# **GPSC TCFD Report 2022**

Task Force on Climate-Related Financial Disclosures (TCFD)



January 2023

# GPSC Group fully integrates TCFD framework to address climate risks and opportunities

"With the effort for increasing transparency on the resiliency of GPSC climate change strategies, GPSC prepares report in response to TCFD to fulfil our ambitious target, which is NET- ZERO".

## **TCFD Disclosure Pillars**



#### Governance

The organization's governance around climate-related risks and opportunities

#### Strategy

The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning

#### **Risk Management**

The processes used by the organization to identify, assess, and manage climate-related risks

#### **Metrics and Targets**

The metrics and targets used to assess and manage relevant climate-related risks and opportunities



Disclosure of climate risks in line with TCFD framework is an opportunity for GPSC to:

- Demonstrate climate leadership and alignment with the best international climate reporting practice to stakeholders
- Show **readiness** of GPSC to respond to climate challenges in a timely manger with reliable and systematic process towards achievements to date
- Have better access to capital by increasing investors' and lenders' confidence that the company's climaterelated risks are appropriately assessed and are being integrated in the risk management processes
  - Meet increasing requirements for climate-related financial disclosures by **investors and regulators**



# GPSC group adopts the TCFD reporting guidance and illustrates Physical and Transition risks as follows:

#### Figure 2

Income Statement

#### Major Categories of Financial Impact

**Revenues.** Transition and physical risks may affect demand for products and services. Organizations should consider the potential impact on revenues and identify potential opportunities for enhancing or developing new revenues. In particular, given the emergence and likely growth of carbon pricing as a mechanism to regulate emissions, it is important for affected industries to consider the potential impacts of such pricing on business revenues.

**Expenditures.** An organization's response to climate-related risks and opportunities may depend, in part, on the organization's cost structure. Lower-cost suppliers may be more resilient to changes in cost resulting from climate-related issues and more flexible in their ability to address such issues. By providing an indication of their cost structure and flexibility to adapt, organizations can better inform investors about their investment potential.

It is also helpful for investors to understand capital expenditure plans and the level of debt or equity needed to fund these plans. The resilience of such plans should be considered bearing in mind organizations' flexibility to shift capital and the willingness of capital markets to fund organizations exposed to significant levels of climate-related risks. Transparency of these plans may provide greater access to capital markets or improved financing terms.

#### Balance Sheet

Assets and Liabilities. Supply and demand changes from changes in policies, technology, and market dynamics related to climate change could affect the valuation of organizations' assets and liabilities. Use of long-lived assets and, where relevant, reserves may be particularly affected by climate-related issues. It is important for organizations to provide an indication of the potential climate-related impact on their assets and liabilities, particularly long-lived assets. This should focus on existing and committed future activities and decisions requiring new investment, restructuring, writedowns, or impairment.

**Capital and Financing.** Climate-related risks and opportunities may change the profile of an organization's debt and equity structure, either by increasing debt levels to compensate for reduced operating cash flows or for new capital expenditures or R&D. It may also affect the ability to raise new debt or refinance existing debt, or reduce the tenor of borrowing available to the organization. There could also be changes to capital and reserves from operating losses, asset write-downs, or the need to raise new equity to meet investment.

The Task Force encourages organizations to undertake both historical and forward-looking analyses when considering the potential financial impacts of climate change, with greater focus on forward-looking analyses as the efforts to mitigate and adapt to climate change are without historical precedent. This is one of the reasons the Task Force believes scenario analysis is important for organizations to consider incorporating into their strategic planning or risk management practices.

#### able 1

#### Examples of Climate-Related Risks and Potential Financial Impacts

pe	Climate-Related Risks <sup>32</sup>	Potential Financial Impacts				
	Policy and Legal					
	<ul> <li>Increased pricing of GHG emissions</li> </ul>	<ul> <li>Increased operating costs (e.g., higher compliance costs, increased insurance premiums)</li> </ul>				
	<ul> <li>Enhanced emissions-reporting obligations</li> </ul>	<ul> <li>Write-offs, asset impairment, and early retirement of existing assets due to policy changes</li> </ul>				
	<ul> <li>Mandates on and regulation of existing products and services</li> <li>Exposure to litigation</li> </ul>	<ul> <li>Increased costs and/or reduced demand for products and services resulting from fines and judgments</li> </ul>				
	Technology					
KISKS	<ul> <li>Substitution of existing products and services with lower emissions options</li> <li>Unsuccessful investment in new technologies</li> <li>Costs to transition to lower emissions technology</li> </ul>	<ul> <li>Write-offs and early retirement of existing assets</li> <li>Reduced demand for products and services</li> <li>Research and development (R&amp;D) expenditures in new and alternative technologies</li> <li>Capital investments in technology development</li> <li>Costs to adopt/deploy new practices and processes</li> </ul>				
5	Market					
Iransit	<ul> <li>Changing customer behavior</li> <li>Uncertainty in market signals</li> <li>Increased cost of raw materials</li> </ul>	<ul> <li>Reduced demand for goods and services due to shift in consumer preferences</li> <li>Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment)</li> <li>Abrupt and unexpected shifts in energy costs</li> <li>Change in revenue mix and sources, resulting in decreased revenues</li> <li>Re-pricing of assets (e.g., fossil fuel reserves, land valuations, securities valuations)</li> </ul>				
	Reputation					
	<ul> <li>Shifts in consumer preferences</li> <li>Stigmatization of sector</li> <li>Increased stakeholder concern or negative stakeholder feedback</li> </ul>	<ul> <li>Reduced revenue from decreased demand for goods/services</li> <li>Reduced revenue from decreased production capacity (e.g., delayed planning approvals, supply chain interruptions)</li> <li>Reduced revenue from negative impacts on workforce management and planning (e.g., employee attraction and retention)</li> <li>Reduction in capital availability</li> </ul>				
	Acute	- Reduced revenue from decreased production capacity (e.g.,				
ISKS	<ul> <li>Increased severity of extreme weather events such as cyclones and floods</li> </ul>	<ul> <li>transport dimicuities, supply chain interruptions)</li> <li>Reduced revenue and higher costs from negative impacts on workforce (e.g., health, safety, absenteeism)</li> <li>Write-offs and early retirement of existing assets (e.g., damage</li> </ul>				
r R	Chronic	to property and assets in "high-risk" locations)				
Physica	<ul> <li>Changes in precipitation patterns and extreme variability in weather patterns</li> <li>Rising mean temperatures</li> <li>Rising sea levels</li> </ul>	<ul> <li>Increased operating costs (e.g., inadequate water supply for hydroelectric plants or to cool nuclear and fossil fuel plants)</li> <li>Increased capital costs (e.g., damage to facilities)</li> <li>Reduced revenues from lower sales/output</li> <li>Increased insurance premiums and potential for reduced availability of insurance on assets in "high-risk" locations</li> </ul>				



# **Table of Content**

TCFD	Document Page / GPSC Website
Governance	
a) Describe the board's oversight of climate related risks and opportunities.	
b) Describe management's role in assessing and managing climate-related risks and opportunities.	Page 6-9
Strategy	
a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	Page 11-20
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	Page 18-20
c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Page 21-30
Risk Management	
a) Describe the organization's processes for identifying and assessing climate-related risks.	Page 32
b) Describe the organization's processes for managing climate-related risks.	Page 32-33
c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	Page 33-37
Metrics & Targets	
a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	Page 39, 41-44
b) Disclose Scope 1, Scope 2, and if appropriate Scope 3 greenhouse gas (GHG) emissions, and the related risks.	Page 40-41, 44
c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	Page 39-40, 44

Document Page / GPSC Website

# Governance

- a) Describe the board's oversight of climate-related risks and opportunities.
- b) Describe management's role in assessing and managing climate-related risks and opportunities





# **GPSC Climate Change Governance**



GPSC has established climate change governance where the board and management levels are both responsible for low carbon transition of the company which described below. Climate governance structure is presented in the next page.

#### **Board-level Responsibilities**

GPSC's Board of Directors, particularly Corporate Governance and Sustainability Committee and Risk Management Committee, is responsible for overseeing various climate-related risks & opportunities and processes including;

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

Climate-related updates are regularly scheduled in the Board meetings for at least annually, which scheduled on some meeting at quarterly basis for Risk Management Committee and quarterly basis for Corporate Governance and Sustainability Committee.

GPSC involved with the Board members who had expertise on climate change (e.g. power industry, innovation, sustainability management) in order to maximize the benefit on overseeing climate-related matter.

#### **Management-level Responsibilities**

Chief Executive Officer of GPSC is the highest management position in charge of climate change management, supported by a Group Climate Change Strategy Committee (GCSC), as an executive level climate or sustainability-specific committee chaired by Chief Operating Officer (COO), which spearheaded on climate strategy formulation, as well as, a Group Climate Change Strategy Task Force, chaired by Executive Vice President Corporate Strategy and Subsidiary Management, which drove the implementation. Both groups consists of senior managers and officers from diverse departments across the organization to ensure company-wide alignments and collaborations. The roles on assessing and managing climate-related risks and opportunities were covered by these committees in collaboration with Risk Management Department and Strategy Department. Climate-related progresses were reported to the Board-level committees at least on guarterly basis and to the Board of Directors semi-annually.

Furthermore, GPSC also established a Group Climate Change Strategy Sub-Task Force which drives climate change on working team level in various aspects; climate policy & strategy, GHG account, climate finance, and innovation and technology.

GPSC provided monetary incentives to executives and employees in various positions in relation to emission reduction and energy efficiency improvement which were part of corporate KPI.



# **GPSC Climate Change Governance Structure**



Governance

C

Sustainability and Climate Change Policy

GPSC Group set up climate governance structure comprising of representatives from various functions to management team to effectively drive climate action across the group comprising the following groups:

> Responsible to **oversee climate change policy, strategy and action plan to drive and mitigate climate risks**. This committee will also take role in the decision making on low carbon investment and technology.

Works closely under direction from GCSC. This task force is responsible to execute climate actions of the company including **assess risks and opportunities, set up strategy, target and action plan, monitor GHG emission performance**, as well as supporting initiatives related to climate change.

Comprising of members from various departments, is responsible to execute actions related to their roles. These include **development of policy and strategy, GHG emissions monitoring, climate finance study, research on innovation & technology and communication.** 

**Sustainability and Climate Change Policy** is responsible for recommending and communicating sustainability strategy, action plans, and policy to all employees to ensure compliance as well as monitoring and auditing each business unit to confirm the effective implementation of action plans. Moreover, the Department is responsible for creating sustainability culture among the company's employees and suppliers, in order to become an organization that truly achieves sustainable development.





GPSC rewards employees associated with the management of 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:

Employee Level	Type of Incentive*	Incentivized KPIs
Chief Executive Officer (CEO)	Monetary	<ul> <li>Eco-efficiency (GHG Emissions reduction)</li> <li>Renewable MWe Growth (Other KPIs)</li> </ul>
Executive Officer	Monetary	<ul> <li>Roadmap to Net Zero GHG aligned with PTT group (Emissions reduction)</li> </ul>
Employee	Monetary	<ul> <li>Roadmap to Net Zero GHG aligned with PTT group (Emissions reduction)</li> <li>GPSC Group GHG reduction (Emissions reduction)</li> </ul>

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

# Strategy

- a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.
- b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.
- c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2 °C or lower scenario.





# **Overview of GPSC Climate Risks & Opportunities**

GPSC evaluated climate risk and opportunities in short-term (1-2 years) medium-term (3-5 years) and long-term (>5 years) across the value chain from upstream (suppliers), direct operation, and downstream (customers). GPSC climate risks & opportunities in 2022 are as follows.



#### Risks

#### **Opportunities**





- GPSC Group Own Operation, Upstream (Raw material Natural Gas, Coal), Downstream (Key Customers)
- The assessment have been done in both semi-quantitative using climatic modeling tool and literature assessment/review





Own Operation and Downstream (Key Customers)

Upstream (Raw Material – Natural Gas, Coal)





# Scope of Assessment

Location	Fossil Fuel Power Plant & Downstream	Location	Own Operation (Solar & RDF Power Plant)	Location	Upstream (Raw Material Suppliers)	
	<ul> <li>GPSC CUP1</li> <li>GPSC CUP2</li> <li>GPSC CUP3</li> <li>GPSC CUP4</li> <li>GHECO-One</li> <li>Glow Energy Phase 1</li> <li>Glow Energy Phase 2</li> <li>Glow Energy Phase 4</li> <li>Glow Energy Phase 5</li> <li>Glow SPP2</li> <li>Glow SPP3</li> <li>Glow SPP 11 Phase 1,2,3 area</li> </ul>	Pichit	<ul> <li>Sak lek plant 1</li> <li>Ta parn hin plant1</li> <li>Sak lek plant 2</li> <li>Ta parn hin plant2</li> </ul>	Thailand	<ul> <li>PTT (Tier-1 raw material provider)</li> <li>PTTEP (Non-Tier 1)</li> </ul>	
		Suphanburi	<ul> <li>Suphanburi, Dan Chang</li> </ul>	Indonesia	• KPC (Coal Supplier)	
Bayona		<ul> <li>Glow Energy Phase 2</li> <li>Glow Energy Phase 4</li> <li>Glow Energy Phase 5</li> <li>Glow SPP2</li> <li>Glow Energy CFB</li> <li>Glow SPP3</li> </ul>	Lopburi	• Lopburi, Ban mi		
l			Khon kaen	<ul><li>PPS1</li><li>PPS2</li></ul>	Thailand	• Banpu (Coal Supplier)
				PPS3		
		Saraburi	WHA industrial estate			
		Rayong	<ul><li> Pluack dang PV</li><li> RDF plant</li></ul>			
Chonburi	• GPSC Sriracha	Chanthaburi	<ul> <li>Chanthaburi shimp farm solar</li> </ul>			

**Remarks:** GPSC applies the assessment into the future operations, mergers & acquisition to evaluate impact on their businesses, strategy, and financial planning.



TCFD

# **Physical Risk Assessment**

Summary of physical risk assessment

(qualitative and quantitative climate-related scenario analysis)

Risk	Indicator	IPCC Scenario	Timeframe	Description / Criteria	Tool
Drought	Rainfall	<b>RCP</b> 2.6, 4.5, 6.0, 8.5 <b>SSP</b> 126,245,370,585	Short 1 y Medium 3-5 y Long > 5y	<ul> <li>The projection of rainfall data conducted by both climate model CMIP 5 and 6 have been generated over Thailand</li> <li>Standard Precipitation Index (SPI) has been calculated and use as the factor to indicate drought and flood year</li> </ul>	AQUEDUCT
Flood	Rainfall	RCP 2.6, 4.5, 6.0, 8.5 SSP 126,245,370,585	Short 1 y Medium 3-5 y Long > 5y		EXPLORER
Tropical Cyclone	Rainfall Wind speed	<b>RCP</b> 2.6, 4.5, 6.0, 8.5	Short 1 y Medium 3-5 y Long > 5y	<ul> <li>The projection of rainfall data conducted by both climate model CMIP 5 and 6 have been generated over Thailand and Indonesia (Upstream)</li> <li>The frequency of tropical cyclone categories 1-5 have been counted and projected</li> </ul>	ScienceDirect
Lighting & Hail	Convective Available Potential Energy (CAPE)	<b>RCP</b> 2.6, 4.5, 6.0, 8.5	Short 1 y Medium 3-5 y Long > 5y	• The utilization of CAPE as the indicator and reviewed over related literature showing the projection of frequency and intensity of lighting/hail over Thailand	
Increasing temperature	Temperature	RCP 2.6, 4.5, 6.0, 8.5 SSP 126,245,370,585	Short 1 y Medium 3-5 y Long > 5y	• The projection of surface temperature data conducted by both climate model CMIP 5 and 6 have been generated over Thailand and Indonesia (Upstream)	ScienceDirect

\*RCP – representative concentration pathway, SSP– Shared Socioeconomic Pathways Socioeconomic, CMIP- Coupled Model Intercomparison Project

14 **GPS** 

Strategy 

 Overview: Share Socioeconomic Concentration Pathway

Scenarios	Description
SSP 1: Sustainability - Taking the green road	<ul> <li>This future poses low challenges to mitigation and low challenges to adaptation</li> <li>Global population peaks mid-century</li> <li>Emphasis on human well-being</li> <li>Environmentally friendly technologies and renewable energy</li> <li>Strong and flexible institutions on global, regional, and national level</li> </ul>
SSP 2: Middle of the road	<ul> <li>This future poses moderate challenges to mitigation and moderate challenges to adaptation</li> <li>Population growth stabilizes toward the end of the century</li> <li>Current social, economic, and technological trends continue</li> <li>Global and national institutions make slow progress toward achieving sustainable development goals</li> </ul>
SSP 3: Regional rivalry - A rocky road	<ul> <li>This future poses high challenges to mitigation and high challenges to adaptation</li> <li>Population growth continues with high growth in developing countries</li> <li>Emphasis on national issues due to regional conflicts and nationalism</li> <li>Economical development is slow and fossil fuel dependent</li> <li>Weak global institutions and little international trade</li> </ul>
SSP 4: Inequality - A road divided	<ul> <li>This future poses low challenges to mitigation and high challenges to adaptation</li> <li>Population growth stabilizes toward the end of the century</li> <li>Growing divide between globally-connected, well educated society and fragmented lower income societies</li> <li>Unrest and conflict becomes more common</li> <li>Global, regional, and national institutions are ineffective</li> </ul>
SSP 5: Fossil-fueled development - Taking the highway	<ul> <li>This future poses high challenges to mitigation and low challenges to adaptation</li> <li>Global population peaks mid-century</li> <li>Emphasis on economic growth and technological progress</li> <li>Global adoption of resource and energy intensive lifestyles</li> <li>Lack of environmental awareness</li> </ul>

TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

TCFD

# **Strategy a** Representative Concentration Pathway (RCP)

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Scenarios	Description	Global mean temperature Change	Maintain at 2.0 C by 2050
RCP 2.6	<ul> <li>Mean Radiative forcing at earth surface is 2.6 W/m2;</li> <li>High effort on the implementation of decarbonization</li> <li>Medium intensity &amp; low frequency in extreme weather</li> </ul>	1.6 C in 2050	Possible
RCP 4.5	<ul> <li>Mean Radiative forcing at earth surface is 4.0 W/m2;</li> <li>Medium effort on the implementation of decarbonization</li> <li>Medium intensity &amp; medium frequency in extreme weather</li> </ul>	2.4 C in 2050	Possible, with high uncertainty
RCP 6.0	<ul> <li>Mean Radiative forcing at earth surface is 6.0 W/m2;</li> <li>Medium effort on the implementation of decarbonization</li> <li>High intensity &amp; medium frequency in extreme weather</li> </ul>	3.6 C in 2050	Impossible
RCP 8.5	<ul> <li>Mean Radiative forcing at earth surface is 8.5 W/m2;</li> <li>Low effort on the implementation of decarbonization</li> <li>High intensity &amp; high frequency in extreme weather</li> </ul>	4.3 C in 2050	Impossible



# **Transition Risk Assessment**

## Summary of Transition risk assessment

(qualitative and quantitative climate-related scenario analysis)

Risk	Timeframe	Scenario and Reference	
T1 Stakeholder concern and negative feedback	Short 1 y Medium 3-5 y Long > 5y	<ul> <li>News publishers play an important role in transition risk assessment as well. The stakeholders concern/feedback can be found in the worldwide and domestic news.</li> </ul>	A Roadmap for the Global Energy Se
T2 Increased Technological Competition	Short 1 y Medium 3-5 y Long > 5y	• World energy outlook provide the 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.	<b>13 Oct 2021</b> World Energy 2021
T3 Changing in customer behavior	Short 1 y Medium 3-5 y Long > 5y		
T4 Changing in climate related regulation	Short 1 y Medium 3-5 y Long > 5y	<ul> <li>International energy agency has very useful research that related to the scenario of the establishment of cap and trade regulation over Thailand; moreover, IEA have provide scenario analysis for the increasing of carbon pricing and the impact to electric &amp; utilities sector. The scenario includes Business-As-Usual EBITDA Growth (BAU), and IEA Stated Policies Scenario (STEPS), Sustainable Development Scenario (SDS), Beyond 2°C Scenario (B2DS) and Net Zero Emissions by 2050 Scenario (NZE).</li> </ul>	Guardian







Countri

by 2050

# **GPSC's Climate-related Physical Risks**

Strategy

TCFD

**Remarks:** 

low

Medium

TASK FORCE ON CLIMATE-RELATEE FINANCIAL DISCLOSURES a) b

Very High

Hiah

**Time Horizon** Impact on Financial Planning **Management Implication** Physical Risks Impact Areas **Business Implications** Medium-Average estimated Cost of **Management Approach** Short-term Long-term Impact Implication Cost time frame Management term Storm. heavy rainfall and thunder may affect Installed lighting 1. Increasing operational continuity protection system Increased 329 million 21 Million Extreme Upstream & and reliability. operating cost Maintain high 6 Supplier's ability to THB THB Weather Direct operation and CAPEX preparedness of Events supply critical • Revenue loss **Emergency Response** components might be Plan affected. Flooding may affect operational continuity Implement flood barrier and reliability. • Water drainage Sediments may affect • Increased installation 658 million 41 Million Upstream & the efficiency of operatina cost 6 2. Flood Maintain high THB THB Direct operation hydropower plants. and CAPEX preparedness of • Supplier's ability to Revenue loss **Emergency Response** supply critical Plan components might be affected. • Drought may affect operational continuity Reduce water and reliability as water consumption ٠ Increased 739 million 27 Million Upstream & is used in cooling Increase water circularity operating cost 6 3. Drought Direct operation process. THB (reuse/recycle) THB Revenue loss Water supplier may Expand sources of water • not be able to provide supply water. Installation of water The impact spray to reduce causes temperature leading to Efficiency drop in 4. Increasing insignificantly • Increased the increase in energy N/A 6 **Direct** operation thermal power plants mean operating cost to GPSC efficiency and solar PV. temperature Plant modification based operation in on situation in short-2022 term

Short-term: 1-2 years, Medium-term: 3-5 years, Long-term: >5 years





**Remarks:** 

low

Medium

# **GPSC's Climate-related Transition Risks**

		Time Horizon			Impact on Financial Planning			Management Implication			
Transition Risks	Risk Type	Short- term	Medium- term	Long- term	Impact Areas	Business Implications	Impact	Implication Cost	Average estimated time frame	Management Approach	Cost of Management
5. Change in stakeholder behavior and expectation	- Reputational Risk				Upstream	<ul> <li>Increasingly limited financial access for carbon intensive business.</li> <li>Failure to fulfill company's commitments and target will cause reputational damage.</li> <li>Negative reputation for carbon intensive business.</li> </ul>	- Decreased access to capital	3,650 million THB	6	<ul> <li>Decarbonize business through renewable energy expansion, phase down coal power</li> <li>Efficiency improvement and implementing carbon removal approaches (CCUS and reforestation)</li> </ul>	N/A
6. Change in climate related law regulations	<ul> <li>Current Regulation</li> <li>Emerging Regulation</li> <li>Legal Risk</li> </ul>				Upstream & Direct operation & Downstre am	<ul> <li>Carbon tax or cap &amp; trade scheme will increase operating costs.</li> <li>Increase in low carbon fuel (e.g. natural gas) price due to high resource competition</li> </ul>	- Increased direct cost and operating cost	2,136 million THB	6	<ul> <li>Implement internal carbon price</li> <li>Study of carbon tax and carbon cap &amp; trade mechanisms</li> <li>Decarbonize business through renewable energy expansion, phasing down coal power</li> <li>Efficiency improvement and implementing carbon removal approaches (CCUS and reforestation)</li> </ul>	18,000 million THB
7. Change in Iow carbon technology	- Technology Risk				Upstream & Direct operation & Downstre am	<ul> <li>Delayed business transformation may lead to failure to capture new demands e.g. renewables, smart grid, microgrid.</li> <li>Delayed adoption of new technologies may cause customers dissatisfaction compared to our competitors.</li> </ul>	- Increased direct cost and CAPEX - Revenue loss	N/A	6	<ul> <li>Scale up renewable energy to achieve net-zero emission company</li> <li>Decrease the gap between conventional and renewable energy</li> <li>Introduce environmental-friendly technology and battery</li> <li>Open innovation implementation with university and other partners</li> </ul>	N/A
8. Change in customer behavior	- Market Risk				Direct operation & Downstre am	<ul> <li>Delayed decarbonization may risk the loss of customers who increasingly prefer low carbon/ renewable electricity.</li> </ul>	- Increased operating cost and CAPEX - Revenue loss	6,375 million THB	6	<ul> <li>Conduct feasibility study on smart grid in Thailand</li> <li>Apply REC in own renewable plants as opportunity</li> </ul>	16,900 million THB

Short-term: 1-2 years, Medium-term: 3-5 years, Long-term: >5 years

Very High

High



#### **GPSC's Climate-related Opportunities** Strategy a b

TASK FORCE ON CLIMATE-RELATE FINANCIAL DISCLOSURES

TCFD







# **Business Strategy and Corporate Outlook**



Climate risks and opportunities have influenced various parts of GPSC's business strategy both in our current core business operations to our strategic development in the future.

The climate opportunities shed the light on future market expansion towards green electrification and low carbon society. This is reflected in our strategic products and services development. In the same way, transition risks accelerate these business shifts to ensure regulatory compliance and avoid opportunity loss.

In terms of strategic enablers, **'operational excellence'** is crucial factor in driving our process efficiency to cut GHG emissions. Adaptation plans for climate physical risks are integrated in the **'agile & resilient organization'** element to uphold the reliability. Moreover, **'partnerships'** with suppliers, customers and other partners was identified as a key to develop future products and services and decarbonize our scope 3 emissions across the value chain. Lastly, **'sustainability'** is a key to enhance our climate management reputation which broadens our access to capital.





#### S1 Strengthen and Expand the Core

Promote and develop the Company's core business with the aim of creating maximum satisfaction for shareholders. Accessing customer needs and building confidence through **Operational Excellence** principles to develop and maintain a level of security, stability, and profitability at the international level (through continuous talent development), management standards system, and the application of **digital technology** to help drive and enhance operations in various fields as well as expanding to other nearby businesses both at domestic and internationally.

#### S2 Scale-up Green Energy

Increasing the **proportion of clean energy** project development both from solar power and wind power while **integrating renewable energy with energy storage system (ESS)**, focusing on the target country (India, Vietnam, Taiwan) and committed to reducing Carbon Intensity to expand the company's growth. In parallel to the reduction of carbon dioxide emissions.

#### S3 S-curve & Batteries

Investing in innovation to generate revenue from the **battery business** and **New S-curve** to support the changes in energy and electricity business in the future. It aims to become a leader in the production of energy storage systems, batteries for electric vehicles, and service providers related to batteries within Thailand and other regions like India. In addition to batteries, other new Scurve businesses that the company may place more emphasis on in the future include digital energy businesses, Hydrogen Energy Business, and Carbon Capture, Utilization, and Storage

#### S4 Shift to customer-Centric Solutions

Moving towards the **Energy Management System business**, the company aims to develop businesses related to power systems and energy management for commercial entrepreneurs and customers in industrial estates such as Building Energy Management, Energy Storage System, District Cooling, as well as electricity trading through the Energy Trading Platform to meet the demand of electricity users in both industrial and household sectors effectively and respond to the future energy trends

# Strategy C GPSC Climate Strategy

Intention to neutralize residual emissions and/or further mitigate emissions beyond our value chain with the following activities



TCFD

Strategy c	<b>GPSC Climate Stra</b>	tegy						
TCFD TASK FORCE ON CLIMATE-RELATED FINARCLAIL DISCLOSURES								
	TARGET Carbon inte	ensity reduction 10% by 2025 &	35% by 2030					
	(Scope 1&2) Carbon Neut	rality by 2050 Net Zero GHG	Emissions by 2060					
Net-zero Strategy	Programs or activities to achiev	ve the emission reduction to	argets (scope 1 & 2 reduction)					
	Paduca Esseil Eusl Llagga	Energy Efficiency	✤ 50 Initiatives					
Committee Driving	Reduce Fossil Fuel Osage	According to GHG Emission Reduction plan 1 % by 2023	<ul> <li>Reduction Potential 90,000 Tones CO2e/year</li> </ul>					
		Grow Renewables	Policy of no new coal investment					
GPSC Group Climate Change Strategy Committee (GCSC)	Grow Renewables	According to business plan more than 50 % by 2030	<ul> <li>Phase down fossil-fuel power plant and grow renewable in both domestic and international</li> </ul>					
GPSC Group Climate Change Strategy	Programs or activities to neutr value chain (scope 1, 2 & 3 red	alize residual emissions and uction)	d mitigate emissions beyond the					
Task Force	Enhance infrastructure	CCUS & Hydrogen	<ul> <li>Co-study with PTT group and external party to explore carbon hub</li> </ul>					
GPSC Group Climate		According to CCUS Roadmap by 2030 in investing in permanent removal	To study electricity production from green and/or blue H2 for fuel cell					
Sub-Task Force			<ul> <li>Reforestation 2,000 rai by 2030</li> </ul>					
	Trading & Offsetting	Reforestation &	Reduction Potential 19,000 Tones CO2e					
			Internal carbon Pricing : Investment criteria					



# Strategy C GPSC Climate Strategy

To deliver our carbon neutrality 2050 and net-zero 2060 commitment, GPSC established pathway towards net-zero and climate strategy to guide our journey.

Based on climate-related risk and opportunity assessment, the company develop climate Strategy which is driven by 4 main strategic areas to deliver a holistic outcomes not only to reduce GHG emissions but also strengthening business model (risk mitigation) and capture opportunities that may arise in the future.

### Self-Reduction

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

### **Decarbonizing Technology**

Facilitate direct GHG removal from conventional power plants coupled with enablement technologies. Internal awareness & capacity building GPSC Climate Governance External Partnership through value

GPSC Climate Governance

Internal awareness & capacity building

ΝΕΤ

ZER

St.Reduction

tinology

lizing

Business Mode

compensio

102

#### Business Model Transformation & Resilience

Phase down fossil-fuel power plant, switch to low carbon energy sources and grow renewable in both domestic and international. Strengthening infrastructure and ensure business model resilience.

#### Compensation

Initiate nature-based solution (NbS) and generate additional values through Energy Attribution Certificates (EACs) participation.

## Key Enabling Factors

The key supporting elements that strengthen strategy towards the achievement of Net-Zero GHG emissions from the involvement of internal to external stakeholders.

# Strategy C GPSC Climate Strategy



The targets cover emission scope 1 & 2

TCFD

## 4 Strategic Programs in "Net Zero Emission Pathway

- 1. Reduce Fossil Fuel Usage and Improve Energy Efficiency
- According to GHG Emission Reduction plan 1% by 2023
  - 50 Initiatives
  - Reduction Potential 90,000 Tones CO2e/year

#### 2. 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

#### 3. 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

#### 4. Trading & Offsetting

٠

- **Reforestation & Carbon Pricing** 
  - Reforestation 2,000 rai by 2030
  - Reduction Potential 19,000 Tones CO2e
  - Internal carbon Pricing : Investment criteria





27

Physical Scenario Analysis of Climate-related Risks **Drought** 

GPSC conducted qualitative and quantitative scenario analysis on key physical and transition risks in alignment with internationally recognized scenarios to inform our business and climate strategy on potential impacts in order to remain resilient amid future climate-related uncertainties.

Physical Risk	Indicators	Scenarios	Timeframe	Description	Sources
Drought	Standardized Precipitation- Evapotranspiration Index (SPEI)	<ul> <li>RCP 2.6 (Low emission scenario)</li> <li>RCP 8.5 (Business- As-Usual)</li> </ul>	2022-2060 ; covering all 3 timeframes • Short-term 1 year • Medium-term 3-5 years • Long-term > 5 years	Change in precipitation pattern could result in episodes of drought which affect the power plant such as the thermal power plants which require water for boiler and cooling process and hydropower plants which directly utilize the volume of water to run the turbine.	THE CLIMATE EXPLORER

<ul> <li>Focal Question <ul> <li>To what degree might droughts affect GPSC's annual EBITDA under RCP 8.5 and RCP 2.6 scenario?</li> </ul> </li> <li>Indicators Analyzed <ul> <li>Change in Standardized Precipitation-Evapotranspiration Index (SPEI) under 2 climate scenarios over the 2022-2060 timeframe</li> <li>Number of plant shutdown days and cost incurred</li> <li>Cost of seawater reverse osmosis over the period of water supply shortage.</li> </ul> </li> <li>Results <ul> <li>The financial impacts from the drought events are relatively low in both RCP 8.5 (Business-As-Usual) and RCP 2.6 (Low emission scenario).</li> <li>From the analysis, in 2060, the drought event will have a relatively low impact on GPSC profitability at approximately 0.9% decrease in EBITDA.</li> </ul> </li> </ul>	<ul> <li>Financial Impact Implication <ul> <li>An estimated financial implication from drought impact is less than -1% of GPSC EBITDA in 2060.</li> <li>739 million THB</li> <li>Cost of unplanned shutdown (47 million THB/ day) x Estimated period of length (14 days)</li> <li>Cost of sea water RO and reduction cost 81 million THB (per year)(6.75 million per month)</li> </ul> </li> <li>Implications in financial planning <ul> <li>Reduced revenue generation from plant shutdown</li> <li>Increased operating cost from unplanned shutdown and water desalination treatment</li> <li>27 Million THB</li> <li>[Total water that purchase from other supplier during drought period (184,301 m3/ week) x Estimated cost of purchasing water from the alternative suppliers (33 THB/ m3)] + Difference in electricity purchasing and selling</li> </ul> </li> <li>Influence on business strategy</li> <li>Reinforce business resilience against drought and improve operational excellence by improving plant's water efficiency and installation of water storage and reverse osmosis system. This will enable one of the strategy's main pillars: S1 Strengthen and Expand the Core.</li> </ul>

#### Strategy С TCFD

28

TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

# Transition Scenario Analysis of Climate-related Risks Change in Climate Related Regulations

Transition Risks	Indicators	Scenarios	Time Horizon	Description	Sources
Change in climate related law regulations	<ul> <li>Singapore carbon tax rate</li> <li>The International Monetary Fund's global average carbon price</li> </ul>	<ul> <li>Emission projection in</li> <li>Business-As-Usual EBITDA Growth (BAU)</li> <li>Sustainable Development Scenario (SDS)</li> <li>Beyond 2°C Scenario (B2DS)</li> <li>Net Zero Emissions by 2050 Scenario (NZE)</li> </ul>	2022-2060 ; covering all 3 timeframes • Short-term 1-2 years • Medium-term 3-5 years • Long-term > 5 years	For current regulation, Thailand recently released a Power Development Plan (PDP) calling for a shift towards renewable energy sources. It forces GPSC to develop a plan for the purpose and links to the emerging regulation of the emission reduction that may result in carbon tax enforcement where the companies are charged in relation to the amount of $CO_2$ emitted. Thus, the degree of financial impact of carbon tax for GPSC depends on the amount of emission under each emission pathway. Certainly, It is the important legal risk for electric utilities.	Actional Environment Acquercy Water water water Constraints Actional Action



## Transition Scenario Analysis of Climate-related Risks Change in Climate Related Regulations

In this analysis, GPSC refer a carbon tax as a sort of a fee imposed on businesses that emit GHG emissions to the atmosphere. The scenarios considered includes 2 types as follows:

- Above 2 degree Celsius: Business-As-Usual EBITDA Growth (BAU) and IEA Stated Policies Scenario (STEPS)\*
- 2 or below 2 degree Celsius: IEA Sustainable Development Scenario (SDS)\*, Beyond 2°C Scenario (B2DS) and Net Zero Emissions by 2050 Scenario (NZE)

Note:

- Given the fact that Thailand's Climate Change Act has still underway. Any specific laws on GHG emission activities are expected to be hindered, unless the Act has achieved Cabinet approval.
- Considering the complicated nature of ETS, we define the "carbon tax" as reasonable representative to "law and regulation" risks in Thailand's country context at this stage.
- \* According to the context of GPSC and Thailand at this time, the net zero target year is assumed to be 2065 for IEA SDS and no net zero target for IEA STEPS (referring to Thailand's Intended Nationally Determined Contribution: INDC 2015).





## Transition Scenario Analysis of Climate-related Risks Change in Climate Related Regulations

If carbon tax represent a financial cost to achieve net zero level, the impacts could be to reduce half of GPSC's financial statement.



#### EBITDA after carbon tax



- EBITDA, or earnings before interest, taxes, depreciation, and amortization, is used as a parameter to observe how GPSC would be affected if the carbon tax measure has been imposed by the Government.
- In order to stay along each selected pathways and applying the tax rate as the cost of carbon, GPSC will have to bare a cost of carbon emissions from its operations at different level depending on emission pathway we select. In any case, the company's **EBITDA** will be **decreased** by a certain percentage in 2060 without any other low carbon applications and/or measures.
- From the analysis, it is apparent that with the company's aim to reduce GHG emission reaching **the three pathway scenarios (including IEA SDS, B2DS and NZE)**. the cost of doing so would **affect the financial statement at a relatively low rate (5-8% reduction of EBITDA in 2060).** Excepting **the IEA STEP scenario**, it would cause impact by **37.2% of EBITDA in 2060**.
- While a bold analysis on running the business with no GHG mitigation measures would result into a tremendous decrease in EBITDA of around halfway in 2060.
- Although in IEA B2DS and NZE scenarios, the effects on EBITDA in 2060 is at 4.7%, the difference is that the NZE pathway would reach net zero 10 years earlier than B2DS. Thus, the accumulated non-tax savings over years are higher in the case of NZE due to the fact that NZE pathway would allow the company to emit less.



# **Risk Management**

- a) Describe the organization's processes for identifying and assessing climaterelated risks.
- b) Describe the organization's processes for managing climate-related risks.
- c) Describe how processes for identifying, assessing, and managing climaterelated risks are integrated into the organization's overall risk management.





GPSC has in place a process for climate risks and opportunity identification and assessment as follows.





# Risk Management b c Inte

## Integration of Climate Risks & Opportunities Management

GPSC climate risks identification, assessment and management are integrated into muti-disciplinary company-wide risk and opportunity management process through the following:

- Alignment of risk taxonomy and time horizon based on TCFD recommendations
- Standard approach to identifying and assessing risks and opportunities
- The use of unified criteria to determine material risks
- Consistent application of risk tools related to risk management
- Integration of the material risks and opportunities as part of GPSC group business strategy

Points of integration of climate risks & opportunities management into muti-disciplinary company-wide risk and opportunity management process

Identification of Climate Related Risks and Opportunities Assessment	•	Prioritization of Climate Related Risks and Opportunities	•	Company's Centralized Enterprise Risk/Opportunity Management Process
<ul> <li>Climate related risks and opportunities identification in         <ul> <li>Physical risks</li> <li>Transition risks</li> <li>Opportunities</li> </ul> </li> <li>Screening of the identified risks and opportunities</li> </ul>		<ul> <li>Input gathering of the identified risks and opportunities in term of level of impact and likelihood including both financial and non- financial impact</li> <li>Risks and opportunities prioritization and analysis</li> </ul>		<ul> <li>Results from the prioritization are integrated into the centralized enterprise risk/opportunity management process and reporting to relevant executive-levels</li> <li>The consolidation of the corporate risks and opportunities results as parts of executive strategic thinking session and contribution to GPSC Group Business Strategy</li> </ul>
Involvement Level– Functional levels		Involvement Level – Functional and Corporate levels		Executive-level has own sponsorship on the scenario analysis  Involvement Level– Functional and Corporate levels (Executive-level)





С

**Climate-Related Risk Mitigation and Adaptation** 

## **Increase Extreme Weather**

Fossil Fuel Power Plants

- Renewable Power Plants
- Infrastructure (e.g. solar PV) could be damaged by hailstorms leading to the increased cost toward repair and replacement

**Potential Impacts** 

infrastructure or machinery and equipment,

resulting in higher maintenance cost and

lower power generation efficiency and

discontinuity of power generation.

Weather extremes can cause damage

• Highly rainfall or cloudy day can reduce the power generation from solar panel.

## **Risk Mitigation Plan**

- Implement back-up procedure in order to response to the emergency incidents, BCM plan
- Provide employee training for emergency crisis
- Install lightning protection systems (lightning arrestors).
- Has back-up electricity in case of emergency

## **Adaptation Plan**

(Less than 5 years of implementation timeline) (Existing and New Operations)

- Construct solid infrastructure and facilities to endure physical damage
- Research the installation of technology for reducing CAPE\* over the surrounding area.
- Develop the short circuit protection system.

#### Remarks:

- CAPE describes the instability of the atmosphere and provides an approximation of updraft strength within a thunderstorm.
- A higher value of CAPE means the atmosphere is more unstable and would therefore produce a stronger updraft.





## **Climate-Related Risk Mitigation and Adaptation**

Flood

С

infrastructure

mudslide

## Potential Impacts

Cause damage infrastructure or machinery

generation efficiency and discontinuity of power generation especially at coastal

Obstruct employees, suppliers and contract to

travel to work due to flood. landslide and

Increased cost toward repair/restoration/

replacement as well as insurance cost

and equipment, resulting in higher

maintenance cost and lower power

Cause business operation suspension

#### Fossil Fuel Power Plants

Renewable Power Plants

## **Risk Mitigation Plan**

- Monitors water conditions closely with the representatives from PTT Group's water resource management committee
- Set up the business continuity management (BCM) to ensure its effective response to the problems and to maintain operational continuity
- Have back-up electricity in case of emergency
- Manages by monitoring and mitigation controls in accordance to the EIA and other regulations that applied to the country of operation in oversea.

## **Adaptation Plan**

(Less than 5 years of implementation timeline) (Existing and New Operations)

- Install water drainage system and flood barrier to prevent high water elevation and flooding
- Review vulnerability area and assets on flooding and implement adaptive measures such as increase floor elevation

Source: https://www.gpscgroup.com/en/sustainability/environmental/clean-energy-future-and-climate-resilience https://docs.wbcsd.org/2014/03/Building\_A\_Resilient\_Power\_Sector.pdf https://www.epa.gov/arc-x/climate-impacts-water-utilities#tab-1





TCFD

## **Climate-Related Risk Mitigation and Adaptation**

## Drought

С

power supply.

## Potential Impacts

Operation disrupted due to shortage of water

affects the plant's ability to deliver reliable

for cooling the power plant. Low water supply



Fossil Fuel Power Plants



 Reduced efficiency due to less rain not washing off dust and lack of water for solar PV cleaning

Renewable Power Plants

## **Risk Mitigation Plan**

- Construct water storage and have backup emergency storage for 3 days of operations.
- Creates water management plan to prepare for risky events related to water resource such as secure contract of demineralized water from other supplier
- Reduce water consumption/Reduce productivity, increase water circularity (reuse/recycle)

### **Adaptation Plan**

(Less than 5 years of implementation timeline) (Existing and New Operations)

- Installed seawater RO to produce freshwater for power operations
- Consider another water supply expansion initiative (collaboration with others in Map Tha Put Industrial Area)
- Increase water circularity (reuse/recycle)
- Monitor the available water supply nearby the site





TCFD

С

## **Climate-Related Risk Mitigation and Adaptation**

## **Increase Temperature**



Fossil Fuel Power Plants Decrease in electricity generation/efficiency due to higher temperature (Fossil and Renewable power plants)

to an increase of water usage

**Potential Impacts** 

Cause cooling efficiency decreased which lead

Peak power plants struggle to produce peak electricity demand

## **Risk Mitigation Plan**

- Installing water spray to reduce temp during electricity production.
- Add or improve cooling and ventilation.

### **Adaptation Plan**

(Less than 5 years of implementation timeline) (Existing and New Operations)

- Look for new areas that are not in the area at risk of rising temperature
- Improve infrastructure and strengthen to endure high temperature





# Metrics and Targets

- a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
- b) Disclose Scope 1, Scope 2, and if appropriate Scope 3 greenhouse gas (GHG) emissions, and the related risks.
- c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.





# **Climate-Related Opportunities Metrics**

GPSC set climate-related opportunity targets as part of our Business Strategy which resonate with Thailand's climate policies and regulations to progress toward carbon neutrality in 2050 and net zero emission in 2065. These metrics reflect our progress on capturing climate-related opportunities including scaling up of renewable power, business diversification, low carbon technology development and adoption.

#### S1 STRENGTHEN AND EXPAND THE CORE

 Realized synergy value between GPSC and GLOW with EBITDA ≥ 1,6000 million baht

#### S2 SCALE-UP GREEN ENERGY

- Increase electricity production with renewable energy by equity at approximately 8,000 MW
- Increase the proportion of renewable energy to more than 50 percent

#### **S3 S-CURVE & BATTERIES**

• Battery production capacity expansion to 5-10 GWh by 2030.

#### S4 SHIFT TO CUSTOMER-CENTRIC SOLUTIONS

• Subsidiary's income increased by more than 5,000 million baht from being an Energy Management Solution Provider in 2030

Data	Unit	2019	2020	2021	2022	Target	Target year	% Progress
Realized synergy value in terms of EBITDA	million THB	16,783	19,559	17,724	10,026	≥ 2,300	2030	100%
Ratio of renewables-based power generation	%	21	11	26	34	50	2030	68%
Installed capacity of renewable-based power generation	MW	406	537	1,486	2,208	8,000	2030	27.6%

\*Energy management solution provider are the businesses related to power systems and energy management for commercial entrepreneurs and customers in industrial estates such as Building Energy Management, Energy Storage System, District Cooling, as well as electricity trading through the Energy Trading Platform.



# GHG Emissions Performance (1/2)

#### TCFD TASK FORCE ON CLIMATE-RELATE FINANCIAL DISCLOSURES

Metrics & Targets

**GHG emissions** are crucial indicators reflecting GPSC's effort in GHG reduction and transforming our business towards low carbon future. By reducing GHG emissions, this can link to lowering our transition risks including changes in regulations (carbon tax and carbon pricing), stakeholder expectations and the changes in customer behavior.

#### **GHG Emission Reduction Targets:**

- To become carbon neutral by 2050 (Scope 1+2) and net-zero by 2060 (Scope 1+2)
- To reduce GHG emission intensity by 10% and 35% by 2025 and 2030, respectively from base year in 2020 (0.44 tCO2e/MWh).

Data	Unit	2019	2020	2021	2022
Total direct GHG emissions (Scope 1)	Tonnes CO <sub>2</sub> e	11,198,789.45	11,177,882.48	11,844,924.88	12,680,802.16
Indirect GHG emissions from energy purchased and consumed (scope 2)	Tonnes CO <sub>2</sub> e	12,644.73	20,522.36	22,726.50	27,850.95
Other indirect GHG emissions (Scope 3)	Tonnes CO <sub>2</sub> e	322,000.24	327,078.19	1,393,955.65	1,555,098.09
Total Upstream	Tonnes CO <sub>2</sub> e	322,000.24	327,078.19	1,393,451.13	1,555,098.09
i. Purchased goods and services	Tonnes CO <sub>2</sub> e	0	0	0	0
ii. Capital goods	Tonnes CO <sub>2</sub> e	0	0	0	0
iii. Fuel- and energy-related activities (not included in Scopes 1 or 2)	Tonnes CO <sub>2</sub> e	321,554.86	326,913.35	1,386,325.74	1,550,323.84
iv. Upstream transportation & distribution	Tonnes CO <sub>2</sub> e	111.73	95.52	1,913.09	0
v. Waste generated in operations	Tonnes CO <sub>2</sub> e	0	0	5,208.12	4,685.93
vi. Business travel	Tonnes CO <sub>2</sub> e	333.65	69.32	4.19	88.32
vii. Employee commuting	Tonnes CO <sub>2</sub> e	0	0	0	0
Total Downstream	Tonnes CO <sub>2</sub> e	0	0	504.52	0
ix. Downstream transportation and distribution	Tonnes CO <sub>2</sub> e	0	0	504.52	0
Total GHG emission Intensity	Tonnes CO2e/MWh	0.42	0.44	0.44	0.45

For more detailed information please see GPSC Performance Data

# GHG Emissions Performance (2/2)

**Metrics & Targets** 

Data	Unit	2019	2020	2021	2022			
GHG emissions reduced as a direct result of reduction initiatives								
i. Estimated annual CO <sub>2</sub> e savings	Tonnes CO <sub>2</sub> e	422,185.00	581,930.00	581,930.00	433,122.00			
ii. Total annual investment required	THB	661,812,500.00	801,912,500.00	801,912,500.00	368,595,460.00			
iii. Total anticipated annual cost savings	THB	1,658,136,000.00	1,660,422,082.96	1,660,422,082.96	1,711,239,111.00			
iv. Average pay-back period	Year	7.98	9.66	9.66	8.51			

**GPSC's GHG data are collected and calculated** based on 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), and PTT Group GHG Standard & Calculation Tools.

**GPSC Group applies a single carbon price** at **15 USD/tCO<sub>2</sub>e** across business units, including company independent of geography. The carbon price is reviewed regularly by Business Development and Corporate Strategy department, Corporate Finance and Strategy - Strategic Financial Planning department, and Plant Operations in order to maintain its application and effectiveness. This is also to ensure that all corporate decision in the future is in line with the carbon markets.



**Energy performance** are closely related to GHG emissions which reflects GPSC's effort in GHG reduction and transforming our business towards low carbon future. By reducing non-renewable energy consumption, efficiency improvement and increasing our proportion of renewable energy generation, it can link to lowering our transition risks including changes in regulation (carbon pricing), stakeholder expectations and the change in customer behavior and responds to our opportunities such as scaling up of renewable energy and low carbon technology adoption.

Data	Unit	2019	2020	2021	2022
A) Total non-renewable fuels purchased and consumed	MWh	43,657,687.90	45,309,560.82	49,970,339.53	52,835,414.94
Stationary Combustion:	MWh	43,656,296.14	45,307,227.13	49,959,694.82	52,829,522.03
Mobile combustion:	MWh	1,391.76	2,333.69	10,644.71	5,892.91
B) Non-renewable electricity purchased	MWh	23,715.90	43,730.16	45,462.09	55,713.05
C) Steam/heating/cooling and other energy (non-renewable) purchased	MWh	0	0	0	0
D) Total renewable energy consumption	MWh	0	0	2,761.11	4,313.25
E) Total non-renewable energy (electricity and heating & cooling) sold, (exclude reselling)	MWh	26,463,181.17	25,688,432.27	26,748,852.62	28,023,741.79
F) Total renewable energy (wind, solar, biomass, hydroelectric, geothermal, etc.) sold	MWh	2,245.53	2,248.43	14,654.06	44,612.08
Total non-renewable energy consumption [(A+B+C)-E]	MWh	17,218,222.63	19,664,858.71	23,273,769.44	24,867,386.20
Total energy intensity	MWh/MWh	0.65	0.77	0.87	0.89





GPSC seeks to improve water efficiency by optimizing water withdrawal and increase the proportion of water reused/ recycled. These water conservation activities safeguards GPSC from physical risks by enhancing our resilience against drought.

Data	Unit	2019	2020	2021	2022
Total water withdrawn from all areas	M Liters	2,026,158.21	1,953,221.99	1,592,931.92	1,800,787.67
Total water withdrawal index	m³/MWh	76.57	76.04	59.53	64.16
Total water discharge to all areas	M Liters	2,007,377.80	1,935,760.16	1,558,794.98	1,765,700.72
Total water consumption in all areas	M Liters	18,858.75	17,461.83	34,136.95	35,086.95
<b>Total Net Fresh Water Consumption</b> (Total water withdrawal from fresh water - Total water discharge fresh water, excluded Third party water)	M Liters	52,715.64	47,051.59	34,876.95	31,840.35
Water reused/ recycled	M Liters	365.15	302.90	175.17	71.95
Recycled & Reused water	%	0.02	0.02	0.011	0.004
Exposure to Water Stressed Areas					
Percentage of production plants in water-stressed areas	%	0	0	0	0
Percentage of Cost of goods sold (COGS) of plants in water- stressed areas	%	0	0	0	0
Total actual and opportunity costs (e.g. forgone income) from water-related incidents	THB	0	0	0	0

Furthermore, to cope with flooding and extreme weather events which are GPSC's key physical risks, GPSC set target on having System Average Interruption Frequency Index (SAIFI) of  $\leq$  0.10 by 2030 as part of business strategy: S1 STRENGTHEN AND EXPAND THE CORE. The success of adaptation plan which consist of multiple activities on engineering and management aspects will directly have impact on the achievement of this target.



## **Emission Reduction Targets and Net-Zero commitment**

GPSC set the emission reduction targets for emission scope 1& 2 and commit to be Net-Zero emission by 2060. The targets that are showed below has already planned to be achieve by 4S strategy and 4 key activities including reduce fossil fuel usage, grow renewable, enhance infrastructure (CCUS and hydrogen technology), and trading and offsetting.

Emission Reduction Targets									
Target Type	Scope cover	ed by the target	Target Time	Target Timeframe     Baseline year emissions covered			% reduction target from base year		
Intensity			Base Year	2020	Tonnes CO2e/ megawatt hour (MWh)	0.435	25		
targets	Scope I + 2 combined	Target Year	2030	% of total base year emissions	100	35			
Net-Zero commitment									
-	Target Timeframe Target scope & related emission reduction target (as % of base year emissions)								
Base	e Year	2020	Scope 1 & 2 100						
Target Year2060Scope 3					100				

Note: Scope 3 emission target will be consistent to the fuel provider.

Metrics & Targets

TCFD

a



# **THANK YOU**

**Global Power Synergy Public Company Limited** 

555/2 Energy Complex Building B, 5th Floor, Vibhvadi - Rangsit Road, Kwaeng Chatuchak, Khet Chatuchak, Bangkok 10900 Tel. 02-140-4600 Fax. 02-140-4601 Email corporate@gpscgroup.com

