Bangchak Climate Strategy

Task Force on Climate-Related Financial Disclosures (TCFD 2024)

Content

Bangchak apply the TCFD framework in the management of climate-related risks and opportunities. We integrate the TCFD in the process following TCFD recommendations in 2017 and in line with the TCFD's 2021 "Annex: Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures" https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf. The period covered by this report is calendar year 2023.

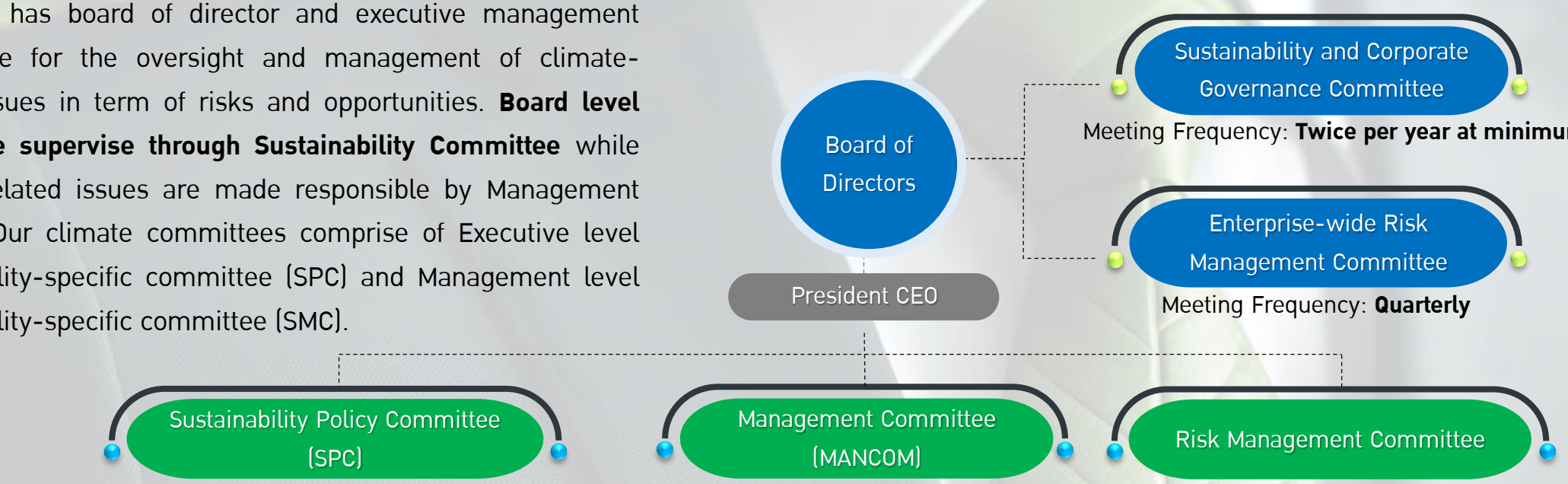
Disclosure Area	Disclosure Requirement
Governance *Disclose the company's governance around climate-related risks and opportunities*	*a) Describe **the board's oversight** of climate-related risks and opportunities* *b) Describe **management's role** in assessing and managing climate-related risks and opportunities*
Strategy *Disclose the actual and potential impacts of climate-related risks and opportunities on the company's businesses, strategy, and financial planning where such information is material*	*a) Describe the **climate related risks and opportunities** the company has identified **over the short, medium, and long term*** *b) Describe the **impact of climate-related risks and opportunities** on the company's businesses, strategy, and financial planning* *c) Describe the **resilience of the company's strategy, taking into consideration different climate-related scenarios**, including a 2°C or lower scenario*
Risk Management *Disclose how the company identifies, assesses, and manages climate-related risks*	*a) Describe the company's **processes for identifying and assessing climate related risks*** *b) Describe the company's **processes for managing climate related risks*** *c) Describe **how processes** for identifying, assessing, and managing climate related risks **are integrated into the company's overall risk management***
Metrics & Targets *Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material*	*a) Disclose **the metrics used** by the company 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 company to manage climate-related risks and opportunities **and performance against targets***

Governance

Governance

Describe the **board's oversight** of climate-related risks and opportunities

Bangchak has board of director and executive management responsible for the oversight and management of climate-related issues in term of risks and opportunities. **Board level committee supervise through Sustainability Committee** while Climate-related issues are made responsible by Management position. Our climate committees comprise of Executive level sustainability-specific committee (SPC) and Management level sustainability-specific committee (SMC).



Chairman: Group Chief Executive Officer and President (CEO)
Meeting Frequency: Minimum half year

Sustainability Management Committee (SMC)

Chairman: Executive Vice President position
Meeting Frequency: Minimum half year

***Bangchak has** Corporate Planning, Corporate Compliance, Innovation and Business Development Group Functional Task Force (**CPG Task Force**) **to review the common practices guidelines of companies within group for** the strategic planning, new business initiatives, organizational governance, sustainable development, and **Net Zero GHG Emission**. **Finally, seeking approval from** the Strategic Steering Committee (**SSS Steering Committee**) for promoting collaboration processes among the companies within group.*

Governance

Describe the **board's oversight** of climate-related risks and opportunities

Sustainability and Corporate Governance Committee (SCGC)

- **Propose** corporate governance and sustainability development practices, including **climate change related issues** to the Board of Directors.
- Supervise the performance of the Board of Directors and the management in accordance with good corporate governance and sustainability development principles.
- **Review** good corporate governance and **sustainability development practices**. By comparing with international standards and making recommendations to the Board of Directors for continuous improvement and response to stakeholders' needs and expectation.
- **Assign** good corporate governance and sustainability development policy, including **climate change guideline using TCFD for enhancement task Force on Climate-Related Financial impact**.
- Perform duties as assigned by the Board of Directors.

Enterprise-wide Risk Management Committee (ERMC)

- **Propose** policy, strategy and goals for **risk management including climate-related risk**.
- Develop an organization-wide risk management system for continuous efficiency.
- Promote cooperation in risk management at all levels of the organization.
- Supervise the company to have appropriate and effective risk management.
- The Chairman of the Enterprise-wide Risk Management Committee reports the results of the next meeting to the Board of Directors.
- Perform duties as assigned by the Board of Directors.

Governance

Describe **management's role** in assessing and managing climate-related risks and opportunities

Sustainability Policy Committee (SPC)*

- **Provide policy and strategy direction** for the company's business in accordance with the mission corporate culture, with responsibility to stakeholders, including economic, social, and environmental aspects **especially climate change and climate-related risks and opportunities** in accordance with the international sustainability direction, in order to ensure the organization's sustainability. **The target of Carbon Neutrality by 2030 and Net Zero GHG emission by 2050 has been defined.**
- Progress the report to the Sustainability and Corporate Governance Committee (SCGC)

*** Group Chief Executive Officer and President is chairman of the meeting**

Sustainability Management Committee (SMC)

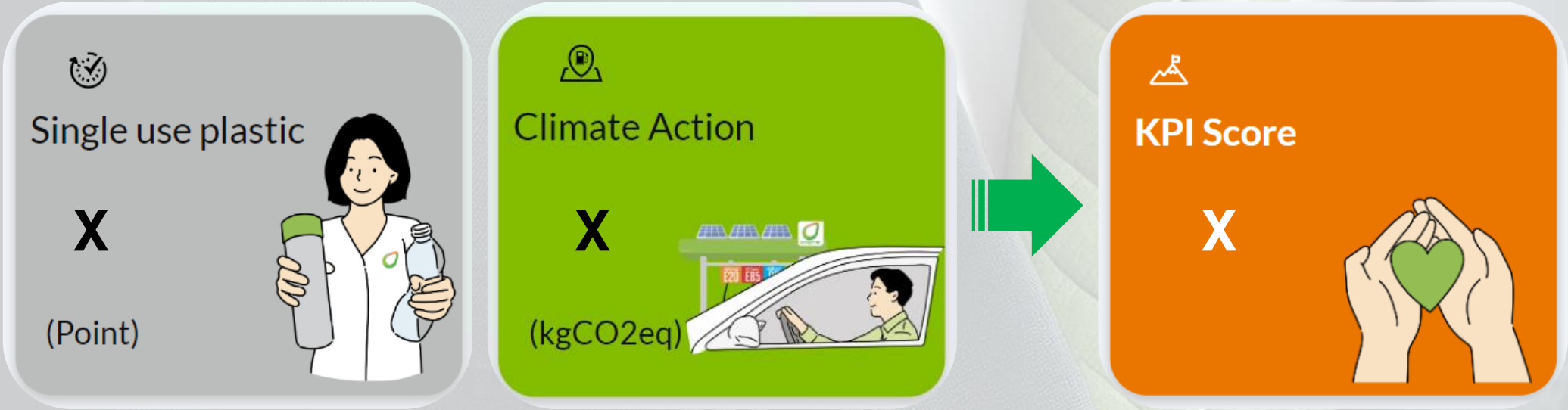
- **Conduct the work plans and manage work** according to the responsibilities towards various groups of stakeholders according to the direction and framework specified by the Corporate Sustainability Policy Committee to bring innovation and GHG management tools to use within the Bangchak Corporation in order **to achieve Carbon Neutrality in 2030 and Net Zero in 2050**
- **Prepare climate strategy and manage opportunities and risks arising from climate change**.
- Encourage work processes and development plans or events to **increase awareness, knowledge, and understanding of sustainability including climate change**. Participating in operations with Bangchak Corporation stakeholders by submitting a report to the working committee or reviewing in order to promote collaboration among affiliated companies in Strategic Corporate Governance Planning (CPG Task Force)
- Progress the report to the Sustainability Policy Committee (SPC)

Governance

Describe **management's role** in assessing and managing climate-related risks and opportunities

Bangchak provide incentives for the management of climate change issues including the attainment of near-term and long-term targets. **Chief Executive Officer (CEO) is the highest management level which response to cap on GHG Emission as KPI** (reflect to GHG emission reduction annually).

- We **associate** this **KPI to related-Executive Vice President and Business Unit Managers**, respectively.
- **To ensure that climate-related ambition and goal are embedded throughout the company, We set KPI's employees to reduce personal carbon emissions** by refuse single use plastic. Finally, these performance will reflect to monetary as bonus.



Strategy

Strategy

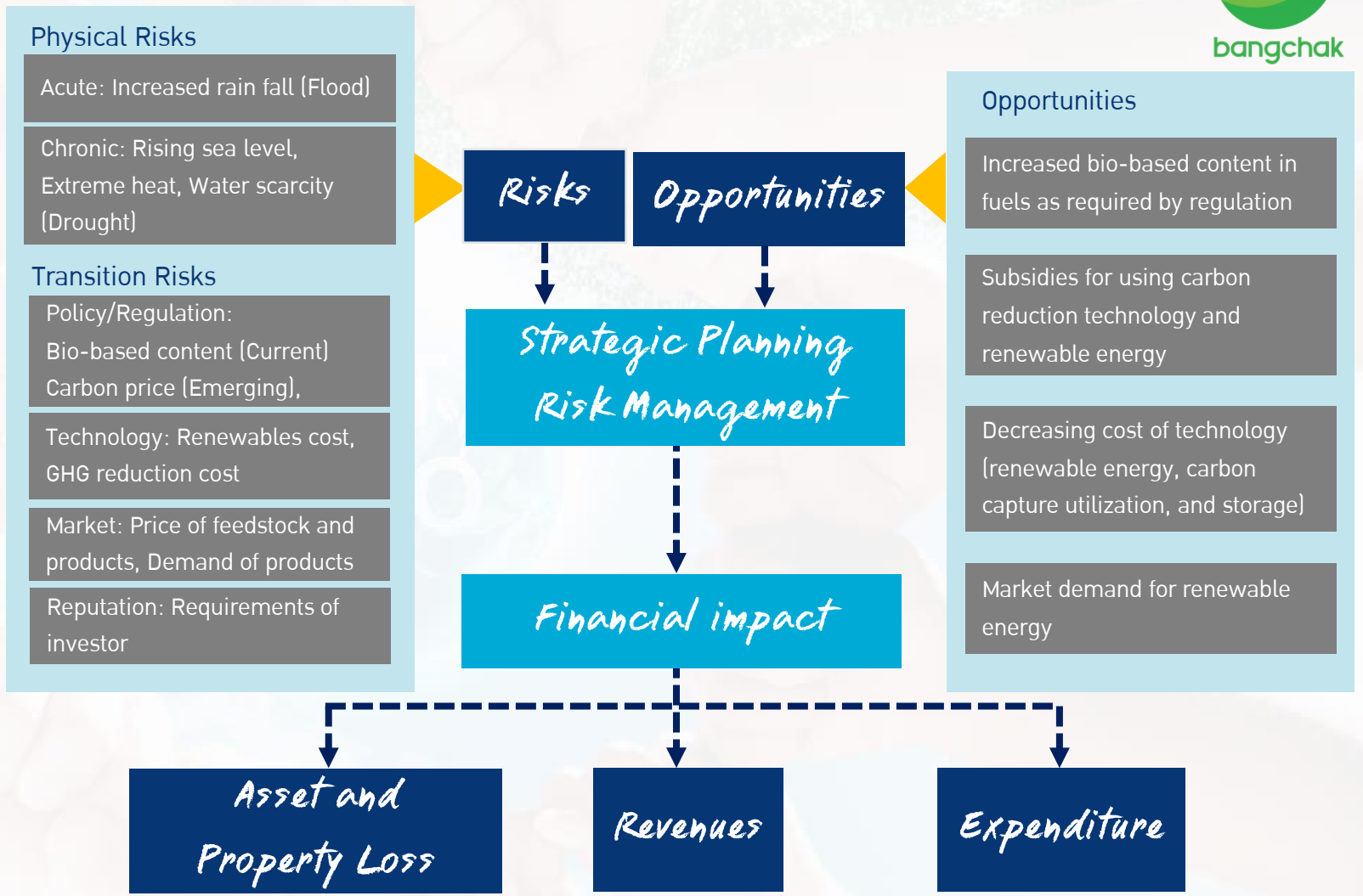
For oil and gas sector, Bangchak sets organizational boundary by operational control approach. They comprise of **Refinery and Oil Trading Business including Marketing Business**. Our complex refinery has capacity 120 KBD, BCP Trading is the biggest independent oil trader in Singapore and our 218 COCO type service stations in year 2023 is our distribution channels through industrial & retail. **Emission inventory of Bangchak scope 1, 2 and 3 integrates both Centralized and Decentralized approaches** by GHG Protocol corporate accounting and reporting standard.

In Year 2023, Bangchak received the accolade as a Climate Action Leading Organization (CALO), prestigious recognition for outstanding leadership organizations in greenhouse gas management. **We achieved a Gold-level assessment in criteria of measure and reduce GHG emission**. This result is be determined by the Thailand Carbon Neutral Network (TCNN).

Strategy

Describe the climate related risks and opportunities the company has **identified** over the short, medium, and long term

Bangchak identify key climate change risks and **integrate climate drivers into environmental scanning and identifying factors having potential impact**. We **evaluate climate-related risks** in time horizon: **short-term** (0-2 years), **medium-term** (2-10 years) **and long-term** (more than 10 years) and incorporated in TCFD report. **We have applied Physical scenario**; **RCP 2.6** (below 2°C) and **RCP 8.5** (Above 2°C). For **Transition scenario,** Bangchak uses the IEA World Energy Outlook 2023 where the world transitions to low carbon sources of energy; **IEA NZE 2050** (below 2°C) **& IEA STEPs** (Above 2°C) **both qualitative and quantitative** climate-related scenario analysis including the goal of limiting the global temperature increase to no more than 2°C by reducing greenhouse gas emissions. We apply climate-related risks in existing and new operations.



Strategy

Describe the climate related risks and opportunities the company has **identified** over the short, medium, and long term

Physical Risks

Physical Risk Assessment Process

Bangchak Corporation has identified the physical risk hazard using qualitative assessment methodology.

Geospatial Information

1 Define Baseline Natural Hazards

- Open Source Datasets → Apply *ThinkHazard* developed by World Bank Group to provide a general view of the hazards for a given location that should be considered in climate resilience. The hazard levels provided are based on published hazard data, provided by a range of private, academic and public organizations.
- Key Natural Hazards → An initial baseline hazard evaluation was conducted for Bangchak using Thailand data as representative location of 218 COCO type of Marketing Business and Regional Office and **Phra Khanong District as the location of Refinery**

For more information on ThinkHazard, please access Think Hazard

2 Climate Change Projections

- Climate Data CMIP-5 for RCP 2.6 and 8.5 (2030 and 2050) → Extract the hazard risk data from *Climate Change Knowledge Portal*
  - Time period: Historical period (1986-2005), 2030,2040 and 2050
  - Scenario: RCP 2.6 and RCP 8.5 in 2030 and 2050
- Data for Key Climate Indices → Data extracted from Climate Change Knowledge Portal. Example of data extraction include:
  - Time period: Historical period (1986-2005), 2030,2040 and 2050
- Qualitative Risk Rating

The *Climate Change Knowledge Portal* (CCKP) provides global data on historical and future climate, vulnerabilities, and impacts. For more information of Climate Change Projection methodology, please access: Download Data | Climate Change Knowledge Portal (worldbank.org)

*The IPCC's Fifth Assessment Report (AR5) relies heavily on the Coupled Model Intercomparison Project, Phase 5 (CMIP5), a collaborative climate modelling process coordinated by the World Climate Research Programme (WCRP). **Coupled Model Intercomparison Project Phase 5 (CMIP5)** provide projections of future climate change on near term and long term.*

Strategy

Describe the climate related risks and opportunities the company has **identified** over the short, medium, and long term

Physical Risks

Baseline natural hazard

Thailand

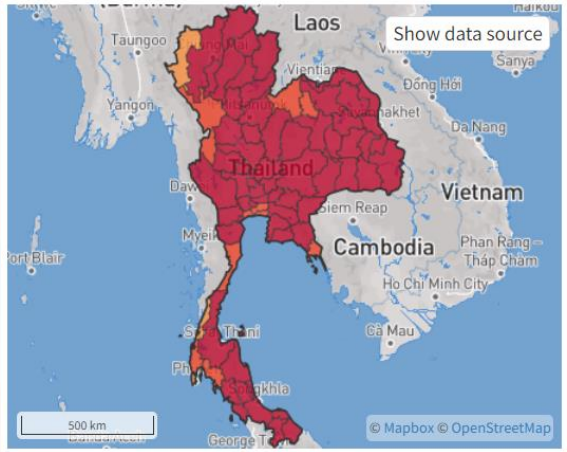
(Cover 218 COCO type of Marketing Business and Regional Office)

ThinkHazard!

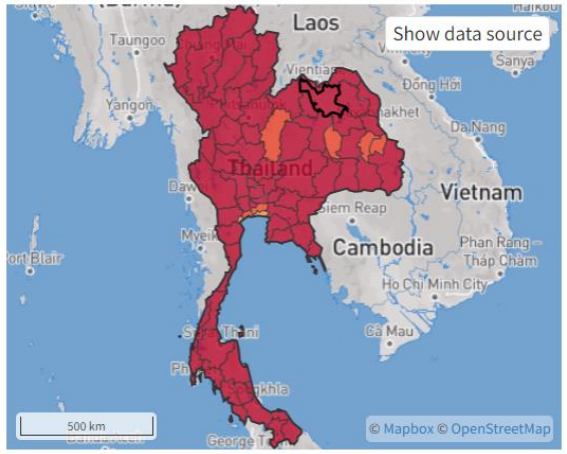
Hazard level

High	Medium
Low	Very low

Riverine **Flood**

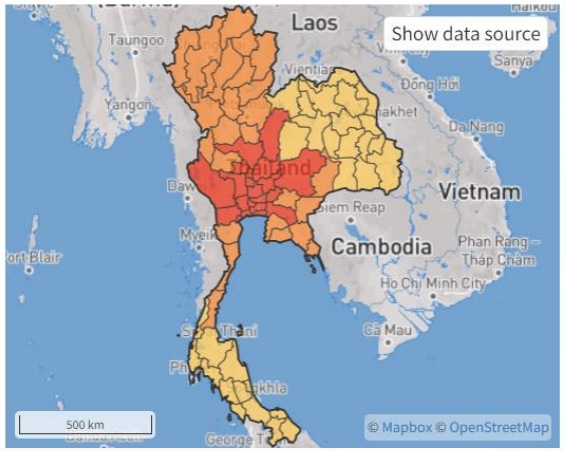


Urban **Flood**



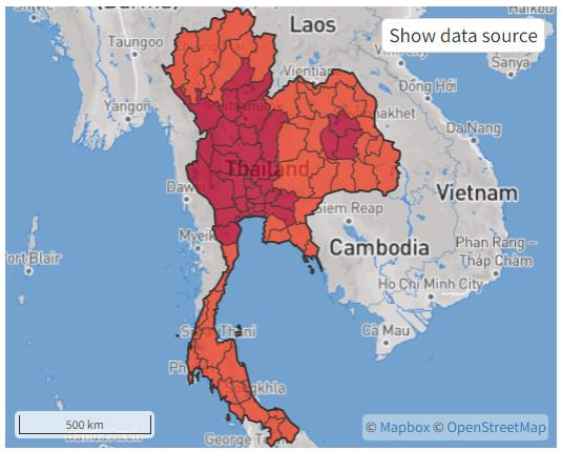
This means that potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years. **Project planning decisions, project design, and construction methods must take into account the level of river flood hazard**.

Drought



This **means that** there is up to a 20% chance droughts **will occur in the coming 10 years**.

Extreme Heat



This **means that** prolonged exposure to extreme heat, resulting in heat stress, is expected to **occur at least once in the next five years**.

Strategy

Climate change projection and Selection top risks

Describe the climate related risks and opportunities the company has **identified** over the short, medium, and long term

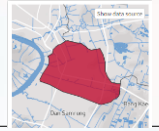
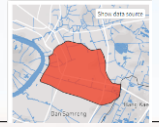
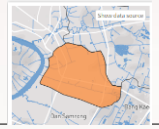
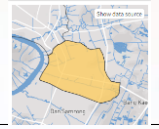
bangchak

Physical Risks

ThinkHazard!

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

At Phra Khanong, Bangkok, Thailand
(Cover Refinery Business & HQ Office)

			RCP 8.5			RCP 2.6		
			2030	2040	2050	2030	2040	2050
Extreme Heat		***High***	*Slight Increase*	*Moderate Increase*	*Moderate Increase*	*Slight Increase*	*Slight Increase*	*Slight Increase*
Drought		***Medium***	*Slight Increase*	*Slight Decrease*	*Slight Decrease*	*Slight Increase*	*Slight Increase*	*Slight Decrease*
Urban **Flood**		***Low***	*Slight Increase*	*Moderate Increase*	*Significant Increase*	*Moderate Increase*	*Moderate Increase*	*Significant Increase*
Riverine **Flood**		***Very Low***	*Slight Increase*	*Moderate Increase*	*Moderate Increase*	*Slight Increase*	*Moderate Increase*	*Moderate Increase*

Legend and Hazard Score for RCP 2.6 and RCP 8.5 scenarios

	Category	Drought (Change in annual drought probability	Riverine & Urban Floods (change in 1 day and 5 day maximum rainfall)	Coastal floods and sea level rise	Extreme Heat (Change in annual average maximum temperature)
3	Significant Increase	<-1	>10%	>50cm	>2°C
2	Moderate Increase	<-0.5	>5%	>25cm	>1°C
1	Slight Increase	<0	>0%	>0cm	>0°C
0	No Change	0	0%	0cm	0°C
-1	Slight Decrease	>0	<0%	<0cm	<0°C
-2	Moderate Decrease	>0.5	<-5%	<-10cm	<-1°C
-3	Significant Decrease	>1	<-10%	<-20cm	<-2°C

Categorization criteria considers all climate indicator values across scenarios and time horizons. The climate indicator went through a normalization process which involves comparing the minimum and maximum value across all time horizons and scenarios. Process depends on the indicator, some may be normalized by climate zone whereas some are done globally

Note: *RCP 8.5 scenario: A pathway delivers a temperature increase of about 4.3°C by 2100, relative to pre-industrial temperatures.*
RCP 2.6 scenario: Stringent mitigation scenario. A pathway which is representative of a scenario that aims to keep global warming likely 1.5°C and above pre-industrial temperatures by 2100.

Risk Driver Find Out

***Extreme Heat**: The climate projection of Climate Change Knowledge Portal shows an **increasing trend** especially in RCP 8.5 scenarios which is the worst case.*

Drought**: We concentrate the water stress issue which has significant impact to our refining process, though the climate projection shows a **decreasing trend** both RCP 8.5 and RCP 2.6 scenarios. Therefore, **drought has been selected as our key driver risk.

Flood**: The climate projection shows a **significant increasing trend** both RCP 8.5 and RCP 2.6 scenarios. This situation has a significant impact to own operation and upstream and downstream logistics. Hence, **flood has been selected as our key driver risk.

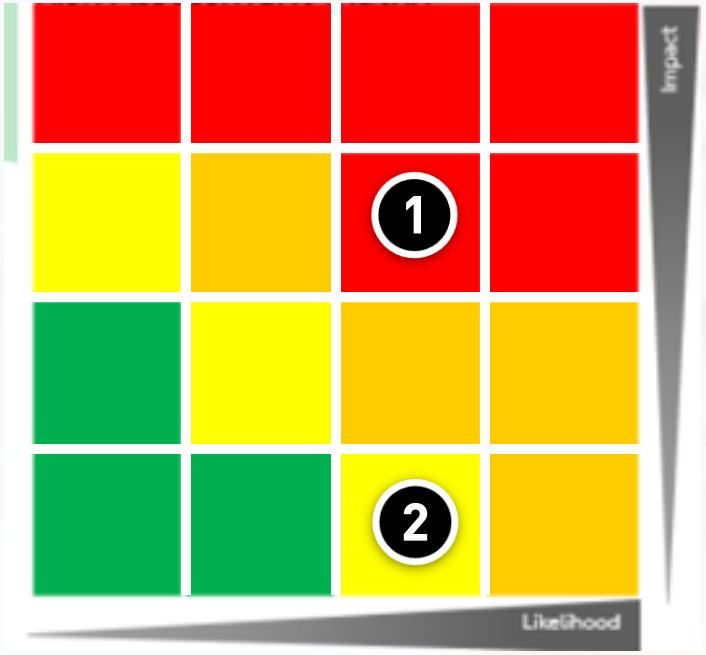
Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Physical Risks

Physical Risk Prioritization Matrix

Our risks are prioritized using our Enterprise Risk Management definitions for impact and likelihood.
This prioritization has helped us understand what parts of our strategy we should pursue first. These risks are described below.



Risk levels

- High
- Low
- Medium
- Very low

1. Flood and Sea level rise

Rising sea level might cause flooding in the operation area, affecting total production.
From the assessment and risk management plan. Bangkok metropolitan flood protection could support equivalent to 2.23 m water level above the sea. Bangchak prepare a business continuity plan to manage the case of flooding in the refinery area.

2. Drought

- In 2023 Bangchak conducted a water stress assessment through the AQUEDUCT program to find that the location of Bangchak Refinery was a medium-high (20-40%) risk area, which by definition is not a significant area for water stress.
- Bangchak promotes the reduction of water consumption in all production processes with all affiliates and business unit. Moreover, a project of drilling for ground water was initiated for secure water storage and supply.

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Physical Risks

Physical Risk Implications

Risk levels

- High
- Medium
- Low
- Very low

Bangchak's Physical Risk Assessment in Time Horizon timeframes

Risk Type	BCP's Risk Driver	Impact in time horizon		
		Short term (0-2 years)	**Medium term** (2-10 years)	**Long term** (>10 years)
Acute	**Drought:**	🟡	🟡	🟡
	Flood:	🔴	🔴	🔴
Chronic	**Sea Level Rise:**	🟡	🟡	🔴

Drought Impact:
Expense 0.0012 million baht per *day from groundwater using 10% in drought effect such as salt water intrusion causes and revenue loss ~ 270 million baht* per *1 week for shutdown case.*

Flood & Sea Level Rise Impact:
Revenue loss ~ 39 million baht per day
[Crude run 120 KBD, FX 35]

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Physical Risks Based on Bangchak climate risk assessment, we set up overall plan to mitigate and adapt to response.

Strategic Response of Flood & Sea Level Rise

Refinery Business

- Monitor flood situation and the sea water level at peer.
- Empty the rainwater drainage as schedule.
- Prepared basic design of the dam for flood refinery area prevention **3 million THB.**
- Installed flood prevention equipment **1 million THB** and Inspect on work plan schedule.
- Business Continuity Management Plan (BCM) & Crisis Management Plan (CMP) yearly exercise.

Marketing Business

- Non flood area is the criteria for service station selection.
- Service stations have been designed for flood prevention.
- Business Continuity Management Plan (BCM) & Crisis Management Plan (CMP) yearly exercise.

Strategic Response of Drought

- Monitor water supply quality in daily from Metropolitan Waterworks Authority (MWA).
- Reduce water supply consumption in production, such as
  - Improved groundwater wells which is alternative resources **1.5 million THB**
  - Improved Reverse-Osmosis unit (RO) and Electro-Deionization unit (EDI) including RO city unit **32 million THB** which can reduce water supply 0.1 million m^3/year.
  - In year 2023 Improved cycle efficiency of cooling tower **375 million THB**.
- Reuse condensate and stripped water 1.3 million m^3/year.
- Recycle treated wastewater 0.2 million m^3/year into production process.

Strategy

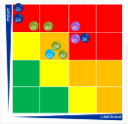
Describe the climate related risks and opportunities the company has **identified** over the short, medium, and long term

Transitional Risks

Transitional Risk Assessment Process

- **Identify Impact Drivers** — Determine the factors putting pressure on companies into a low-carbon economy transition

- **Prioritisation of risks and opportunities** — Analysis of risks and opportunities to business based on each driver



- **Scenario Analysis** — Qualitative assessment of identified impact under two transition scenarios by 2030 and 2050

iea International Energy Agency

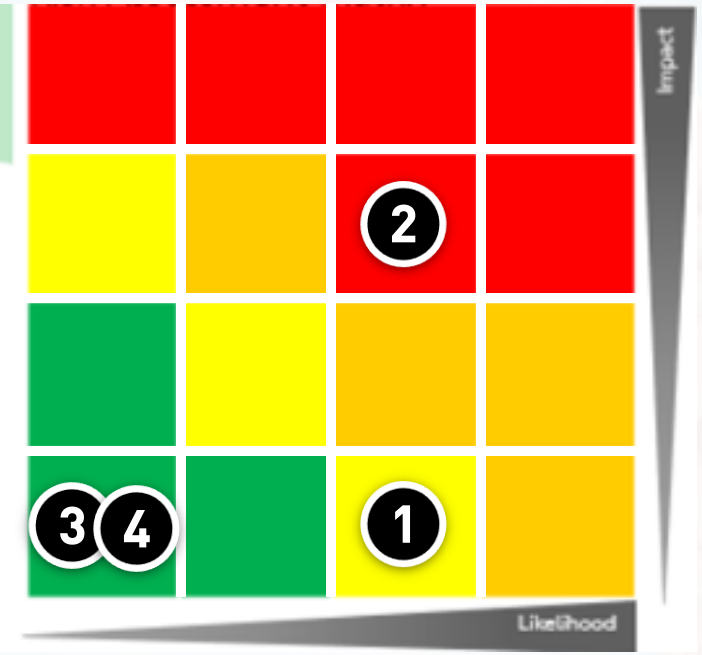
- **Strategic Response** — Identify potential response measures to risk and opportunities

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Transitional Risks

Transition Risk Prioritization Matrix



Risk levels

- High
- Low
- Medium
- Very low

1. Carbon price

Bangchak has increased the proportion of revenue from low carbon emission businesses while improving the efficiency of operation processes and using low-emission fuels to achieve company target on carbon emission reduction 30% by 2030 and net zero GHG emission target by 2050. We also established the Carbon Markets Club to promote carbon credit trading accelerating the transition into low carbon society.

2. Crude oil price

Price of fossil fuel might be decreased due to the lower demand which will affect to inventory gain/loss.

3. Price of fuel

Sale volume might decrease according to the lower demand according to the sustainability trend, or lower margin according to lower fuel price.

4. Reputation

- Bangchak have processes for stakeholder engagement to increase stakeholder trust and get their needs/expectations.
- We set up Net Zero Development Division to be responsible for data management and reporting obligations.
- We apply digital solutions to facilitate the process of data management and reporting.

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Risk levels

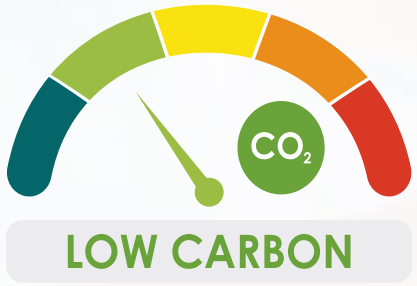
High Low Medium Very low

bangchak

Transitional Risks

Bangchak's Transitional Risk Assessment in Time Horizon timeframes.

BCP's Risk Driver		Impact in time horizon			Impacts
		Short term (0-2 years)	Medium term (2-10 years)	Long term (>10 years)	
Policy and Legal	Carbon Price of GHG emission aligning with Climate related scenario (Carbon Tax, Cap and Trade)	Low	Medium	Medium	Increased OPEX from mandatory carbon prices



Strategic Response of Carbon Price

Bangchak has **increased the proportion of revenue from low carbon emission businesses** while **improving the efficiency of operation processes** and **using low-emission fuels** to achieve company target on carbon emission reduction 30% by 2030 and net zero GHG emission target by 2050. We also **established the Carbon Markets Club to promote carbon credit trading** accelerating the transition into low carbon society.

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Risk levels

High Low Medium Very low

bangchak

Transitional Risks

Bangchak's Transitional Risk Assessment in Time Horizon timeframes.

BCP's Risk Driver		Impact in time horizon: Short (0-2 years)	Medium term (2-10 years)	Long term (>10 years)	Impacts
Market	Crude oil price	🔴	🟡	🟡	Increasing of crude oil price cause gross refining margin decreased
	Fuel price	🟢	🟡	🟡	Decreasing of demand cause sale volume and margin decreased

Strategic Response of Crude oil price

Price of fossil fuel might be decreased due to the lower demand which will affect to inventory gain/loss. There are three main strategies to cope with volatility.

(1) **Enhance flexibility of crude sourcing** via the establishment of BCPT

(2) **Refinery optimization** via various optimization programs to enhance reliability and mitigate risks of operation downtime, together with crude and product stock management.

(3) **Product diversification** to the uplift product value. We has modified the refinery to more diverse products to the market, there are UO (unconverted oil) for feedstock of lube base oil & paraffin wax and the instance solvents for industrial components, including paint, thinner, and resin.

Strategic Response of Fuel price

Sale volume might decrease according to the lower demand according to the sustainability trend, or lower margin according to lower fuel price.

- We have **developed service station model** to enhance return, not only to maintain high quality fuel but also new value proposition to our value customer as a "Greenovative Destination", a lifestyle destination for intergeneration, to fulfilled customers' needs and meet their changing behavior. The model has included on-site offering of variety food and beverage services from well-known brands, Grab & Go delivery services, unique design service station.
- We also partnership with MG/PEA/Sharge to **install more than 260 EV chargers at Bangchak service stations nationwide**. (2030 forecasted retail EBITDA still increase compared to 2023).

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Risk levels

High Low

Medium Very low

bangchak

Transitional Risks

Bangchak's Transitional Risk Assessment in Time Horizon timeframes.

BCP's Risk Driver		Impact in time horizon			Impacts
		Short term (0-2 years)	Medium term (2-10 years)	Long term (>10 years)	
Reputation	Investor demands and data request	🟢	🟡	🟡	Increased compliance and reporting cost

Strategic Response of Reputation

- Bangchak have processes for stakeholder engagement to increase stakeholder trust and get their needs/expectations.
- We set up Net Zero Development Division to be responsible for data management and reporting obligations.
- We apply digital solutions to facilitate the process of data management and reporting.

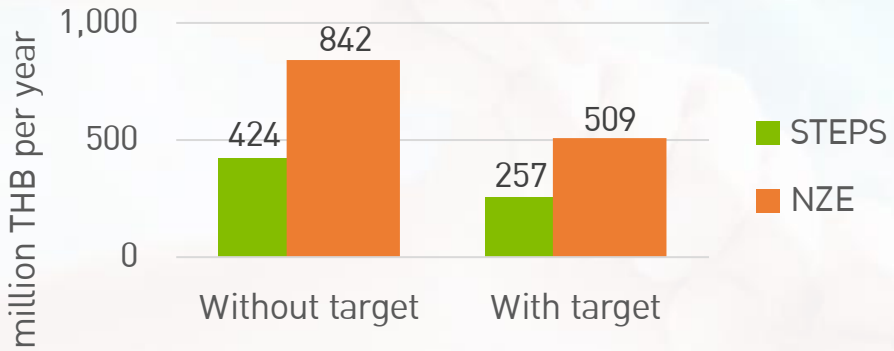
Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

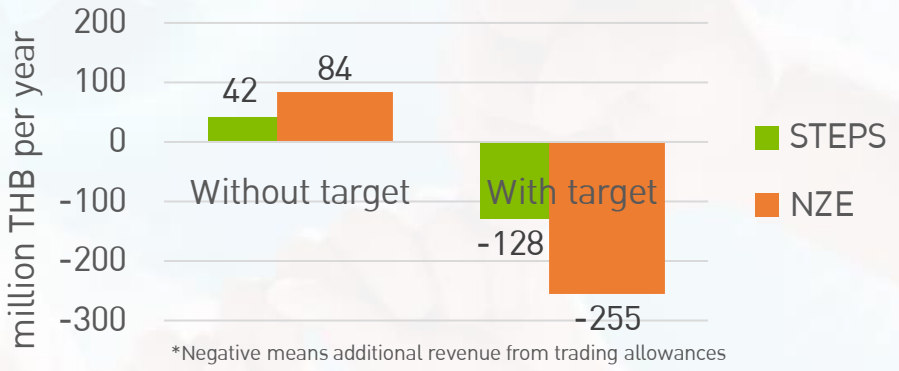
Transitional Risks

Bangchak **compare the impacts for carbon price in different scenario** that reflect current real-world conditions and starting points of the International Energy Agency (IEA): World Energy Outlook (WEO) 2023. First, **The Stated Policies Scenario (STEPS)** which is an outlook based on the latest policy settings **and the Net Zero Emissions by 2050 Scenario (NZE)** which is additional progress is still required to meet the objectives which limits global warming to 1.5 °C. Bangchak assumed that 30% reduction and 10% reforestation will be achieved by 2030 and 60% carbon sequestration technology will be achieved by 2050 in line with Bangchak's strategy "Pathway to Net Zero 2050". In case with target, Bangchak will has **additional revenue from trading allowances (Cap and Trade) and Lower impact than with out target case in Carbon Tax mechanism**.

Implications for Carbon Tax Y2030



Implications for Cap and Trade Y2030



*Negative means additional revenue from trading allowances

Assumptions:

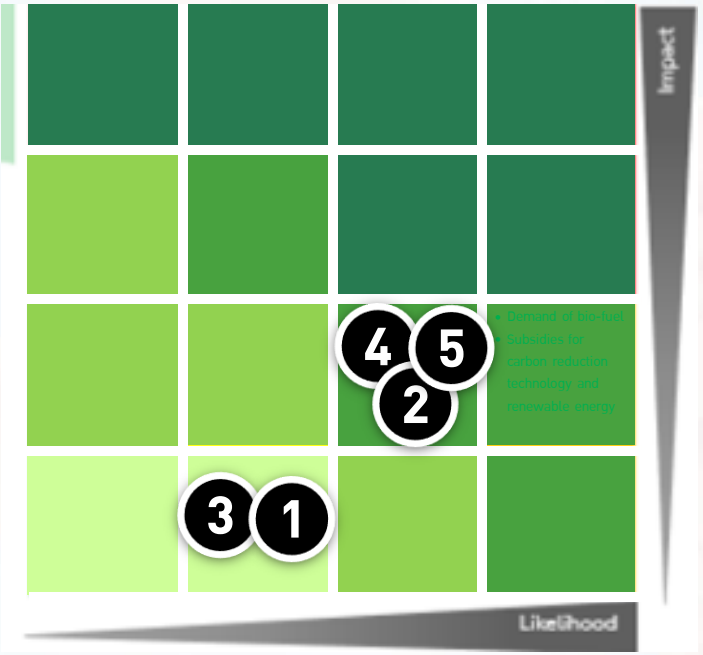
- Carbon tax in Thailand will be implemented before 2030
- For Cap and Trade, the cap reduction will be 2% per year in line with EU-ETS
- Bangchak's business will grow according to current plans
- Conservative assumption of carbon tax on both Scope 1 and 2, typically governments only put carbon price on Scope 1, however in some jurisdictions such as Japan a carbon price is placed both on Scope 1 and 2

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Transitional Risks

Transition Opportunity Prioritization Matrix



Opportunity levels

- High
- Low
- Medium
- Very low

1. Increased requirement of bio-based content in fuels by regulation

The increase in demand would result in higher revenue for BBGI, which has already expanded its business to adapt to the low carbon economy.

2. Subsidies for carbon reduction technology and renewable energy

The requirement from the policy would reduce the investment costs for carbon reduction technology and renewable energy.

3. Cost of carbon capture, utilization and storage

Cut down on operational costs as the cost (USD/tCO_2) of CCUS technologies drops below the price of carbon (USD/tCO_2e). This technology helps reduce the amount of money paid to the government regarding emissions by cutting down on emissions. (without a carbon price, CCUS will not be feasible from a cost perspective).

4. Demand of bio-fuel

Bangchak Corporation has expanded their business to transition to a low carbon economy. One of the businesses offers high-quality bio-based products. Therefore, the increase in demand for bio-fuel would promote the business, resulting in higher revenue for Bangchak Corporation.

5. Demand for renewable electricity

A shift in consumer demand toward more sustainable products offers BCP an opportunity to adopt clean technologies and provide low-carbon products and services that also create business opportunities (e.g., generation of geothermal energy, solar energy, or other clean energies).

23

Strategy

Describe the **impact** of climate-related risks and opportunities on the company's businesses, strategy, and financial planning

Opportunity levels

High Low

Medium Very low

bangchak

Opportunity

Bangchak's Opportunity Assessment in Time Horizon timeframes.

Opportunity Driver		Impact in time horizon			Impacts	Strategic Response
		Short term (0-2 years)	Medium term (2-10 years)	Long term (>10 years)		
Policy and Legal	Increased requirement of biobased content in fuels by regulation				Increased revenue from Bio-based Business	Bio-based business expansion
	Subsidies for carbon reduction technology and renewable energy				Improved return on investment for GHG reduction technologies and renewable energy and Reduced carbon cost	• Monitor and review subsidy opportunities for mitigation technologies suitable for Bangchak Corporation. • Encourage private sector and governmental support to deploy key technologies for deep decarbonization
Technology	Maturation of Carbon Capture, Utilization and Storage (CCUS)				• Reduced CAPEX for CCUS • Reduced carbon cost.	Seek collaboration with strategic partners to pilot and assess CCUS applications
Marketing	Increased demand for renewable energy (Electricity and Bio-fuel)				Increased revenue from Power and Bio-based Business	Shifting consumer demand to more sustainable product. Opportunity to adopt Green business by investment though subsidiary company such as Green Power Business (BCPG), Bio-based business (BBGI) and Sustainable Aviation Fuel (BSGF). Bangchak subsidiary company BCPG and BBGI in 2023 EBITDA from BCPG and BBGI account around 12% of Bangchak Group EBITDA.

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

Bangchak has identified climate change-related opportunities that have the potential to generate a substantive positive change in our business operations and revenue growth.

The strategic plan from 2023 until the year 2030 will focus on the growth of five key business sectors.

Refinery & Oil Trading Business

294 KBD of nameplate capacity with 500,000 Tons of Paraxylene

Phra Khanong Refinery

bsrc

Sriracha Refinery

bcpg

Clean Power Business

4 power generation technologies in 7 countries over the world with 2,038 MW in total

Marketing Business

Distribution channels through industrial & retail channels >2,203 service stations nationwide

bbgi

Bio-based Products

No.1 fully integrated Biofuel producer in Thailand with 1.85 ML/D in production capacity

OKEA ASA

Natural Resources

Norway-based oil & gas company with production capacity of 22-25 KBD in 2023

Bangchak plan to invest 150,000 million THB for operation in next 7 years (2024 to 2030), 30% in Refinery and Marketing Business, 30% in Natural Resources, 30% in Green Business and 10% in and New Frontier Business including Bio-based.

https://www.dailynews.co.th/news/2986056/

For the development of new business plans to strengthen sustainability in addition to the existing businesses, seeking opportunities to **diversify investments into other sectors** to meet future demands. This **encompasses** the liquefied natural gas (**LNG**) business, which will serve as a clean energy source, as well as the business of leasing and purchasing electric motorcycles (**Winnonie**). Furthermore, there will be institutions dedicated to innovation **and nurturing businesses** that focus on studying technology **related to climate change, sustainable energy, and synthetic biology**.

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

Bangchak has in place to reduce the emission derived from our activities directly through our low carbon products cause to third-parties can reduce their own emissions (avoided emission at 3rd party *or* scope 3 emission). We improve the energy efficiency of certain technologies so that we are consistent with avoiding or contributing to the adaptation side of dangerous climate change. **Bangchak was certified to register the Carbon Label Products by** Thailand Greenhouse Gas Management Organization (**TGO**) **5 products**. Our products have carbon footprint lower than average of Thailand. We keep refining process management continuously improve both operational stability and operational efficiency, lead to reduction in energy intensity and GHG emission. thaicarbonlabelIBangchak

(1) Emission factors for Bangchak's product from carbon label products according to the PCR standard (Product Category Rule: PCR) by the Greenhouse Gas Management Organization (TGO)

(2) Emission factors for normal oil product from IPCC 2006, Vol.2, table 3.2.1, 3.2.2, and the Department of Alternative Energy Development and Efficiency (DEDE)

(3) TGO Approval date 25 July 2023, Certificate expired 24 July 2026

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

Bangchak look beyond direct emissions and increasingly consider low-carbon products and avoid emission at third parties to **contribution to a low-carbon economy**. Such as:

Bio Based Products Business

Bangchak conducts bio-based products business through the business operation of BBGI Co., Ltd., which engages in the production and sale of biofuels as the largest player in Thailand. The subsidiary and associated companies of BBGI have a total production capacity of 1,600,000 liters per day, divided into 600,000 liters of ethanol per day and 1,000,000 liters of biodiesel per day. **The objective is to lower trade deficits due to fuel imports, contribute to national energy security, support farmers, and preserve the environment including GHG emission reduction**. The Company also promotes the blending of ethanol with gasoline and biodiesel with diesel to yield gasohol 91, gasohol 95, gasohol E20, gasohol E85, and Hi-Diesel. BBGI

Green Power Business

Bangchak invests in the green power business via BCPG Public Company Limited (BCPG), a subsidiary established **to engage in the generation and distribution of green electricity from renewables and new forms of clean energy in Thailand and overseas**. BCPG

Sustainable Aviation Fuel (SAF)

also known as sustainable aircraft fuel, is another sustainable option for the world that can help reduce GHG emissions in the aviation industry. Bangchak joint venture agreement to establish BSGF Company Limited with a **THB 8,000-10,000 million investment**, with the investment proportion of 51% held by Bangchak, 29% by Thanachok Oil Light, and 20% by BBGI respectively. BSGF will be Thailand's first and only producer and supplier of SAF from used cooking oil. BSGF

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

Liquefied Natural Gas - LNG

Bangchak Spearheads Clean and Convenient Fuel Business for Transportation, Opening Thailand's First LNG Refueling Station. Clean fuel: LNG is **environmentally friendly with lower emissions** when compared to diesel resulting in less environmental pollution. The LNG refueling station is operated by BTSG Company Limited, a joint venture between Bangchak Corporation (51% stake) and Thai Special Gas Company Limited (TSG) (49% stake). BTSG

Battery Swapping as a Service provider - Winnonie

First electric motorbike rental platform with battery swapping stations in Thailand, help Motorcycle Taxi **cut GHG emissions** while reducing the conventional costs of motorcycle installments, fuel, and maintenance. WINNONIE

Bangkok Fuel Pipeline and Logistics Company Limited

Bangchak **invested THB 1,600 million** to expand its business into fuel pipeline transportation to strengthen and stabilize Group businesses through the acquisition of executive rights over the 99-kilometer fuel pipeline system from Fuel Pipeline Transportation Limited (FPT) through the Bangkok Fuel Pipeline and Logistics Company Limited, **reduces carbon emissions** in line with Bangchak's vision that emphasizes sustainable innovative business development in harmony with environment and society BFPL

Bangchak is taking a proactive step to promote Carbon Credit transactions in conjunction with KASIKORNBANK. This marks a significant milestone as Thailand's first Carbon Credit Linked FX Forward Contract. This transaction will not only **broaden the reach of carbon credit trading**, but also serves as a **catalyst for various sectors in the mission to reduce greenhouse gases**, fostering new financial innovations in the Thai financial market."

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

To promote and encourage employee, we enhance knowledge and understanding to contribute to mitigating global warming. Bangchak initiate 'Bangchak 100X Climate Action'. such as:

- **"Carbon Free Management Team" campaign** to declare commitment of management team which comprise of 21 members, the collective greenhouse gas emissions rate is approximately 200 tons CO_2e per year. This emission will be offset by carbon credits and serve as a goal **to compensate personal carbon emissions** in the following years.
- Support employee's commuting **to use public passenger transport systems** by integrating employee cards with the Rabbit card of Bangkok Mass Transit System (BTS).
- Offset employee's business travel in year calendar 2023 to be neutrality flight.
- "**Reduce Waste at the Source with Bangchak campaign** " to encourage Thai people to participate by sorting orphan waste and delivering for appropriate management through the mobile waste collection project by **N15 Technology** and turn into energy in finally. Through this initiative, orphan waste is turned into energy, **reducing the amount of waste sent to landfills, which emit methane, combatting global warming, and reducing coal-powered electricity generation**.

Strategy

Describe the **resilience of the company's strategy**, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

Other Bangchak 100X Climate Actions such as:

- **Support the community-based business service station network** which operate by cooperative network to install solar cell systems on rooftops to save costs. Additionally, **supports the registration of carbon credits obtained from the installation of solar cell systems** with the Thailand Greenhouse Gas Management Organization (TGO).

- **Support Thai Rice NAMA** which reduce GHG emission 30% from conventional cultivation by purchasing 40 tons of "climate-friendly rice" and distribute this products to Bangchak's customers at 133 service stations in Bangkok and its vicinity.

- **Supports Thongyod House's athletes** who will be traveling to compete in various countries, totaling approximately 20 events. All their emissions from their travel and daily lives throughout the year 2023 will be offset by carbon credits **to compensate personal carbon emissions** of the athletes.

Risk Management

Risk Management

Describe the company's **processes for identifying and assessing climate related risks**

Our assessment focus on own operations and cover some of upstream/downstream activities. Time horizons climate risk assessment covered short-term (0-2 years), medium-term (2-10 years) and long term (> 10 years).

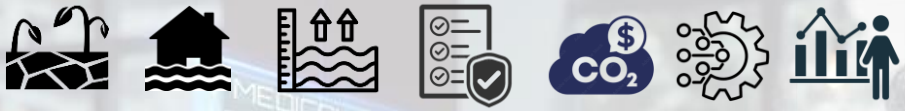
Bangchak **Risk management policy:**

- **Mandates managers and employees** in various departments **take responsibility for risk management**. They are required to have roles and involvement in developing the organization's risk management and understand their related responsibilities in risk management.
- **Efficient risk management processes** are established **at every stage of operations** following the principles of good corporate governance. There is **integration of risk management with the organization's strategic planning** and information technology management **to** facilitate effective risk management, **reducing the chances of negative impacts and increasing the opportunities** for success.
- Take an action to support successful organization-wide risk management, utilizing limited resources effectively for risk identification, assessment, and appropriate management.
- Promote and encourage the culture of organizational risk management, ensuring that everyone understands the importance of risk management.
- **Participate in standardized risk management systems** including managers and employees at all levels within the organization **and joint venture partners** to achieve common business goals, align with sustainable business development policies, align with environmental and social factors, and adhere to Environmental, Social, and Governance (ESG) principles.

Risk Management

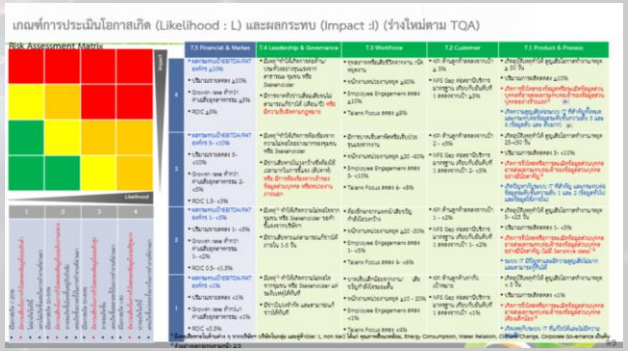
Describe the company's **processes for identifying and assessing climate related risks**

1. Evaluate factors that may impact the goal



2. Assess how various factors impact in which aspect

3. Evaluate the impact and likelihood of risk occurrence (potential financial size and scope of physical and transition risk)



4. Develop a risk management plan to reduce the impact or likelihood of risk occurrence

Risk Mitigation Plan : รัฐบาลประกาศยกเลิกการใช้น้ำมันแก๊สโซฮอล์ 91

EXAMPLE

Risk Event :	รัฐบาลประกาศยกเลิกการใช้น้ำมันแก๊สโซฮอล์ 91
Root Cause Analysis	นโยบายภาครัฐ
Risk Impact :	EBITDA ลดลง X ล้านบาท คิดเป็น Y% ของเป้าหมาย
Risk Owner :	RFBG
Target :	ลดระดับจาก (4,3) เป็น (3,2)
Degree of Acceptance:	Mitigating

Existing Risk Response

1. เข้าร่วมกับกลุ่มโรงกลั่นในการเจรจากับภาครัฐ
2. ส่งหนังสือไปยากลุ่มโรงกลั่น เพื่อขอแสดงแนวทางการช่วยเหลือจากภาครัฐ

Required Risk Response	Cost (MB)/MH	Due Date	Owner	Progress
1. ขึ้นจดภาครัฐ เพื่อขอให้พิจารณาลดการใช้น้ำมันแก๊สโซฮอล์ 91	-	ต่อเนื่อง	xx	อยู่ระหว่างรอผลพิจารณาจากภาครัฐ

5. Define Key Risk Indicators (KRIs)

Key Risk Indicator (KRI) : Operational Risk

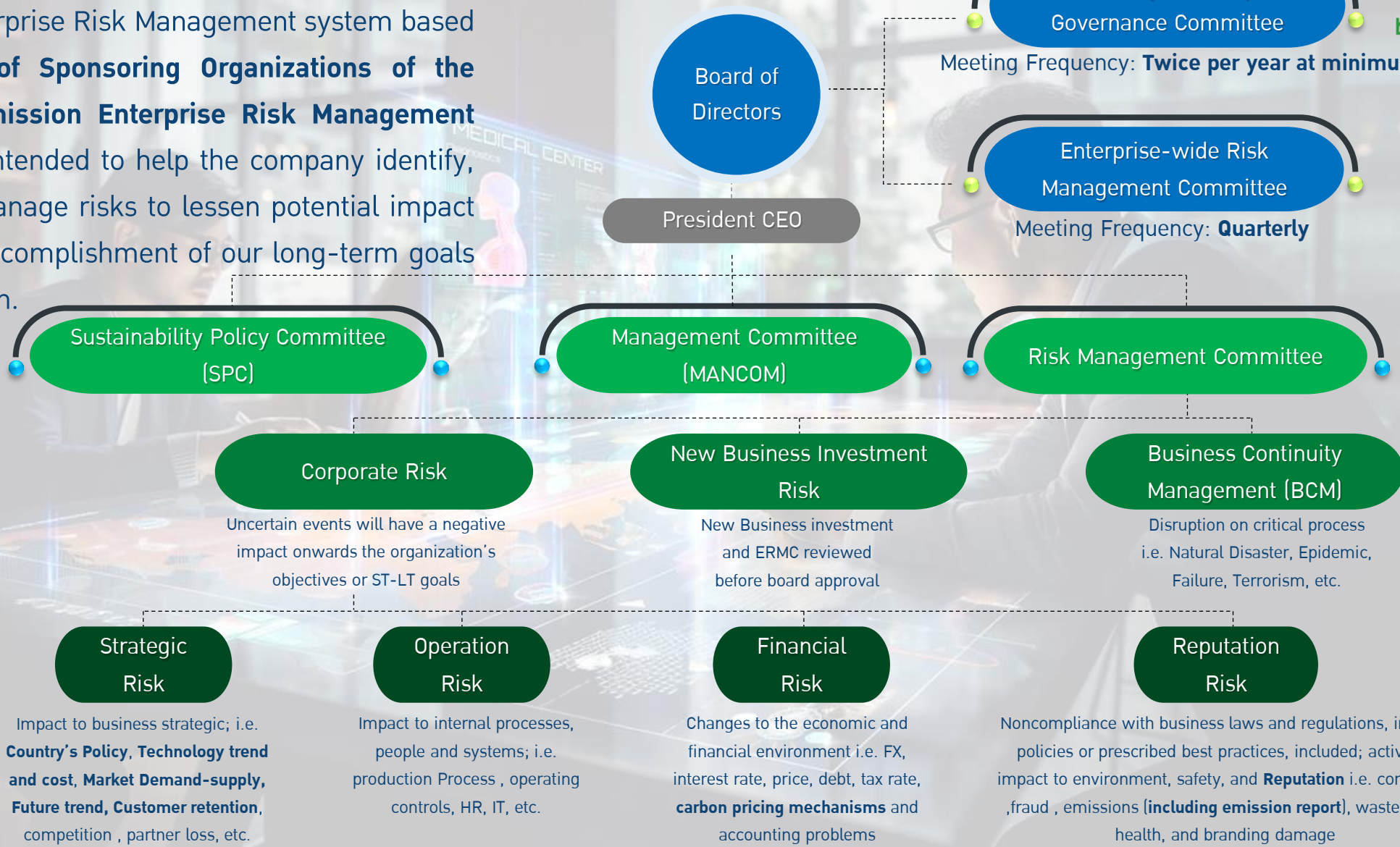
EXAMPLE

Operation Risk	KRI	Current Status	ปฏิบัติงานปกติ	Risk Appetite	Risk Tolerance
O1 เกิดน้ำท่วมโรงงานและเครื่องจักร	ระดับน้ำในแม่น้ำ	ระดับน้ำสูงกว่าห่าเขื่อน 0.1 เมตร	ระดับน้ำสูงไม่เกินระดับห่าเขื่อน	ระดับน้ำสูงกว่าห่าเขื่อนไม่เกิน 0.5 เมตร	ระดับน้ำสูงกว่าห่าเขื่อน >0.5 เมตร
O2 โรงงานไม่สามารถเดินเครื่องได้อย่างสม่ำเสมอ	% Operation Availability	Operation Availability 95%	Operational Availability ≥ 94.4%	Operational Availability ≥ 93.4%	Operational Availability < 93.4%

Risk Management

Describe the company's **processes for managing climate related risks**

Bangchak's Enterprise Risk Management system based on **Committee of Sponsoring Organizations of the Treadway Commission Enterprise Risk Management (COSO ERM)** is intended to help the company identify, evaluate, and manage risks to lessen potential impact and assist the accomplishment of our long-term goals and business plan.



Describe **how processes** for identifying, assessing, and managing climate related risks are **integrated into the company's overall risk management**

Processes for Mitigating Climate-related Risks

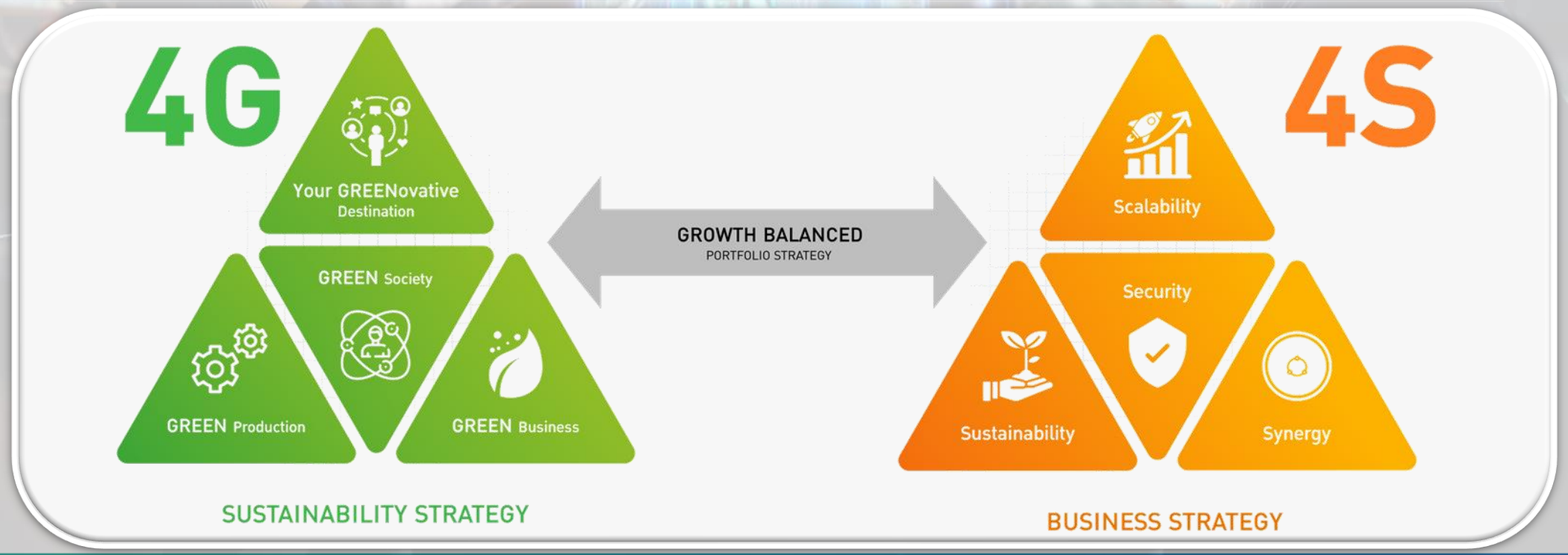
Multiple internal and external risk factors that may affect Bangchak Corporation's business operation have been analyzed both in short term, medium term and long-term period. The system incorporates risks in strategy and finance. It is managed with specific key risk indicators (KRIs) to monitor and track the likelihoods and severity of all identified risks and provides treatment plans to mitigate and minimize the risks and drive operations to succeed as planned. The company promotes a culture of risk management in the organization and extends it to companies in the group by allowing all departments in the Bangchak Corporation of Companies **to create a risk plan every year.** With an action plan for climate change, Bangchak Corporation has invested in green energy business to use renewable energy and have been enhanced green procurement for products and services through supply chain management in 5 years target (2018-2022). In addition, we have conducted scenario analysis of our own internal carbon price. To identify the impact on EBITDA and plan the strategy in different scenarios, a carbon tax aligned with well below 2 degrees Celsius and 1.5 degrees Celsius scenarios, as well as Thailand's cap-and-trade scheme, was considered. Examples of actions to mitigate transition risks include reducing GHG emissions through energy efficiency improvement projects and implementing internal carbon shadow prices for new investment decision-making and energy efficiency projects.

For physical risk, water stress and floods pose a significant risk to Bangchak Corporation's businesses and its business partners value chains. We have prepared measures to mitigate and mange these effects. The refinery plant located in Phra Khanong district was assessed the likelihood of hazards for physical risk as our refinery major receptor of our risks throughout our business.

Risk Management

Describe **how processes** for identifying, assessing, and managing climate related risks are **integrated into the company's overall risk management**

Bangchak has a Climate Risk Management process and Integrated into multi-disciplinary company-wide risk management processes of the company's centralized enterprise risk management program covering physical risk (acute and chronic) and transitional risk (current regulation, emerging regulation, technology, Legal, Market and Reputation) including opportunity. The Framework and the principles for risk management that Bangchak Corporation has been utilized to systematize the management of risks linked with climate change throughout the company. The purpose of this is to incorporate climate-related risk management into Bangchak's internal management to ensure that the company can preserve and generate long-term value.



Metrics and Targets

Metrics and Targets

Disclose the **metrics used** by the company to assess climate-related risks and opportunities in line with its strategy and risk management process

Bangchak considers the target to be science-based to in-line with what the climate science deems necessary to meet the goals of the Paris Agreement-limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C. First, Bangchak focus and prioritize on own operational emission. We have **corporate-level emission reduction target publicly in absolute target related 2030-year as is near-term emissions and 2050-year as is our long-term target reduction which compare base 2019-year calendar** and baseline year emission **cover Scope 1 and Scope 2**. **Our significant emission scope 3, there are comprise of Category 11** (Use of sold products) **and Category 1** (Purchased goods and services)**. For Category 15** (financed emissions) will be accounted next. **Boundary of GHG emission in this report include both Prakanong refining process and Gas station to reflect emission of oil supply chain**. Provision of Scope 1 and Scope 2 in line with the GHG Protocol methodology. Emission factor and methodology consist of Intergovernmental Panel on Climate Change (IPCC) National Greenhouse Gas Inventory Guidance 2006, ISO 14064-1, American Petroleum Institute (API) GHG Compendium 2009 and Thailand Greenhouse Gas Management Organization (TGO).

Not only inside Bangchak's value chain but we also concern beyond value chain mitigation, so that 'NET' is the one of 4 pillars of our climate strategy (BCP316NET) we built. This includes activities outside of a company's value chain that avoid or reduce GHG emission, **such as SAF, BFPL, BTSG and Winnonie investment**.

UN SDG13 Climate action is our key concern due to top materiality topics of Bangchak's stakeholder are Climate Change Adaptation & Risk Management and GHG Emissions. To ensure focused implementation of climate change strategy, **GHG emission reduction is set as Corporate KPI in 2023** for the all-executive levels and relevant business unit including Group Chief Executive Officer, Presidents. Removal Carbon Credit will be used for residual emissions or emissions sources that remain after a company has included all technically or economically feasible emission reduction to our target.

Metric according to GRI standard which covers GRI 305-1 (Scope 1), GRI 305-2 (Scope 2), GRI 305-3 (Scope 3), GRI 305-4 (GHG Intensity), GRI 305-5 (GHG reduction), GRI 305-7- Air emission, GRI 303-3 Water management in the stress area, GRI 303-5 Water consumption in the stress area including energy: Sustainability report 2023

Metrics and Targets

Disclose the **metrics used** by the company to assess climate-related risks and opportunities in line with its strategy and risk management process

Bangchak use an **internal price of carbon at rate 25 $/tCO$_2$e** (a hypothetical cost of carbon to each ton of CO_2e as a tool to reveal hidden risks and opportunities throughout its operations and supply chain) **and Internal fee** type (quantify the capital investment required to meet climate-related target). **We apply these programs to company-wide** by external resources (price projections from the International Energy Agency; IEA) and Internal consultation price setting approach. This core element is **integrated ongoing in our strategy and has become a standard operating practice in business planning as a means of testing strategics and investment assumptions**. Internal assumptions of a carbon price as a planning tool **to help identify revenue opportunities, risk, and as an incentive to drive maximum energy efficiencies to reduce costs and guide capital investment decisions**.

Metrics and Targets

Disclose **Scope 1, Scope 2, and, if appropriate, Scope 3** greenhouse gas (GHG) emissions, and the related risks

GHG Emission of

Prakanong Refinery and Gas Station Y2023

Crude Oil Exploration
1.37-million-ton CO_2e

Crude Oil Transportation
0.44-million-ton CO_2e

Water Supply process
0.002-million-ton CO_2e

Waste Transportation
0.067-million-ton CO_2e

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Refining Process
Scope1 = 0.94-million-ton CO_2e

Scope2 = 0.006-million-ton CO_2e

Use of Sold Product
2.5-million-ton CO_2e

Product Transportation
0.039-million-ton CO_2e

Supply Chain
Cover two-thirds (67%) of Scope 3 emissions

Scope 3 = 4.43-million-ton CO_2e

For historical period: Sustainability report 2023

Metrics and Targets

Describe the targets used by the company to manage climate-related risks and opportunities and performance against targets

Our company publicly committed to reaching net-zero GHG emissions and **set targets and programs to achieve Carbon Neutrality by 2030 and Net Zero GHG Emission by 2050** to fulfil the commitment through TCNN-CALO platform and Bangchak's website: https://investor.bangchak.co.th/en/net-zero . GHG emission 2023 (scope 1 and 2) of the refinery increase 4 % compared with base year 2019 due to KBD increasing. Nevertheless, **Total GHG emission (Scope 1 and 2) per weight of raw materials (intensity) decrease 2%.**

Breakthrough Performance 30%

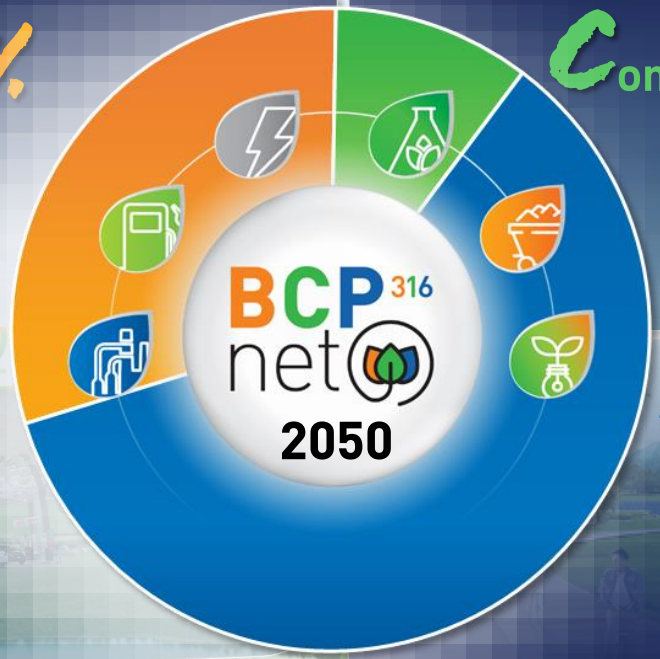
Efficiency and Process Improvement

Energy Intensity Index: EII

97.5 → 90.5

Emphasizes high quality production processes, efficiency enhancements for *Low Carbon*

- Niche Products
- Furnace Coating
- Solar Roof



Conserving Nature and Society 10%

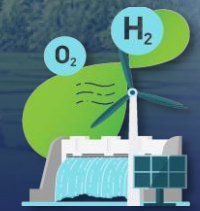
100,000 tCO_2e/y in 2030 onward

Focusing on **Agricultural, reforestation and Mangrove reforestation campaigns**

Proactive Business Growth & Transition 60%

Green Portfolio, Future Technology, Carbon Capture and Utilization

Partnering with carbon clean, C-QUESTER



Winnonie
EV-Bike Platform & Battery Swapping Station

bsgf
Sustainable Aviation Fuel Producer

NET Zero Ecosystem

bfpl
Fuel transportation, providing low-carbon fuels

btsg
LNG Supply & Integrated system for logistic and industrial customer

Carbon credit linked FX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