capacity in India stands at 9,525 MW. The company aims to generate more than 500 GW of renewable power by 2030. In addition to its investment in Avaada Energy, GPSC has invested in fully integrated clean energy businesses with Brookfield Global Transition Fund and Avaada Group.

First Offshore Wind Project in Partnership with CIP

GPSC invested in a 595-MW offshore wind farm project called Changfang and Xidao (CFXD) jointly with Copenhagen Infrastructure Partners (CIP). This is GPSC's first investment in offshore wind farms and the project requires specific expertise in EPC and project development. The project's EPC was 88% completed, and partial operations have begun. The COD is scheduled for Q1/2024. GPSC will continue to identify future investments in renewable power generation in Thailand.

Climate-Related Risks & Opportunities

3.2 CCUS Technology

Carbon Capture, Utilization, and Storage (CCUS) Technology Development Consortium

GPSC has established the CCUS Consortium in partnership with the Bio-Circular-Green-economy Technology & Engineering Center (BCGeTEC) at the Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, several companies from other sectors, government agencies, and other network member organizations. Currently, the CCUS Consortium is working on three projects as described below.

1. Researching the development and implementation of CCUS in Thailand's core industries through various approaches such as technology application, promotion, and development.
2. Collaborating internationally on membrane-assisted processes for hydrogen production and CO₂ conversion into higher-value products like methanol and methane.
3. Developing technology with a high technology readiness level (TRL) for CCUS demonstration.

PTT Group's Feasibility Study of Carbon Capture and Storage (CCS) Application

GPSC has collaborated with PTT Group to conduct the PTT Group CCS Hub Model Project. The project aims to explore the feasibility of implementing a comprehensive CCS application for offshore and on/nearshore projects. Its goal is to help reduce GHG emissions from the operations of GPSC Group in Chonburi and Rayong. The project will serve as a crucial model for upscaling the application of CCS on a national level. The project is expected to have three benefits: 1) findings on CCS application, 2) successful establishment of Thailand's first offshore project (Arthit Project), and 3) opportunities for scaling up offshore CCS application and on/nearshore CCS adoption.

3.3 Reforestation

Reforestation Program

GPSC places great value on its business while also ensuring that it mitigates the challenges posed by climate change. We do this by increasing green space, preserving the environment, and promoting ecosystems that increase biodiversity. Since 2013, we have been involved in a reforestation project in Thailand, where we have already planted 65,450 trees. In 2023, we plan to reforest an additional 46,000 trees in 149 rai. We have also signed a memorandum of understanding with relevant government agencies and communities to continue our stewardship for the next five years. In addition to these ongoing projects, we have also undertaken a project to maintain 34 rai of green areas in community spaces.

3.4 Energy Efficiency

In response to a global shift toward clean energy and user demand for more efficient solutions, GPSC is actively pursuing energy-saving innovations. This includes the development and implementation of smart energy management systems. These systems optimize energy consumption by analyzing usage patterns and automating adjustments based on real-time data. By integrating smart technology, GPSC aims to empower its customers to reduce energy consumption costs, increase our reliance on renewable energy sources, and ultimately enhance the overall energy efficiency of the power grid.

More details about Four Strategic Programs in "Net Zero Emission Pathway can be found in [GPSC's Integrated Sustainability Report 2022](#), [GPSC's Integrated Sustainability Report 2023](#) and [GPSC's 56-1 One Report 2023](#)

Climate-Related Risks & Opportunities

TARGET Carbon intensity reduction 10% by 2025 & 35% by 2030
(Scope 1&2) Carbon Neutrality by 2050 | Net Zero GHG Emissions by 2060

Net-zero Pathway

Committee Driving

GPSC Group Climate Change Strategy Committee (GCSC)

GPSC Group Climate Change Strategy Task Force

GPSC Group Climate Change Strategy Sub-Task Force

Programs or activities to achieve the emission reduction targets (scope 1 & 2 reduction)

Reduce Fossil Fuel Usage



Energy Efficiency

According to GHG Emission Reduction plan 1 % by 2023

- ❖ 50 Initiatives
- ❖ Reduction Potential **90,000** Tones CO₂e/year

Grow Renewables



Grow Renewables

According to business plan more than 50 % by 2030

- ❖ Policy of **no new coal investment**
- ❖ Phase down fossil-fuel power plant and grow renewable in both domestic and international

Programs or activities to neutralize residual emissions and mitigate emissions beyond the value chain (scope 1, 2 & 3 reduction)

Enhance infrastructure



CCUS & Hydrogen Technology

According to CCUS Roadmap by 2030 in investing in permanent removal

- ❖ Co-study with PTT group and external party to **explore carbon hub**
- ❖ To **study electricity production** from green and/or blue H₂ for fuel cell

Trading & Offsetting



Reforestation & Carbon Pricing

According to Reforestation, 10,000 rai by 2030 removal

- ❖ Reforestation of **10,000** rai by 2030
Reduction Potential **19,000** Tones CO₂e
- ❖ Internal carbon Pricing: Investment criteria

Figure 15: Net Zero strategy and 4 strategic programs

4

IFRS S2:

Risk Management

Climate-related Risk Management

1. Climate-Related Risk and Opportunity Assessment

The climate-related risk and opportunity assessment was conducted utilizing a specialized tool platform and consulting with external experts. This platform encompasses various sources, including scientific publications, global trends, emerging regulations, and news as delineated in **Tables 11 and 12**. Furthermore, an assessment of the financial implications of climate-related risks and opportunities was conducted to identify the risk and opportunity that has the most significant financial impacts on the GPSC Group, as detailed on pages 12-25.

Table 11: Example of Data Providers for Physical Risk Assessment

Data Provider	Indicator
Coupled Model Intercomparison Project 6 (CMIP6) data, extracted from inter-sectoral Impact Model Intercomparison Project (ISIMIP) downscaled Global Climate Models (GCMs)	<ul style="list-style-type: none"> • Warm spell duration index (extreme heat) • Cold spell duration index (extreme cold) • Forest fire danger index (wildfires) • Maximum flooding inundation depth (extreme rainfall and river flooding projections) • Rainfall-induced landslide index (landslides)
World Resources Institute	<ul style="list-style-type: none"> • Maximum coastal flooding inundation depth (coastal & offshore) • Water Stress Index (water stress & drought)
Fathom-Global 2.0	<ul style="list-style-type: none"> • Maximum flooding inundation depth (extreme rainfall and river flooding baseline)
NASA	<ul style="list-style-type: none"> • Rainfall-induced landslide index (landslides)
European Space Agency	<ul style="list-style-type: none"> • Maximum burned area (wildfires for baseline only)

Table 12: Example of Data Providers for Transition Risk and Opportunity Assessment

Data Provider	Scenarios
International Energy Agency (IEA)	<ul style="list-style-type: none"> • Scenario analysis for the increasing of carbon pricing and the impact to electric & utilities sector. The scenario includes Business-As-Usual EBITDA Growth (BAU), IEA Stated Policies Scenario (STEPS), Sustainable Development Scenario (SDS), Beyond 2°C Scenario (B2DS), and Net Zero Emissions by 2050 Scenario (NZE).
World Energy Outlook 2022 (WEO2022)	<ul style="list-style-type: none"> • Overall trend of global energy demand breaking down in each type of energy sources and explained the energy transition through different scenarios including net zero emission as the latest update one.
The IEA WEO2022's Announced Pledges Scenario (APS)	<ul style="list-style-type: none"> • APS scenario considers only the energy implications of currently announced policies and pledges from governments and businesses. This provides a good baseline for assessing risks arising from the gap between these commitments and a smooth transition to a low-carbon future.
International energy agency	<ul style="list-style-type: none"> • International energy agency has very useful research that related to the scenario of the establishment of cap-and-trade regulation over Thailand

The analysis focuses on assessing climate-related risks and opportunities based on where assets are located, types of technologies used, and financial implications. This includes evaluating potential physical and transition risks and opportunities and the timeframes involved. The goal is to assess the potential impact of climate change on assets and operations, as well as the business risks associated with the shift to a low-carbon economy. This includes considering potential regulatory changes, market disruptions, and stranded assets. The aim is to ensure that businesses are well-prepared and resilient in the face of a changing climate and energy landscape (**details on pages 12-22**)

Climate-related Risk Management

1.1 Scope of Assessment

The assessment analyzed 51 GPSC Group's operation assets in Thailand and overseas covering six power plant technologies: Cogeneration, Coal-Fired, Solar, Hydro, Wind, and Waste-to-Energy power plant technologies, along with 2 upstream assets and 1 downstream asset with a significant financial influence on the business. The names of these assets are listed in **Tables 2, 3, and 4**

1.2 Scenarios and Timeframes

Around 200 countries agreed to limit global warming to no more than 2 degrees Celsius by 2100 while also striving to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels under the [Paris Agreement](#). Thailand is committed to reducing its greenhouse gas emissions by 20% from the projected business-as-usual level by 2030 in line with this agreement. GPSC is preparing to support the National Determined Contribution (NDC) and the Paris Agreement as an electricity power producer. We focus on climate-related risks and opportunities through climate scenario analysis, which helps us explore and understand how climate change risks may impact businesses, strategies, and financial performance over time.

GPSC collaborated with third-party consultants to assess the level of impact of each risk across its operations in different scenarios aligning with **Shared Socioeconomic Pathways (SSP1-2.6 and SSP5-8.5)** for **physical risk**. The analysis included value chain activities, and **transition risks** were assessed by identifying material for low carbon economy transition risks, impacted business areas, and value chain impacts. **All transition risks were assessed under IEA STEPS and NET Zero 2050 scenarios**. The **risk and opportunity assessment** is impacted by two variables – intensification of climate drivers in a low carbon economy (**APS scenario**) compared to the base case (**STEPS scenario**), as well as the exposure ratings of each climate driver based on the likelihood and impact should it happen.

Both physical and transition risks were projected under two timeframes: medium-term 2030 and long-term 2050. The consolidated outcomes were consulted with internal stakeholders to understand the impacts of key risks and systematically review risk management strategies and approaches across the business.

1.3 Nature, Likelihood, and Magnitude

Physical Risks

[The Climate Impact Platform \(CIP\)](#) was used to assess the nature, likelihood, and magnitude of risks associated with physical impacts of climate change. The assessment involved evaluating the significance of the risk and the vulnerability of the company's assets. Risk scores were calculated for the present day (baseline) and projected future timeframes (2030 and 2050). The differences in these scores were then analyzed to determine the magnitude of change between the two time periods. The assessment output is presented in a heatmap with the score ranging from very minimal to very high risk (**Figure 6**).

Transition Risks

To assess the transition risk for GPSC's business, an approach involved identifying external factors that put pressure on transitioning to a low-carbon economy. The external factor was calculated based on how drivers change under low carbon transition and base case, using data from the IEA World Energy Outlook 2023 datasets.

Internal factors were also considered, and each selected driver's likelihood and magnitude ratings were used to generate exposure weightings. The internal input was provided by organizational stakeholders with the necessary competencies to identify risks and opportunities across GPSC's business and strategy. This provided an internal view of the company's inherent exposure to each driver. The exposure weightings are normalized into a scale of -1 to 1 (**Table 13**), with a negative value implying a risk and a positive value implying an opportunity.

The transition risk & opportunity heatmap was created by considering both external factors (scenario analysis) and internal factors (weighting exposure). Exposure weightings were applied to each scenario data value based on the indicator's significance to the portfolio sector. This helped to determine risk and opportunity scores, which range from high risk to high opportunity (**Figure 9**).

Climate-related Risk Management

Table 13: Normalized Exposure Weighting Scale

Risk			Opportunity			
-1.00	-0.5	-0.25	0	0.25	0.5	1.00
High Relevance	Moderate Relevance	Low Relevance	Neutral	Low Relevance	Moderate Relevance	High Relevance

2. Process for Climate Risks & Opportunities Identification and Assessment

The subsequent processes delineate GPSC's approach to addressing climate-related risks and opportunities identified by the specialized tool platform as described in the previous topic by implementing a procedure to assess the identified climate-related risks and opportunities based on **GPSC Group's ERM process following the Committee of Sponsoring Organization of Treadway Commission (COSO) ERM Framework 2017 and ISO 31000:2009 framework**. This procedure is integrated into the company-wide, multidisciplinary risk and opportunity management framework (**Figure 17**) and encompasses the following steps:

2.1 Reviewing Potential Risks and Opportunities

GPSC ensures a thorough and systematic integration of risk management, from assessing either positive or negative uncertainties to analyzing, reviewing, and preparing chances of climate-related risks and opportunities for the business. This includes internal uncertainties that may affect the organizational context in areas corresponding to the GPSC Group's strategic business plans, external issues/uncertainties arising from fluctuations in the business environment and emerging issues, and functional risks that are significant and material to the business context. A comprehensive review of the climate-related risks and opportunities relevant to GPSC follows IFRS S2 guidelines by internal functional-level professionals.

2.2 Identifying Risks and Opportunities

GPSC conducts a thorough review and assessment of identified climate-related risks and opportunities, taking into account internal and external factors. This assessment covers emerging risks from changes in business activities or the overall business environment that could affect GPSC Group's strategic objectives. It also includes any potential deviations from regular business operations that could impact current activities and the attainment of GPSC's business goals. GPSC uses standardized criteria to perform qualitative and quantitative risk and opportunity assessments, anchored in the Enterprise Risk Management (ERM) framework and tool, integrating the Committee of Sponsoring Organization of Treadway Commission (COSO) ERM Framework and ISO standards. By following these standards, GPSC adopts a thorough and systematic approach to risk identification across all operational facets, evaluating potential impacts and the likelihood of present and future risks.

2.3 Prioritizing Risks, Identifying Impact, and Formulating Management Approach

The identified climate-related risks have been considered and prioritized by corporate and functional levels using a **corporate risk matrix (Figure 15)** that reflects each individual's risk level based on several aspects such as financial, operational, strategic, and compliance aspects. The risk level is classified on a scale from low to extreme based on the likelihood and impact of each risk. The risks are categorized based on their level, represented by a color on the risk matrix, reflecting the company's level of acceptance. Risks that exceed the company's risk appetite and are assessed at high or extreme levels are represented by the orange or red color on the risk matrix, respectively. In such cases, GPSC will formulate additional risk mitigation plans, designate responsible persons, and specify completion time. Conversely, risks assessed to be at low or medium levels are represented by the green or yellow color on the risk matrix, respectively.

More details about the risk management process can be found in [GPSC's 56-1 One Report 2023](#) and [Risk & Crisis Management](#)

Climate-related Risk Management

01 Review of Risks and Opportunities

Functional Level

Conduct a review of the current risks and opportunities that are relevant to GPSC. These include risks and opportunities in accordance with the taxonomy guided by IFRS S2 (e.g., acute and chronic physical risks; transition risks such as regulatory, technology, reputation, and market; and opportunities such as resource efficiency, energy source, products and services, markets, and resilience).

02 Risk and Opportunities Identification and Assessment

Functional Level

Assess climate-related risks and opportunities that impact business operations and financial implications utilizing the CIP Platform, specialized tools, and consultation with external experts.

04 Risk Validation and Finalization

*Functional Level, and Executive Level
(Corporate Level)*

Validate results with company executives. Utilize the results in the company's strategic planning process to minimize risks and enhance opportunities.

Decisions to mitigate, transfer, accept, or control the risks are made by the responsible managements & committees.

03 Risk Prioritization, Impact Identification and Management Approach Formulation

Corporate Level and Functional Level

- Build an understanding of internal functions and brainstorm ideas and input for risk impact and management approach.
- Prioritize the initial climate-related risks and opportunities based on the locations and technology types of assets and recalibrate those risks and opportunities by considering the percentage of equity shares and revenues generated by each technology type of asset to consolidate the financial impacts on GPSC Group's business.
- Validate results of climate-related risks and opportunities (e.g., operation impacts and financial impacts).
- Define management approach to mitigate risk as well as financial implications.
- Integrate climate-related risks into Enterprise Risk Management (ERM) framework as corporate risks by performing qualitative and quantitative risk assessments of those identified climate-related risks and opportunities based on assessing GPSC Group's ERM process following the Committee of Sponsoring Organization of Treadway Commission (COSO) ERM Framework across GPSC operations to identify potential impacts and likelihood in the present and future.

Figure 16: Process for climate risks and opportunities identification and assessment

Climate-related Risk Management

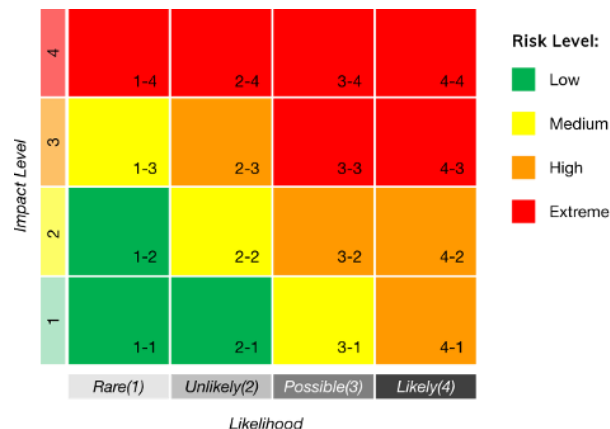


Figure 15: Corporate risk matrix

2.4 Validating and finalizing the identified risks and management plans

The outcomes of the prioritization are incorporated into the centralized enterprise risk and opportunity management process, and then reviewed by the executives. The results of the corporate risks and opportunities are consolidated as a part of the strategic thinking session and help to contribute to the GPSC Group Business Strategy. This helps to minimize risks and enhance opportunities and is subsequently presented to the Board of Directors for approval.

3. Climate-Related Risk and Opportunity Management

GPSC delegates climate-related risks to the company executives to mitigate risk for decision-making and validation of management strategies. This process is conducted annually to systematically review and update strategies in alignment with internal and external contexts. Relevant Key Performance Indicators (KPIs) are established and communicated to key functions and employees to ensure effective risk management, with an annual review to maintain their relevance and effectiveness.

4. Climate-Related Risk Monitoring

The identification, assessment, and management of climate-related risks are conducted regularly by considering metrics on the financial implications of climate change, including GHG emission reduction, water consumption reduction, renewable energy consumption, installed capacity of renewable-based power generation, the cost of the internal carbon price, cost of purchasing alternative water resources, revenues generated from sales of electricity from natural gas and renewable sources as well as capital expenditure on renewable sources, emission reduction technologies (CCS, CCUS) and TVER carbon-saving initiatives, as Key Risk Indicators (KRIs). The GPSC Group Climate Change Strategy Task Force monitors these climate-related metrics and provides quarterly progress updates on sustainability and climate-related risks and opportunities, to the GPSC Climate Change Strategy Committee. These updates ensure that policies, targets, scopes, strategic plans, preventive directions, and guidelines for mitigating and handling climate change impacts, as well as controlling greenhouse gas emissions, align with international standards (SDG 13), climate strategy, the Net Zero pathway, and the targets of both the country and the GPSC Group.

Additionally, quarterly reports are submitted to the Corporate Governance and Sustainability Committee and the Risk Management Committee. Climate-related updates are also scheduled annually in Board meetings to ensure that the Committee and the Board of Directors are consistently informed and able to provide guidance and advice on decision-making related to sustainability and climate change issues.

5. Reporting and Communication

Climate-related risks are an essential aspect of GPSC's operations. To keep stakeholders informed, the company regularly updates its Climate Change-related disclosures to outline its assessment of risks and opportunities. Additionally, GPSC Group verifies its GHG emissions data with third-party experts to ensure accurate measurement of its progress towards GHG reduction targets. The company also regularly communicates its results to its Board of Directors and external stakeholders, ensuring transparency.



IFRS S2:

Metrics and Targets



Metrics and Targets

1. Climate-Related Metrics

1.1 GHG Emission Metrics

GPSC acknowledges that our business operations can contribute to climate change. Therefore, we have established climate-related metrics and targets that follow the IFRS S2 cross-industry metric categories and Industry-Based Guidance. Our GHG emissions-related indicators are measured according to internationally recognized standards to ensure high-quality monitoring and reporting. We use the following standards and guidelines for measuring our GHG emissions:

- American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and natural gas Industry (2009)
- IPCC Guidelines for National Greenhouse Gas Inventories (2006)
- ISO 14064-1
- Thailand Greenhouse Gas Management Organization: The National Guideline Carbon Footprint for organization
- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
- PTT Group GHG Standard & Calculation Tools

We obtain our emission factors from various sources, including the IPCC's Sixth Assessment Report (AR6) and national sources such as the Thailand Greenhouse Gas Management Organization (TGO) and the Ministry of Energy of Thailand.

Our GHG accounting approach is based on the **Operational Control Approach**, reflecting a comprehensive view of our impact and increased emissions accountability. This can help GPSC Group take a holistic view of its environmental impact through reducing emissions throughout our controlled operations, we aim to contribute to a more sustainable future and ensure our long-term business success in a world increasingly focused on climate change. Focusing on reducing emissions across the entire value chain can lead to operational efficiencies and cost savings in the long run.

Therefore, GPSC Group has reported GHG emission metrics with reporting boundary covering operations in Thailand where GPSC holds 75% or more shares or is a strategic owner. The GHG Scope 1 and 2 emission metrics and performance are presented in **Table 14** and **Table 19**, respectively.

Table 14: GHG Emission Metrics and Targets of Direct (Scope 1) and Indirect (Scope 2)

2023 Key Metrics	Units	2023 Target*	GPSC 2023 Performance
			Consolidated Accounting Groups*
Direct GHG emission (Scope 1)	tCO ₂ e	12,262,863.52	8,543,503.91
Indirect GHG emissions from energy purchased and consumed (Scope 2): Location-based	tCO ₂ e	37,271.15	29,141.81
Indirect GHG emissions from energy purchased and consumed (Scope 2): Market-based	tCO ₂ e	37,271.15	29,141.81
Total GHG emission Intensity	tCO ₂ e/MWh	-	0.380

Remark:

* The data of consolidated accounting groups included Head office, Warehouse, CUP-1, CUP-2, CUP-3, CUP-4, Sriracha power plant (SRC), Glow IPP, Glow Energy Phase 1, Glow Energy Phase 2, Glow Energy Phase 4, Glow Energy Phase 5, Glow Energy CFB 3, Glow Energy Solar, Glow SPP 2/Glow SPP 3 plant (Phase 3), Glow SPP 11 Phase 1, Glow SPP 11 Phase 2, Glow SPP 11 Phase 3, GHECO-ONE, CHPP, Solar Private PPA, and Refuse Derived Fuel (RDF) Power Plant.



Metrics and Targets

GPSC Group has focused on measuring both upstream and downstream GHG emissions. we have identified 5 relevant GHG Scope 3 categories according to the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011). These categories include: 1) Fuel and energy-related activities (not included in scope 1 and scope 2); 2) Upstream transportation and distribution; 3) Waste generated in operations; 4) Business travel; and 5) Downstream transportation and distribution.

In addition, since the main goods used are fuel and chemical products, emissions derived from fuel use are included in the “Fuel and energy-related activities (not included in Scope 1 or 2). Therefore, no GHG emissions Scope 3 exists on Purchased goods and services, as they are already covered. Other categories are not relevant to the business.

GPSC's GHG Scope 3 emissions are mainly from Fuel and energy-related activities, which accounted for 99.56% of the total GHG Scope 3 emissions in 2023. Consequently, the GPSC Group aims to reduce GHG Scope 3 emissions by 3.42% in 2037 by phasing out coal power plants and transitioning to natural gas, with the goal of reducing emissions from this activity. The GHG Scope 3 emission metrics and performance are presented in **Table 15** and **Table 20**, respectively.

Table 15: GHG Emission Metrics and Targets of Other Indirect GHG Emissions (Scope 3)

2023 Key Metrics	Units	2023 Target	GPSC 2023 Performance
Other indirect GHG emissions (Scope 3)	tCO ₂ e	1,474,526.87	1,051,195.01

Note:

The scope covers the following operations: Head office, Warehouse, CUP-1, CUP-2, CUP-3, CUP-4, Sriracha power plant (SRC), Glow IPP, Glow Energy Phase 1, Glow Energy Phase 2, Glow Energy Phase 4, Glow Energy Phase 5, Glow Energy CFB 3, Glow Energy Solar, Glow SPP 2/Glow SPP 3 plant (Phase 3), Glow SPP 11 Phase 1, Glow SPP 11 Phase 2, Glow SPP 11 Phase 3, GHECO-ONE, CHPP, Solar Private PPA, and Refuse Derived Fuel (RDF) Power Plant.

1.2 Other Climate-Related Metrics

Energy Performance

Our energy performance is closely related to GHG emissions, demonstrating our commitment to reducing GHG emissions and transitioning our business towards a low-carbon future. By reducing our consumption of non-renewable energy, improving efficiency, and increasing our use of renewable energy, GPSC Group can minimize our transition risks, including changes in regulations (such as carbon pricing), meeting stakeholder expectations, and responding to changes in customer behavior. This also positions us to take advantage of opportunities such as expanding our use of renewable energy and adopting low-carbon technologies. The energy-related metrics and targets are specified in **Table 16**.

Table 16: Energy-Related Metrics and Targets

2023 Key Metrics	Units	2023 Target	GPSC 2023 Performance
Total non-renewable energy consumption	MWh	22,623,918.29	13,366,866.19

Water Performance

GPSC Group aims to enhance water efficiency by optimizing water usage and increasing water reuse/recycling to safeguard against physical risks, such as drought, as described in **Table 17**.



Metrics and Targets

Table 17: Water-Related Metrics and Target

2023 Key Metrics	Units	2023 Target	GPSC 2023 Performance
Total net fresh water consumption	M Liters	37,432.18	23,540.86

Climate-Related Opportunities Metrics

In addition, GPSC Group has set climate-related opportunity targets as part of our 4S Strategy consisting of S1: Strengthen and Expand the Core, S2: Scale-up Green Energy, S3: S-curve & Batteries, and S4: Shift to Customer-Centric Solutions to drive business with a focus to sustainability-driven, which resonates with Thailand’s climate policies and regulations to progress toward carbon neutrality in 2050 and Net Zero emissions in 2060. These metrics reflect our progress in capturing climate-related opportunities, including scaling up renewable power, business diversification, and low-carbon technology development and adoption, as described in **Table 18**.

Table 18: Climate-Related Opportunities Metrics

2023 Key Metrics	Units	GPSC 2023 Performance
Realized synergy value in terms of EBITDA	million THB	17,208
Ratio of renewables-based power capacity	%	26.07
Installed capacity of renewable-based power generation	MW	1,487

Metrics and Targets

Table 19: GHG Scope 1 and 2 Emissions Performance

Data	Unit	2020	2021	2022	2023
Total direct GHG emissions (Scope 1)	tCO ₂ e	11,177,882.48	11,844,924.88	12,680,802.16	8,543,503.91
i. CO ₂	tCO ₂ e	11,148,563.37	11,805,591.40	12,636,751.34	8,524,747.46
ii. CH ₄	tCO ₂ e	3,429.03	5,312.70	13,633.84	4,902.32
iii. N ₂ O	tCO ₂ e	25,028.48	24,292.87	27,508.12	13,854.13
iv. HFCs	tCO ₂ e	744.11	1,067.45	2,031.43	0
v. SF ₆	tCO ₂ e	117.50	8,660.46	877.43	0
vi. PFCs	tCO ₂ e	0	0	0	15,655.43
vii. NF	tCO ₂ e	N/A	N/A	NA	N/A
viii. Biogenic CO ₂ (excluded from total emissions)	tCO ₂ e	34.24	47.43	47.47	5.27
Indirect GHG emissions from energy purchased and consumed (Scope 2): Location-Based*	tCO ₂ e	20,522.36	22,726.50	27,850.95	29,141.81
Indirect GHG emissions from energy purchased and consumed (Scope 2): Market-Based*	tCO ₂ e	20,522.36	22,726.50	27,850.95	29,141.81

Remark:

* GPSC Group purchased electricity from Thailand's national grid, so GHG Scope 2 is the value from location-based only. The company did not purchase Renewable Energy Certificates (RECs) or contractual instruments from suppliers during the past 4 years. Therefore, GHG Scope 2 emissions for location-based and market-based are equal.

For more detailed information, please see [GPSC Performance Data](#)

Metrics and Targets

Table 20: GHG Scope 3 Emissions Performance

Data	Unit	2020	2021	2022	2023
Other indirect GHG emissions (Scope 3)	tCO ₂ e	327,078.19	1,393,955.65	1,555,098.09	1,051,195.01
Total Upstream	tCO ₂ e	327,078.19	1,393,955.65	1,555,098.09	1,051,195.01
i. Purchased goods and services	tCO ₂ e	0	0	0	0
ii. Capital goods	tCO ₂ e	0	0	0	0
iii. Fuel- and energy-related activities (not included in Scopes 1 or 2)	tCO ₂ e	326,913.35	1,386,325.74	1,550,323.84	1,046,463.93
iv. Upstream transportation & distribution	tCO ₂ e	95.52	1,913.09	0	0
v. Waste generated in operations	tCO ₂ e	0	5,208.12	4,685.93	4,731.08
vi. Business travel	tCO ₂ e	69.32	4.19	88.32	0
vii. Employee commuting	tCO ₂ e	0	0	0	0
Other upstream	tCO ₂ e	N/A	N/A	N/A	N/A
Total Downstream	tCO ₂ e	0	504.52	0	0
ix. Downstream transportation and distribution	tCO ₂ e	0	504.52	0	0
x. Processing of sold product	tCO ₂ e	N/A	N/A	N/A	N/A
xi. Use of sold products	tCO ₂ e	N/A	N/A	N/A	N/A
xii. End-of-life treatment of sold products	tCO ₂ e	N/A	N/A	N/A	N/A
xiii. Downstream leased assets	tCO ₂ e	N/A	N/A	N/A	N/A
xiv. Franchises	tCO ₂ e	N/A	N/A	N/A	N/A
xv. Investments	tCO ₂ e	N/A	N/A	N/A	N/A
Other downstream	tCO ₂ e	N/A	N/A	N/A	N/A
Total GHG emission Intensity	tCO ₂ e/MWh	0.436	0.444	0.453	0.380

For more detailed information please see [GPSC Performance Data](#)



Metrics and Targets

1.3 Mapping Climate Risks & Opportunities for Assets

The predominant portion of operational capacity is derived from **Natural Gas Cogeneration Power Plants (26 assets)**, the highest contributing revenues in contrast to other power plant technologies. A comprehensive analysis of climate-related risks and opportunities indicates that Natural Gas Cogeneration Power Plants are susceptible to adverse impacts from water stress and drought. These factors may result in substantial revenue losses owing to operational downtime and costs of purchasing alternative water and seawater RO, as **detailed on pages 16-19**. Furthermore, the assessment of transition risks and opportunities underscores the vulnerability of Natural Gas Cogeneration Power Plants to mandatory carbon pricing, attributable to their relatively high GHG emissions. Implementing carbon pricing by Thailand in the medium and long term may escalate operational costs. Conversely, the findings also propose potential benefits for Natural Gas Cogeneration Power Plants from policy reforms, incentives, and carbon markets. Thailand's support for natural gas utilization in the medium term, coupled with the prospective growth of alternative power plants including **Solar (17 assets)**, **Hydro (3 assets)**, and **Waste-to-Energy (2 assets)** in the long term, aligns with Thailand's aim to achieve 30% of total renewable energy consumption by 2037 as outlined in the Alternative Energy Development Plan (AEDP) and achieve Carbon Neutrality by 2050 and Net Zero emissions by 2065 as **detailed on pages 21-25**.

The percentage of GPSC Group's assets vulnerable to climate-related transition risks, physical risks, and aligned opportunities is as follows:

Table 21: The Number and Percentage of Assets Vulnerable to Climate-Related Physical and Transition Risk

Asset	Number of Assets	Percent (%)
Total Asset	51	100%
Assets vulnerable to climate-related physical risk	26	51%
Assets vulnerable to climate-related transition risk	26	51%

Table 22: The Amount and Percentage of Assets Aligned to Climate-Related Opportunities

Asset	Number of Assets	Percent (%)
Total Asset	51	100%
Assets aligned with climate-related opportunities	48	94%

1.4 Capital Deployment

The amount of capital expenditure (CAPEX), financing, or investment deployed toward climate-related risks and opportunities, as detailed on **pages 19 and 24-25**.

Table 23: The Amount of Capital Deployment

Detail of Capital Expenditure	Type of Response (Mitigate/Support)	Amount (THB)
TVER Carbon-saving initiatives	Support	16,071 Million THB
Emission reduction technologies (CCS, CCUS)	Mitigate	28,296 Million THB
Investment in renewable sources	Support	36,380 Million THB



Metrics and Targets

Furthermore, GPSC Group has entered the voluntary carbon market business due to our 8 [GHG-saving initiatives](#), covering energy and resource efficiency, fuel switching, and renewable energy, with an investment of 16,070,671,270 THB. These initiatives are registered and validated under the Thailand Voluntary Emission Reduction Program (T-VER) scheme. The certifications represent the greenhouse gas emissions reduced or removed by these initiatives. Types of initiatives include Energy Efficiency (EE), Waste Management (WE), and Alternative Energy (AE), which contributed to approximately 582,370 credits verified and available for trading on the market. As a result, we have achieved an estimated annual CO2e savings of 582,370 tCO₂e, as represented.

Currently, GPSC has been implementing various emission reduction programs and adopting low-emission technologies across the operations, such as the operation of co-generation power plants (i.e., CUP2, CUP3, CUP4) in Rayong Area and Solar rooftops in Wangchan Valley. The T-VER has been selected as a key scheme that GPSC Group not only reduces GHG emissions but also generates carbon credits as additional revenue that can be used to support sustainable development opportunities.

Moreover, GPSC Group has implemented an [internal carbon price \(ICP\)](#) of 15 USD/tCO₂e across all business units to comply with climate-related regulations. The company has established a committee and task force to oversee internal carbon pricing projects and greenhouse gas emission reduction investments as emission reduction. Their objective is to plan and monitor the adoption of internal carbon pricing to ensure it aligns with business operations. They are also responsible for assessing the financial situation and green financing guidelines and providing input on developing operational guidelines to enhance the company's understanding of carbon pricing and other financial instruments for maximum effectiveness.

2. Climate-Related Targets

GPSC Group has set a company-wide ambition to achieve Carbon Neutrality by 2050 and Net Zero by 2060. This is part of our effort to become a low-carbon utility company by reducing, removing, and offsetting GHG emissions throughout the company and its supply chain. In the short term, we aim to reduce GHG emission intensity (Scope 1 and 2) by 10% in 2025 and 35% in 2030, and in the long term, by 100% in 2060 from the 2020 baseline level. These targets align with PTT Group (GPSC's parent company) and Thailand National Determined Contribution (NDC). Additionally, GPSC Group is utilizing the Science-Based Target Setting Tool aligned with the Sectoral Decarbonization Approach (SDA) - Power sector, using 2020 as a baseline year. The scope covers all operations of GPSC Group where the company holds more than 75% of shares or has management control/strategic ownership. Achieving these targets will contribute to national and global GHG emission reduction and accelerate the low-carbon transition in the value chain and society. The emission reduction targets are shown in **Table 24**.

Table 24: Emission Reduction Targets

Key Performance Indicator	Unit	Baseline		% Reduction Target from Base Year		
		Value	Baseline Year	2025	2030	2060
Absolute GHG Emission (Scope 1 and Scope 2)	tCO ₂ e	11,198,404.84	2020	-	-	100%
GHG Emission Scope 3	tCO ₂ e	327,078.19	2020	-	-	To achieve Net Zero Emission
Intensity GHG Emission (Scope 1 and Scope 2)	tCO ₂ e/MWh	0.44	2020	10%	35%	

Note:
The target is a gross greenhouse gas emissions target or net greenhouse gas emissions target



Metrics and Targets

Our GHG emissions are calculated based on the GHG Protocol Corporate Accounting and Reporting Standard, which covers 7 GHGs. An independent third party has verified our GHG emissions in line with GRI Standards (GRI 305-1 and 305-2) and AA1000AS standards annually. Our climate-related targets aim to support the National Determined Contribution (NDC) and the pledge in COP28 for Global Renewables and Energy Efficiency Pledge, endorsed by 130 national governments (including Thailand). This also aligns with the global community’s intentions as outlined in the Paris Agreement, which seeks to limit the global average temperature increase to no more than 1.5°C.

Additionally, to achieve Carbon Neutrality by 2050 and a Net Zero target by 2060, GPSC Group has set climate-related opportunity targets as part of our 4S Strategy, which consists of S1: Strengthen and Expand the Core, S2: Scale-up Green Energy, S3: S-curve & Batteries, and S4: Shift to Customer-Centric Solutions with 3D+1C framework to drive business with a focus on sustainability Group has set climate-related opportunity targets as part of our 4S Strategy consisting of S1: Strengthen and Expand the Core, S2: Scale-up Green Energy, S3: S-curve & Batteries, and S4: Shift to Customer-Centric Solutions with 3D+1C framework to drive business with a focus to sustainability-driven.

Specifically, regarding the strategy S2: Scale-up Green Energy strategy, GPSC strives to increase the proportion of clean energy project development, including solar and wind power, to support GHG emission reduction. GPSC Group targets more than 50% renewable energy capacity by 2030, as **Table 25** indicates. In 2023, it was achieved at 52% installed capacity (26% generating capacity).

Table 25: Other Climate-Related Targets

Key Performance Indicator	Unit	Baseline		% Target from Base Year
		Value	Baseline Year	
				2030
Installed Capacity Renewable Energy	%	11.29	2020	>50%

In addition, GPSC performance against each climate-related target can be found in [GPSC's Integrated Sustainability Report 2023](#)

Furthermore, GPSC Group has recognized opportunities to expand its business into low-carbon products in response to shifts in customer behavior and global energy consumption trends. We intend to participate in the voluntary environmental credit market by producing carbon credits and Renewable Energy Certificates (RECs) as viable financial opportunities. A summary of climate-related risks can be found on **pages 16-25** of the report.



IFRS S2: Appendix – IFRS S2 Index

IFRS S2 Index

IFRS S2 Recommended Disclosure		Document Page
Governance		
a) The governance body(s) (which can include a board, committee or equivalent body charged with governance) or individual(s) responsible for oversight of climate-related risks and opportunities.		
I.	how responsibilities for climate-related risks and opportunities are reflected in the terms of reference, mandates, role descriptions and other related policies applicable to that body(s) or individual(s);	Page 6: Figure 3: Climate governance structure Page 7: Figure 4: Climate change climate change task force structure Page 8: 1. Board-Level, 1.1 The Roles and Responsibility
II.	how the body(s) or individual(s) determines whether appropriate skills and competencies are available or will be developed to oversee strategies designed to respond to climate-related risks and opportunities;	Page 8: 1.3 Skill Set and Competencies
III.	how and how often the body(s) or individual(s) is informed about climate-related risks and opportunities;	Page 8: 1.2 Report of Progress
IV.	how the body(s) or individual(s) takes into account climate-related risks and opportunities when overseeing the entity's strategy, its decisions on major transactions and its risk management processes and related policies, including whether the body(s) or individual(s) has considered trade-offs associated with those risks and opportunities; and	Page 8: 1.1 The Roles and Responsibility
V.	how the body(s) or individual(s) oversees the setting of targets related to climate-related risks and opportunities, and monitors progress towards those targets, including whether and how related performance metrics are included in remuneration policies.	Page 10: 4. Monetary Incentives
b) Management's role in the governance processes, controls and procedures used to monitor, manage and oversee climate-related risks and opportunities.		
I.	whether the role is delegated to a specific management-level position or management-level committee and how oversight is exercised over that position or committee; and	Page 9: 2. Management-Level, 2.1 Roles and Responsibilities
II.	whether management uses controls and procedures to support the oversight of climate-related risks and opportunities and, if so, how these controls and procedures are integrated with other internal functions.	

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Strategy	
Climate-related risks and opportunities	
a) Describe climate-related risks and opportunities that could reasonably be expected to affect the entity's prospects.	Page 16 : 1.1.4 Physical Risk Assessment Result- Qualification Analysis
b) Explain, for each climate-related risk the entity has identified, whether the entity considers the risk to be a climate-related physical risk or climate-related transition risk.	Page 17-19 : 1.1.5 Quantification Analysis of Physical Risk Page 21 : 1.2.3 Transition Risk and Opportunity Assessment Result- Qualification Analysis
c) Specify, for each climate-related risk and opportunity the entity has identified, over which time horizons (short, medium, or long term) the effects of each climate-related risk and opportunity could reasonably be expected to occur.	Page 22 : 1.2.4 Quantification Analysis of Transition Risk Page 23 : 1.2.5 Quantification Analysis of Transition Opportunity
d) Explain how the entity defines 'short term', 'medium term' and 'long term' and how these definitions are linked to the planning horizons used by the entity for strategic decision-making.	Page 14 : 1.1.2 Climate Scenarios – Physical Risks and Opportunities Page 20 : 1.2.1 Climate Scenarios and – Transition Risks and Opportunities Page 26-30 : 2. Impacts of Climate-related Risks and Opportunities on Corporate Strategy, including 2.1 Business Strategy, 2.2 Climate Strategy, and 2.3 Net Zero Strategy
Business model and value chain	
a) Description of the current and anticipated effects of climate-related risks and opportunities on the entity's business model and value chain.	Page 26-30 : 2. Impacts of Climate-related Risks and Opportunities on Corporate Strategy, including 2.1 Business Strategy, 2.2 Climate Strategy, and 2.3 Net Zero Strategy Page 31-32 : 3. Four Strategic Programs in Net Zero Emission Pathway Page 33 : Figure 15: Net Zero strategy and 4 strategic programs
b) Description of where in the entity's business model and value chain climate-related risks and opportunities are concentrated.	Page 17-19 : 1.1.5 Quantification Analysis of Physical Risk Page 22 : 1.2.4 Quantification Analysis of Transition Risk Page 23 : 1.2.5 Quantification Analysis of Transition Opportunity

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Strategy (Continue)	
Strategy and decision-making	
a) information about how the entity has responded to, and plans to respond to, climate-related risks and opportunities in its strategy and decision-making, including how the entity plans to achieve any climate-related targets it has set and any targets it is required to meet by law or regulation. Specifically, the entity shall disclose information about:	
I. current and anticipated changes to the entity's business model, including its resource allocation, to address climate-related risks and opportunities (for example, these changes could include plans to manage or decommission carbon-, energy- or water-intensive operations; resource allocations resulting from demand or supply-chain changes; resource allocations arising from business development through capital expenditure or additional expenditure on research and development; and acquisitions or divestments);	Page 26-30: 2. Impacts of Climate-related Risks and Opportunities on Corporate Strategy, including 2.1 Business Strategy, 2.2 Climate Strategy, and 2.3 Net Zero Strategy Page 31-32: 3. Four Strategic Programs in Net Zero Emission Pathway Page 33: Figure 15: Net Zero strategy and 4 strategic programs
II. current and anticipated direct mitigation and adaptation efforts (for example, through changes in production processes or equipment, relocation of facilities, workforce adjustments, and changes in product specifications);	Page 17-19: 1.1.5 Quantification Analysis of Physical Risk Page 22: 1.2.4 Quantification Analysis of Transition Risk Page 23: 1.2.5 Quantification Analysis of Transition Opportunity
III. current and anticipated indirect mitigation and adaptation efforts (for example, through working with customers and supply chains);	
IV. any climate-related transition plan the entity has, including information about key assumptions used in developing its transition plan, and dependencies on which the entity's transition plan relies; and	Page 26-30: 2. Impacts of Climate-related Risks and Opportunities on Corporate Strategy, including 2.1 Business Strategy, 2.2 Climate Strategy, and 2.3 Net Zero Strategy Page 31-32: 3. Four Strategic Programs in Net Zero Emission Pathway Page 33: Figure 14: Net Zero strategy and 4 strategic programs
V. how the entity plans to achieve any climate-related targets, including any greenhouse gas emissions targets.	Page 41-43: 1.1 GHG Emission Metrics and 1.2 Other Climate-Related Metrics (Energy and Water)
b) information about how the entity is resourcing, and plans to resource, the activities disclosed in accordance with paragraph.	Page 41-43: 1. Climate-Related Measures, 1.1 GHG Emission Metrics and 1.2 Other Climate-Related Metrics (Energy and Water) Page 47-48 : 2. Climate-Related Targets

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Strategy (Continue)	
Financial position, financial performance and cash flows	
a) Effects of climate-related risks and opportunities on the entity's financial position, financial performance and cash flows for the reporting period (current financial effects).	Page 17-19: 1.1.5 Quantification Analysis of Physical Risk Page 22: 1.2.4 Quantification Analysis of Transition Risk
b) Anticipated effects of climate-related risks and opportunities on the entity's financial position, financial performance and cash flows over the short, medium and long term, taking into consideration how climate-related risks and opportunities are included in the entity's financial planning.	Page 23: 1.2.5 Quantification Analysis of Transition Opportunity
Climate resilience	
a) Entity's assessment of its climate resilience as at the reporting date:	
I. the implications, if any, of the entity's assessment for its strategy and business model, including how the entity would need to respond to the effects identified in the climate-related scenario analysis;	Page 17-19: 1.1.5 Quantification Analysis of Physical Risk Page 22: 1.2.4 Quantification Analysis of Transition Risk Page 23: 1.2.5 Quantification Analysis of Transition Opportunity
II. the significant areas of uncertainty considered in the entity's assessment of its climate resilience;	Page 12-13: 1.1.1 Scope of Assessment
III. (iii) the entity's capacity to adjust or adapt its strategy and business model to climate change over the short, medium and long term, including; (1) the availability of, and flexibility in, the entity's existing financial resources to respond to the effects identified in the climate-related scenario analysis, including to address climate-related risks and to take advantage of climate-related opportunities; (2) the entity's ability to redeploy, repurpose, upgrade or decommission existing assets; and (3) the effect of the entity's current and planned investments in climate-related mitigation, adaptation and opportunities for climate resilience; and	Page 17-19: 1.1.5 Quantification Analysis of Physical Risk Page 22: 1.2.4 Quantification Analysis of Transition Risk Page 23: 1.2.5 Quantification Analysis of Transition Opportunity

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Strategy (Continue)	
Climate resilience	
b) How and when the climate-related scenario analysis was carried out:	
<p>I. information about the inputs the entity used, including:</p> <ul style="list-style-type: none"> (1) which climate-related scenarios the entity used for the analysis and the sources of those scenarios; (2) whether the analysis included a diverse range of climate-related scenarios; (3) whether the climate-related scenarios used for the analysis are associated with climate-related transition risks or climate-related physical risks; (4) whether the entity used, among its scenarios, a climate-related scenario aligned with the latest international agreement on climate change; (5) why the entity decided that its chosen climate-related scenarios are relevant to assessing its resilience to climate-related changes, developments or uncertainties; (6) the time horizons the entity used in the analysis; and (7) what scope of operations the entity used in the analysis (for example, the operating locations and business units used in the analysis); 	<p>Page 12-15: 1.1 Physical Risks and Opportunities</p> <ul style="list-style-type: none"> • Cover 9 hazards, including extreme heat, extreme cold, river flooding, extreme rainfall flooding, water stress, drought, coastal & offshore, extreme winds & storms, wildfire • 1.1.1 Scope of Assessment • 1.1.2 Climate Scenarios • 1.1.3 Physical Risk Assessment Methodology <p>Page 20: 1.2 Transition Risks and Opportunities</p> <ul style="list-style-type: none"> • Cover 4 drivers, including policy & legal, market, reputation, and technology • 1.2.1 Climate Scenarios • 1.2.2 Transition Risk Assessment Methodology
<p>II. the key assumptions the entity made in the analysis, including assumptions about:</p> <ul style="list-style-type: none"> (1) climate-related policies in the jurisdictions in which the entity operates; (2) macroeconomic trends; (3) national- or regional-level variables (for example, local weather patterns, demographics, land use, infrastructure and availability of natural resources); (4) energy usage and mix; and (5) developments in technology; and 	<p>Page 36: 1. Risk and Opportunity Assessment</p> <ul style="list-style-type: none"> • 1.2 Scenarios and Timeframes
<p>III. the reporting period in which the climate-related scenario analysis was carried out.</p>	<p>Page 14: 1.1 Physical Risks and Opportunities</p> <ul style="list-style-type: none"> • 1.1.2 Climate Scenarios <p>Page 20: 1.2 Transition Risks and Opportunities</p> <ul style="list-style-type: none"> • 1.2.1 Climate Scenarios <p>Page 36: 1. Risk and Opportunity Assessment</p> <ul style="list-style-type: none"> • 1.3 Scenarios and Timeframes

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Risk Management	
a) the processes and related policies the entity uses to identify, assess, prioritise and monitor climate-related risks, including information about:	
I. the inputs and parameters the entity uses (for example, information about data sources and the scope of operations covered in the processes);	Page 35: 1. Climate-Related Risk and Opportunity Assessment <ul style="list-style-type: none"> Table 11: Example of Data Providers for Physical Risk Assessment Table 12: Example of Data Providers for Transition Risk and Opportunity Assessment
II. whether and how the entity uses climate-related scenario analysis to inform its identification of climate-related risks;	Page 36: 1. Climate-Related Risk and Opportunity Assessment <ul style="list-style-type: none"> 1.2 Scenarios and Timeframes
III. how the entity assesses the nature, likelihood and magnitude of the effects of those risks	Page 36: 1.3 Nature, Likelihood, and Magnitude Page 37-38: 2. Process for Climate Risks & Opportunities Identification and Assessment
IV. whether and how the entity prioritises climate-related risks relative to other types of risk;	<ul style="list-style-type: none"> 2.3 Prioritizing Risks, Identifying Impact, and Formulating Management Approach
V. how the entity monitors climate-related risks; and	Page 39: 4. Climate-Related Risk Monitoring
VI. whether and how the entity has changed the processes it uses compared with the previous reporting period;	Page 36: 1. Climate-Related Risk and Opportunity Assessment <ul style="list-style-type: none"> 1.2 Scenarios and Timeframes
b) the processes the entity uses to identify, assess, prioritise and monitor climate-related opportunities, including information about whether and how the entity uses climate-related scenario analysis to inform its identification of climate-related opportunities; and	
c) the extent to which, and how, the processes for identifying, assessing, prioritising and monitoring climate-related risks and opportunities are integrated into and inform the entity's overall risk management process.	
Page 35-36: 1. Climate-Related Risk and Opportunity Assessment <ul style="list-style-type: none"> 1.1 Scope of Assessment 1.2 Scenarios and Timeframes 1.3 Nature, Likelihood, and Magnitude Page 37-39: 2. Process for Climate Risks & Opportunities Identification and Assessment <ul style="list-style-type: none"> 2.1 Reviewing Potential Risks and Opportunities 2.2 Identifying Risks and Opportunities 2.3 Prioritizing Risks, Identifying Impact, and Formulating Management Approach 2.4 Validating and finalizing the identified risks and management plans. 	

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Metric and Targets	
Climate-related metrics	
a) greenhouse gases—the entity shall:	
<p>I. disclose its absolute gross greenhouse gas emissions generated during the reporting period, expressed as metric tonnes of CO₂ equivalent, classified as:</p> <ul style="list-style-type: none"> (1) Scope 1 greenhouse gas emissions; (2) Scope 2 greenhouse gas emissions; and (3) Scope 3 greenhouse gas emissions; 	<p>Page 41-42: 1.1 GHG Emission Metric</p> <ul style="list-style-type: none"> • Table 14: GHG Emission Metrics and Targets of Direct (Scope 1) and Indirect (Scope 2) • Table 15: GHG Emission Metrics and Targets of Other Indirect GHG Emissions (Scope 3) <p>Page 44: Table 19: GHG Scope 1 and 2 Emissions Performance</p> <p>Page 45: Table 20: GHG Scope 3 Emissions Performance</p>
<p>II. measure its greenhouse gas emissions in accordance with the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004) unless required by a jurisdictional authority or an exchange on which the entity is listed to use a different method for measuring its greenhouse gas emissions;</p>	<p>Page 41: 1.1 GHG Emission Metrics</p> <ul style="list-style-type: none"> • Table 14: GHG Emission Metrics and Targets of Direct (Scope 1) and Indirect (Scope 2) <p>Page 44: Table 19: GHG Scope 1 and 2 Emissions Performance</p>
<p>III. disclose the approach it uses to measure its greenhouse gas emissions including:</p> <ul style="list-style-type: none"> (1) the measurement approach, inputs and assumptions the entity uses to measure its greenhouse gas emissions; (2) the reason why the entity has chosen the measurement approach, inputs and assumptions it uses to measure its greenhouse gas emissions; and (3) any changes the entity made to the measurement approach, inputs and assumptions during the reporting period and the reasons for those changes; 	
<p>IV. for Scope 1 and Scope 2 greenhouse gas emissions disclosed (disclose its absolute gross greenhouse gas emissions) disaggregate emissions between:</p> <ul style="list-style-type: none"> (1) the consolidated accounting group (for example, for an entity applying IFRS Accounting Standards, this group would comprise the parent and its consolidated subsidiaries); and (2) other investees excluded, for an entity applying IFRS Accounting Standards, these investees would include associates, joint ventures and unconsolidated subsidiaries); 	
<p>V. for Scope 2 greenhouse gas emissions disclosed in accordance with paragraph 29(a)(i)(2), disclose its location-based Scope 2 greenhouse gas emissions, and provide information about any contractual instruments that is necessary to inform users' understanding of the entity's Scope 2 greenhouse gas emissions; and</p>	

IFRS S2 Index

IFRS S2 Recommended Disclosure	Document Page
Metric and Targets (Continue)	
Climate-related metrics	
<p>VI. for Scope 3 greenhouse gas emissions disclosed</p> <p>(1) the categories included within the entity's measure of Scope 3 greenhouse gas emissions, in accordance with the Scope 3 categories described in the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011); and</p> <p>(2) additional information about the entity's Category 15 greenhouse gas emissions or those associated with its investments (financed emissions), if the entity's activities include asset management, commercial banking or insurance;</p>	<p>Page 42: 1.1 GHG Emission Metric</p> <ul style="list-style-type: none"> Table 15: GHG Emission Metrics and Targets of Other Indirect GHG Emissions (Scope 3) <p>Page 45: Table 20: GHG Scope 3 Emissions Performance</p>
<p>b) climate-related transition risks—the amount and percentage of assets or business activities vulnerable to climate-related transition risks;</p>	<p>Page 46: 1.3 Mapping Climate Risks & Opportunities for Assets</p>
<p>c) climate-related physical risks—the amount and percentage of assets or business activities vulnerable to climate-related physical risks;</p>	<ul style="list-style-type: none"> Table 21: The Number and Percentage of Assets Vulnerable to Climate-Related Physical and Transition Risk
<p>d) climate-related opportunities—the amount and percentage of assets or business activities aligned with climate-related opportunities;</p>	<ul style="list-style-type: none"> Table 22: The Amount and Percentage of Assets Aligned to Climate-Related Opportunities
<p>e) capital deployment—the amount of capital expenditure, financing or investment deployed towards climate-related risks and opportunities;</p>	<ul style="list-style-type: none"> Table 23: The Amount of Capital Deployment
<p>f) internal carbon prices—the entity shall disclose:</p>	
<p>I. an explanation of whether and how the entity is applying a carbon price in decision-making (for example, investment decisions, transfer pricing and scenario analysis); and</p>	<p>Page 47: GPSC Group has implemented an internal carbon price (ICP) of 15 USD/tCO₂e across all business units to comply with climate-related regulations.</p>
<p>II. the price for each metric tonne of greenhouse gas emissions the entity uses to assess the costs of its greenhouse gas emissions;</p>	

IFRS S2 Index

IFRS S2 Recommended Disclosure		Document Page
Metric and Targets (Continue)		
Climate-related metrics		
g) remuneration—the entity shall disclose:		
I.	a description of whether and how climate-related considerations are factored into executive remuneration (see also paragraph 6(a)(v)); and	Page 9: 4. Monetary Incentives
II.	a description of whether and how climate-related considerations are factored into executive remuneration (see also paragraph 6(a)(v)); and	
Climate-related targets		
Quantitative and qualitative climate-related targets		
a) the metric used to set the target		Page 47-48: 2. Climate-Related Targets (absolute and intensity targets with based year in 2020) <ul style="list-style-type: none">Table 24: Emission Reduction Targets (2025, 2030, 2060)Table 25: Other Climate-Related Targets (2030)
b) the objective of the target (for example, mitigation, adaptation or conformance with science-based initiatives);		
c) the part of the entity to which the target applies (for example, whether the target applies to the entity in its entirety or only a part of the entity, such as a specific business unit or specific geographical region);		
d) the period over which the target applies;		
e) the base period from which progress is measured;		
f) any milestones and interim targets;		
g) if the target is quantitative, whether it is an absolute target or an intensity target; and		
h) how the latest international agreement on climate change, including jurisdictional commitments that arise from that agreement, has informed the target.		

IFRS S2 Index

IFRS S2 Recommended Disclosure		Document Page
Metric and Targets (Continue)		
Climate-related targets		
Approach to setting and reviewing each target, and monitoring progress against each target		
a) whether the target and the methodology for setting the target has been validated by a third party;	Page 47-48: 2. Climate-Related Targets (absolute and intensity targets with based year in 2020) <ul style="list-style-type: none">Table 24: Emission Reduction Targets (2025, 2030, 2060)Table 25: Other Climate-Related Targets (2030)	
b) the entity's processes for reviewing the target;		
c) the metrics used to monitor progress towards reaching the target; and		
d) any revisions to the target and an explanation for those revisions.		
Performance against each climate-related target and an analysis of trends or changes in the entity's performance		
a) which greenhouse gases are covered by the target.	Page 44: Table 19: GHG Scope 1 and 2 Emissions Performance Page 47: 2. Climate-Related Targets <ul style="list-style-type: none">Table 24: Emission Reduction Targets	
b) whether Scope 1, Scope 2 or Scope 3 greenhouse gas emissions are covered by the target.		
c) whether the target is a gross greenhouse gas emissions target or net greenhouse gas emissions target. If the entity discloses a net greenhouse gas emissions target, the entity is also required to separately disclose its associated gross greenhouse gas emissions target.		
d) whether the target was derived using a sectoral decarbonization approach.		
e) the entity's planned use of carbon credits to offset greenhouse gas emissions to achieve any net greenhouse gas emissions target. In explaining its planned use of carbon credits.		
I. the extent to which, and how, achieving any net greenhouse gas emissions target relies on the use of carbon credits;	Page 47: GPSC Group has entered the voluntary carbon market business due to our 8 GHG-saving initiatives, with an investment of 16,070,671,270 THB. These initiatives are registered and validated under the Thailand Voluntary Emission Reduction Program (T-VER) scheme.	
II. which third-party scheme(s) will verify or certify the carbon credits;		

IFRS S2 Index

IFRS S2 Recommended Disclosure		Document Page
Metric and Targets (Continue)		
Climate-related targets		
Performance against each climate-related target and an analysis of trends or changes in the entity's performance		
III.	the type of carbon credit, including whether the underlying offset will be nature-based or based on technological carbon removals, and whether the underlying offset is achieved through carbon reduction or removal; and	Page 47 : Technological carbon removal initiatives with underlying offset achieved through carbon reduction.
IV.	any other factors necessary for users of general purpose financial reports to understand the credibility and integrity of the carbon credits the entity plans to use (for example, assumptions regarding the permanence of the carbon offset).	

THANK YOU

Global Power Synergy Public Company Limited

555/2 Energy Complex Building B, 5th Floor, Vibhadi - Rangsit
Road, Kwaeng Chatuchak, Khet Chatuchak, Bangkok 10900

Tel. 02-140-4600

Fax. 02-140-4601

Email corporate@gpscgroup.com

