

Task Force on Climate-Related Financial Disclosures 2023



Introduction

Climate change is an integral part of RATCH's Sustainability Strategy in environmental dimension, as it is a significant issue in the energy and electricity sector. Stakeholders expect market players to reduce greenhouse gas emissions, so as to limit an increase in global temperature and mitigate climate impacts. RATCH as a leading power and energy thus prepared the Climate Change Strategy to achieve carbon neutrality goal in 2050. Endorsed by the Board of Directors, the Climate Strategy studied in feasible carbon emission approaches and methods for the formation of Decarbonization Roadmap and setting of achievable targets in alignment with Thailand's target. The Climate Strategy will also shape operational guidelines in support of SDG 12: Responsible Production & Consumption and SDG 13: Climate Action.

RATCH adopted the Recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) in evaluating climate risks and analysing impacts towards its business strategy and goal. Additionally, TCFD recommendations has been applied for the company's climate disclosure encompassing the 4 core elements; governance, strategy, risk management, and metrics and targets.



Core Elements of TCFD Disclosure

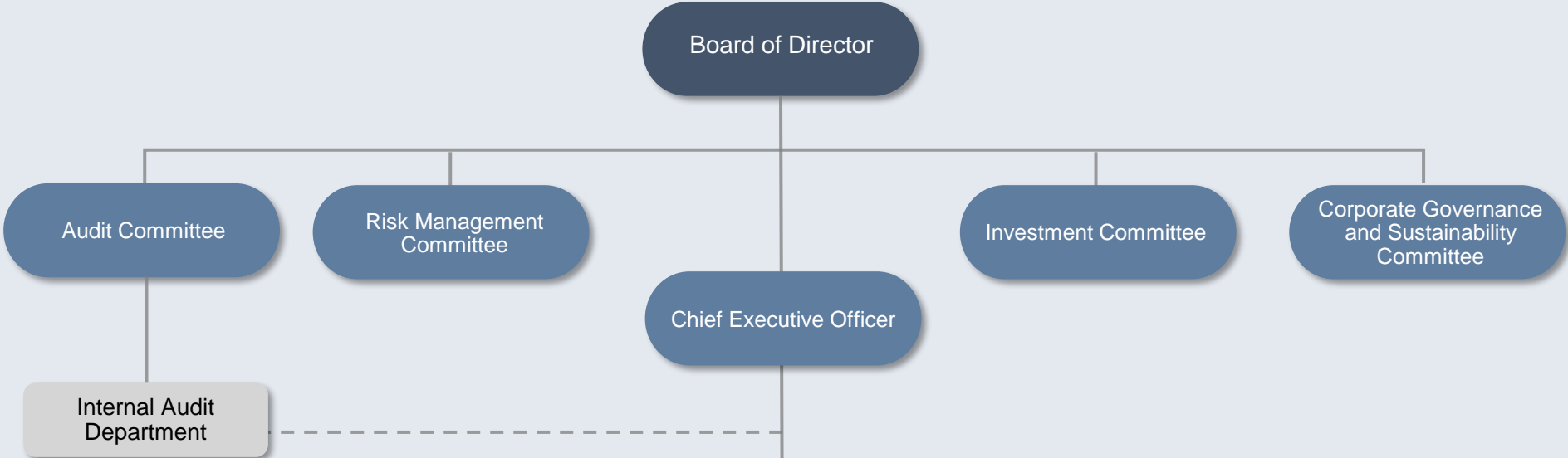
Implementation of TCFD Recommendations



Governance

Climate governing structure

Supervisory Level



Management Level



Climate supervisory level

RATCH Function	Climate Related Roles and Responsibilities
Board of Directors	<ul style="list-style-type: none"> ▪ Extend its supervisory role to cover climate change, by integrating it with the corporate risk management system, the internal control system, business strategies and targets ▪ Define vision, missions, business direction and strategies that ensures the company’s readiness for the energy transition and the journey towards low-carbon businesses ▪ Supervise and give guidance on sustainability and climate strategies, action plans and targets as well as monitor the implementation ensuring to achieve the targets ▪ Endorse climate strategy and action plans including related indicators and targets, ensuring the compatibility with the company’s condition and business context ▪ Monitor progress of climate actions, with supports from the Risk Management Committee, the Audit Committee, and the Corporate Governance and Sustainability Committee
Risk Management Committee	<ul style="list-style-type: none"> ▪ Integrate climate risks and opportunities with the enterprise risk management and risk assessment processes ▪ Supervise and monitor the efficiency of the risk management system and the internal control system as well as the alignment between the Company’s business strategy, targets and the Climate Strategy and targets
Corporate Governance and Sustainability Committee	<ul style="list-style-type: none"> ▪ Supervise and monitor the progress of Sustainability Strategy and Climate Strategy implementation as well as the management of ESG risks ▪ Approve and give guidance on Climate related policies, action plans and targets under the strategy and submit the guidance for the Board of Directors’ approval
Audit Committee	<ul style="list-style-type: none"> ▪ Follow the implementation of Climate Strategy and give advice on compliance of climate related regulations
Investment Committee	<ul style="list-style-type: none"> ▪ Supervise the investment decision-making process concerning climate risk and impact assessment as well as risk management, likelihood and impact to the enterprise and projects

Climate management level

RATCH Function	Climate Related Roles and Responsibilities
Chief Executive Officer (CEO)	<ul style="list-style-type: none"> ▪ Cascade the Board of Directors' guidelines through the preparation of an action plan in alignment with Climate Change Strategy ▪ Follow up on the operational efficiency and progress against the plan compared with the targets
Chief Power Business Development Officer	<ul style="list-style-type: none"> ▪ Integrate climate risks, likelihood and impact assessment with project feasibility studies and due diligence in support of the investment decision-making process ▪ Monitor the operations and compliance with laws, regulations, EIA measures and other relevant conditions during the construction stage ▪ Consider climate risks and relevant regulations a part of the assessment of new projects' suitability ▪ Explore investment in renewable and future-fuel power projects and energy storage system in response to energy transition
Chief Asset Management Officer	<ul style="list-style-type: none"> ▪ Control the efficiency of risk management and ESG operations of the Company, subsidiaries and joint ventures ▪ Monitor asset operations, greenhouse gas emissions and climate risks of power plants and projects ▪ Execute carbon emission reduction projects and manage related climate risks at power plants/assets
Chief Financial Officer	<ul style="list-style-type: none"> ▪ Source green or sustainable funds for the Company Group's development and investment in renewable and green projects ▪ Monitor and ensure the conformity of responses to climate risks with creditors' conditions, accounting standards and action-report reporting to relevant authorities
Executive Vice President - Related and New Business	<ul style="list-style-type: none"> ▪ Integrate climate risks, likelihood and impact with project feasibility studies and due diligence in support of the investment decision-making process ▪ Explore non-power businesses with low carbon emission to support energy transition and the company's GHG reduction target. ▪ Monitor the operations performance and compliance with laws and regulations.
Executive Vice President - Corporate Administration	<ul style="list-style-type: none"> ▪ Execute actions under the Sustainability and the Climate Strategies, roadmap and targets, as well as support and advise operational controlled entities on climate risk assessment, GHG reduction and reporting ▪ Monitor the execution and progress of action plans and targets and report the performance to the Board of Directors, relevant external authorities and stakeholders

Implementation of TCFD Recommendations



Strategy

Climate-Related Risks

Physical Risks

Arise from the change in weather and climate

Acute

event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.

- **Flood** can cause sediment load in the dam leading electricity generating turbine to be damaged
- **Water Stress** can lead the operation site to face water scarcity and have no water to use in electricity generation
- **Lighting** can shutdown operation site and cause damage to electricity generation systems

Chronic

longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves.

- Sustain **heat waves** can reduce worker availability and electricity generation efficiency

Transition Risks

Arise from the change in Stakeholder mindset, Policies, Regulations and Technology

Market

Changing in consumer/customer behavior

- **Customers request more on renewable source** and other services to verify the use of renewable energy for scope 2 emission limitation

Technology

Changing in technological innovation

- The **disruption of new products and services** such as new renewable energy and energy management services

Regulation

Changing in Regulations/policies

- The **legislation** that related to GHG emission limitation e.g. Cap & Trade and Renewable energy plan that enforce the energy sector to invest more on climate mitigation

Reputation

Changing in Stakeholder mindset

- More and more **stakeholders**, particularly investors are looking for corporate climate action; moreover, some investors started to divest from fossil fuel based electricity generation companies


Scenario analysis


RATCH considered Scenario RCP2.6: Average global temperature could be 1.6 degree Celsius warmer in 2050 and Scenario RCP8.5: Average global temperature could be 4.3 degree Celsius warmer in 2050 as the basis for worst-case for analyzing physical and transitional risks.

Scenarios	Description	Global mean temperature Change	Maintain at 2.0 C by 2050
RCP 2.6	<ul style="list-style-type: none">• Mean Radiative forcing at earth surface is 2.6 W/m²;• High effort on the implementation of decarbonization• Medium intensity & low frequency in extreme weather	1.6 C in 2050	Possible
RCP 8.5	<ul style="list-style-type: none">• Mean Radiative forcing at earth surface is 8.5 W/m²;• Low effort on the implementation of decarbonization• High intensity & high frequency in extreme weather	4.3 C in 2050	Impossible

Scope of climate risk analysis

The climate risk analysis was conducted with 22 equity-owned power projects in key markets; Thailand, Australia, Indonesia and Vietnam.

 Thailand
Ratchaburi Power Plant
Nava Nakorn SPP Power Plant
Berkprai Cogeneration SPP Power Plant
RATCH Cogeneration SPP Power Plant
Songkla Biomass Power Plant
RATCH Energy Rayong SPP Power Plant
RATCH Cogeneration SPP Power Plant (Expansion)
REN Korat Energy Power Plant (Under-construction)

 Australia
Townsville Power Station
Kemerton Power Plant
Kemerton Power Plant (Black Start)
Windy Hill Wind Farm
Toora Wind Farm
Starfish Hill Wind Farm
Mount Emerald Wind Farm
Collinsville Solar PV
Yandin Wind Farm
Collector Wind Farm

 Indonesia
Riau Combined-Cycle Power Plant
Paiton Energy Coal-Fired Power Plant *

 Vietnam
Ecowin (Thanh Phong) Wind Farm
Ben Tre Wind Farm (Under-construction)

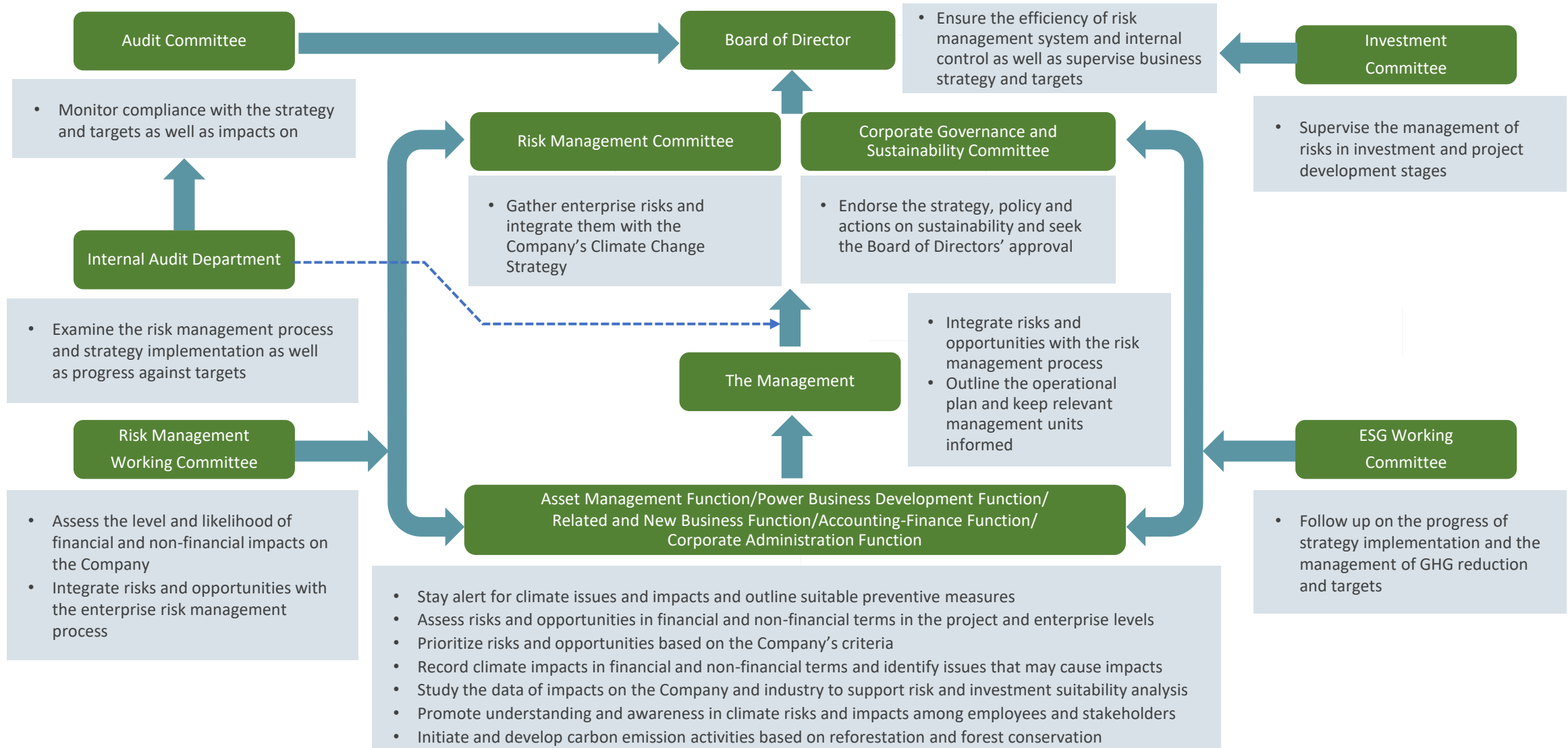
* The share acquisition is underway.

Implementation of TCFD Recommendations



Risk Management

Climate risk management procedure



Climate risk identification and assessment process



Physical risks analysis






Scenario analysis of physical risk

Criteria for identifying risks with substantive impact:

The topics that can potentially cause significant impact on RATCH's strategy in terms of (1) financial, (2) health, safety and environment, (3) business partner/customer, (4) regulation, (5) brand/reputation/social, and (6) goal/achievement

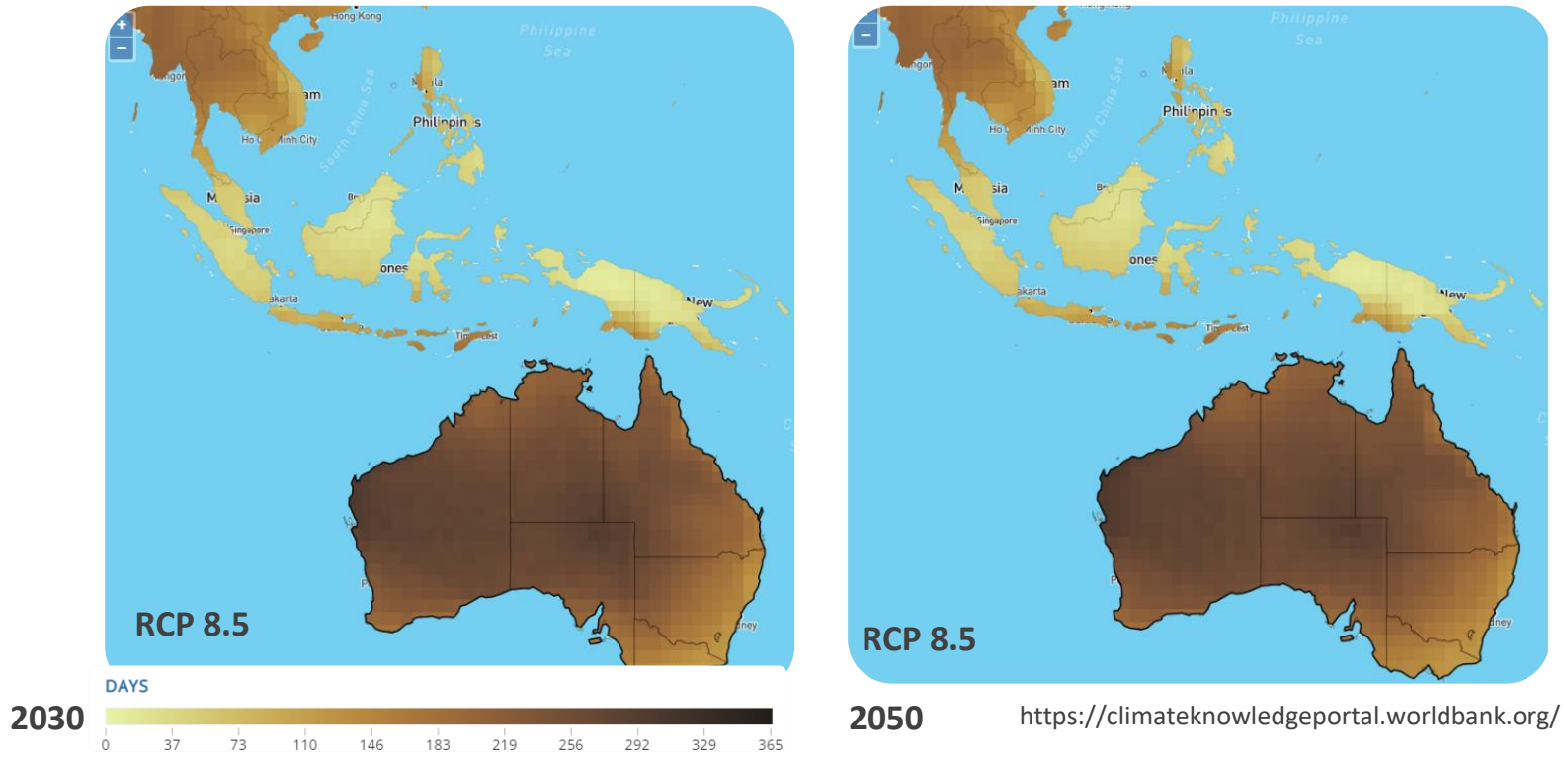
Scope of assessment: RATCH equity-owned power projects

Time horizon: Short term (0 - 2 years) Medium term (3 - 5 years) Long term (6-10 years)

Risks	Risk Type	Time Horizon	Tool for Assessment	Risk Description & Financial Implications	Management Measures
Water Stress	Physical Risk	Short to Medium-term		<ul style="list-style-type: none"> Existing water shortages and constraints on water supply Insufficient water supply, worsening on both severe harm and economic impact 	<ul style="list-style-type: none"> Increase an operation cost for water sourcing
Flood	Physical Risk	Short to Medium-term		<ul style="list-style-type: none"> Damage on corporate assets e.g. company inventory, vehicles, fixtures, and fittings, and valuable machinery. These instruments can be damaged that the loss is beyond repair cost. Severe flooding possibly damage the transmission as a value part of supply chain. 	<ul style="list-style-type: none"> Connect to water network to monitor water situation Construct rain harvesting and water storage system for its suppliers in order to handle water scarcity issues.
Extreme Weather (Wind Speed and Tropical Cyclone)	Physical Risk	Long-term		<ul style="list-style-type: none"> Damage on corporate assets e.g. company inventory, vehicles, fixtures, and fittings, and valuable machinery. These instruments can be damaged that the loss is beyond repair cost. 	<ul style="list-style-type: none"> There is no impact to RATCH.

Physical Risk Scenario & Analysis: Water Stress

Projection of Consecutive Dry Days



The number of consecutive dry days is likely to decrease in long-term

Impacts on business	Examples of risks
<ul style="list-style-type: none"> Existing water shortages and constraints on water supply Insufficient water supply, worsening on both severe harm and economic impact 	<ul style="list-style-type: none"> The Water Stress in 2005 and 2020 in Thailand were affected large swathes in the East, where three provinces are Chachoengsao, Chon Buri and Rayong. Water Stress were likely to limit production, only 7% of water at Rayong reservoir. However, the situation was recovered on time.

Baseline

No.	Asset location	Water Stress
1	Thailand	Low Hazard
2	Australia	Medium Hazard
3	Vietnam	Low Hazard
4	Indonesia	Low Hazard

RCP 2.6

No.	Asset location	Water Stress	
		2030	2050
1	Thailand	Medium Hazard	Medium Hazard
2	Australia	High Hazard	High Hazard
3	Vietnam	Low Hazard	Low Hazard
4	Indonesia	Low Hazard	Low Hazard

RCP 8.5

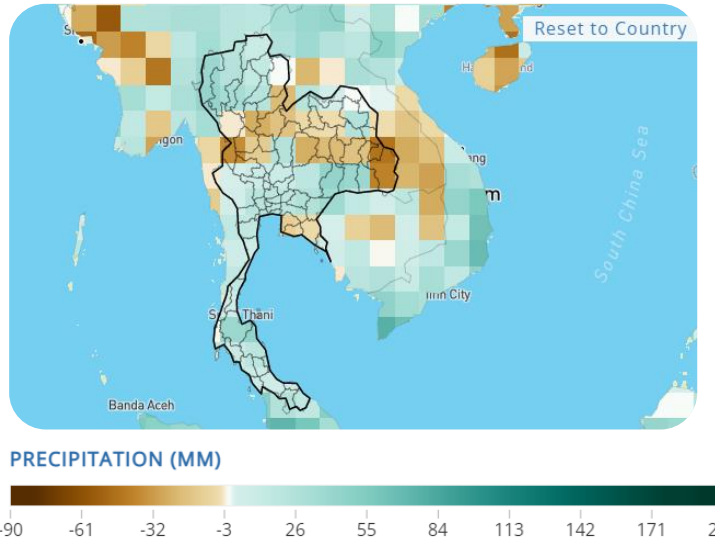
No.	Asset location	Water Stress	
		2030	2050
1	Thailand	Medium Hazard	Medium Hazard
2	Australia	High Hazard	High Hazard
3	Vietnam	Medium Hazard	Medium Hazard
4	Indonesia	Low Hazard	Medium Hazard



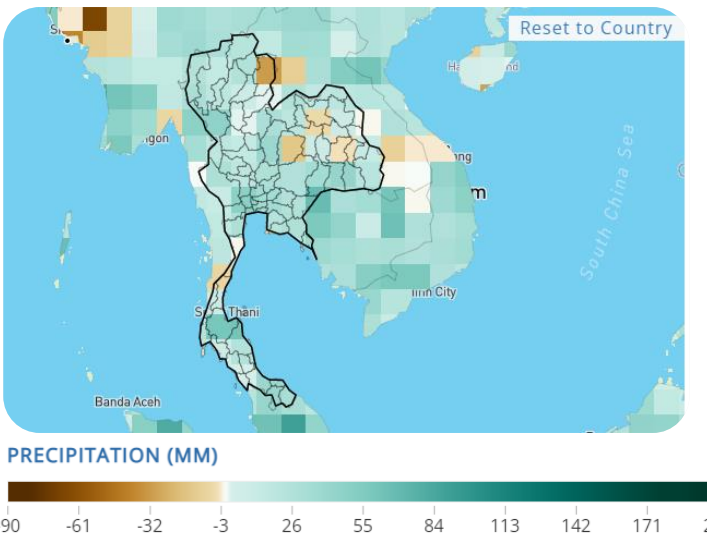
Physical Risk Scenario & Analysis: Flood

Projection of Days with heavy rain

Projected Average Largest 5-day Cumulative Rainfall Anomaly for 2020-2039 (Annual)
Chonburi, Thailand; (Ref. Period: 1986-2005), RCP 2.6, Multi-Model Ensemble



Projected Average Largest 5-day Cumulative Rainfall Anomaly for 2040-2059 (Annual)
Chonburi, Thailand; (Ref. Period: 1986-2005), RCP 2.6, Multi-Model Ensemble



<https://climateknowledgeportal.worldbank.org/>

The heavy rain may increase and decrease in some areas in 2030 but increase in most areas towards 2050

Impacts on business	Examples of risks
<ul style="list-style-type: none"> Damage on corporate assets e.g. company inventory, vehicles, fixtures, and fittings, and valuable machinery. These instruments can be damaged that the loss is beyond repair cost. Severe flooding possibly damage the transmission as a value part of supply chain. 	<ul style="list-style-type: none"> The 2011 floods in Thailand is a powerful example. It caused \$ 45 billion US dollars in damages and Thailand GDP shrunk by 10%. The supply chain disruption of the floods was felt around the world: more than 800 companies affected.

Baseline

No.	Asset location	Riverine Flood
1	Thailand	High Hazard
2	Australia	Medium Hazard
3	Vietnam	High Hazard
4	Indonesia	Low Hazard

RCP 2.6

No.	Asset location	Riverine Flood	
		2030	2050
1	Thailand	High Hazard	Very High Hazard
2	Australia	Low Hazard	Low Hazard
3	Vietnam	High Hazard	High Hazard
4	Indonesia	Low Hazard	High Hazard

RCP 8.5

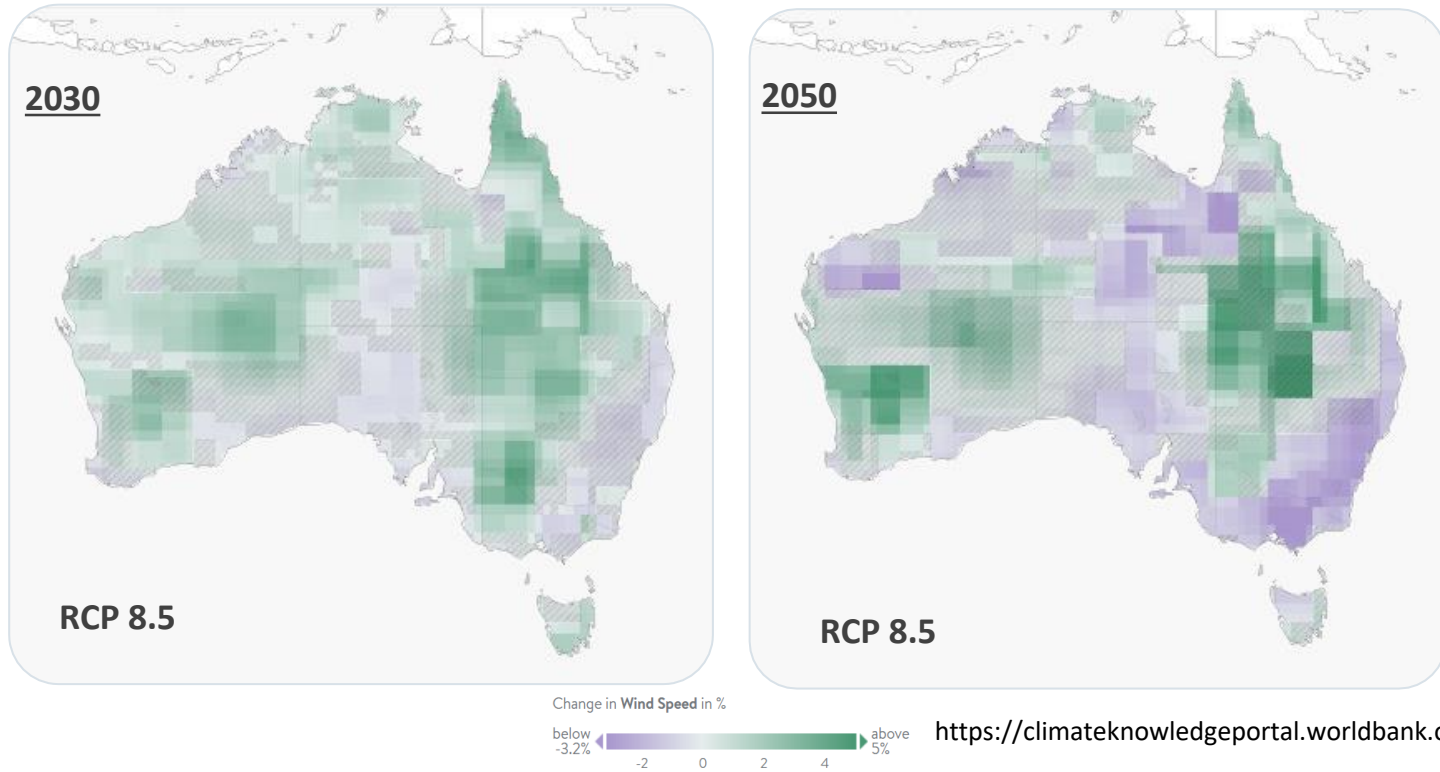
No.	Asset location	Riverine Flood	
		2030	2050
1	Thailand	High Hazard	Very High Hazard
2	Australia	High Hazard	High Hazard
3	Vietnam	High Hazard	Very High Hazard
4	Indonesia	Low Hazard	Very High Hazard



<https://climateanalytics.org/tools/>

Physical Risk Scenario & Analysis: Extreme Weather

Australia Projection of wind speed



The wind speed may increase and decrease in some areas in 2030 but significantly decrease in most areas towards 2050

Impacts on business	Examples of risks
<ul style="list-style-type: none"> • Cause damage to infrastructure, machinery and equipment • Cause injury to workers due to airborne objects • Lightning strike damage electricity distribution line • Hail storm cause minor damage to the infrastructure 	<ul style="list-style-type: none"> • The 2022 South East Queensland cyclone and flooding event report estimates more than 500,000 people were affected by the floods in some way with an estimated human and social cost of \$4.5 billion.

Baseline

No.	Asset location	Extreme Weather
1	Thailand	Low Hazard
2	Australia	Medium Hazard
3	Vietnam	Medium Hazard
4	Indonesia	Low Hazard

RCP 2.6

No.	Asset location	Extreme Weather	
		2030	2050
1	Thailand	Low Hazard	Medium Hazard
2	Australia	Medium Hazard	Medium Hazard
3	Vietnam	Medium Hazard	Medium Hazard
4	Indonesia	Low Hazard	Medium Hazard

RCP 8.5

No.	Asset location	Extreme Weather	
		2030	2050
1	Thailand	Medium Hazard	High Hazard
2	Australia	Medium Hazard	Medium Hazard
3	Vietnam	Medium Hazard	High Hazard
4	Indonesia	Medium Hazard	High Hazard

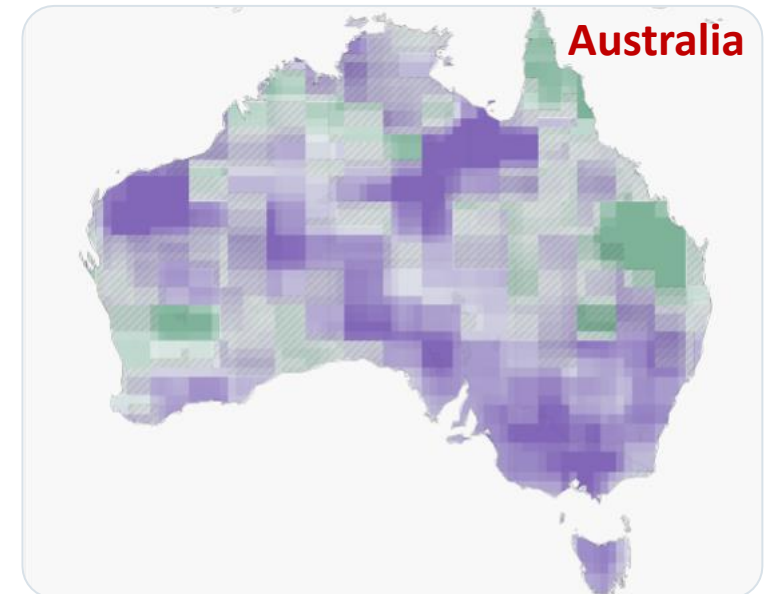
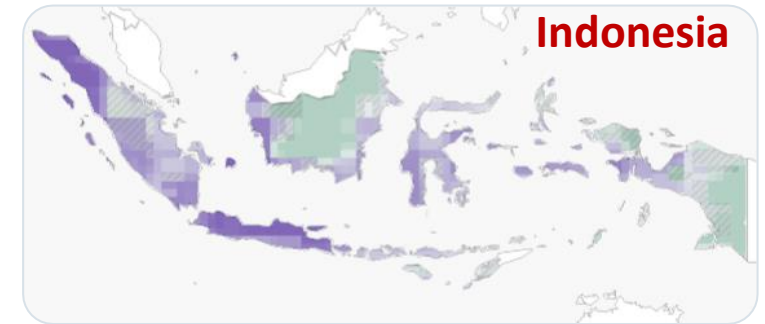
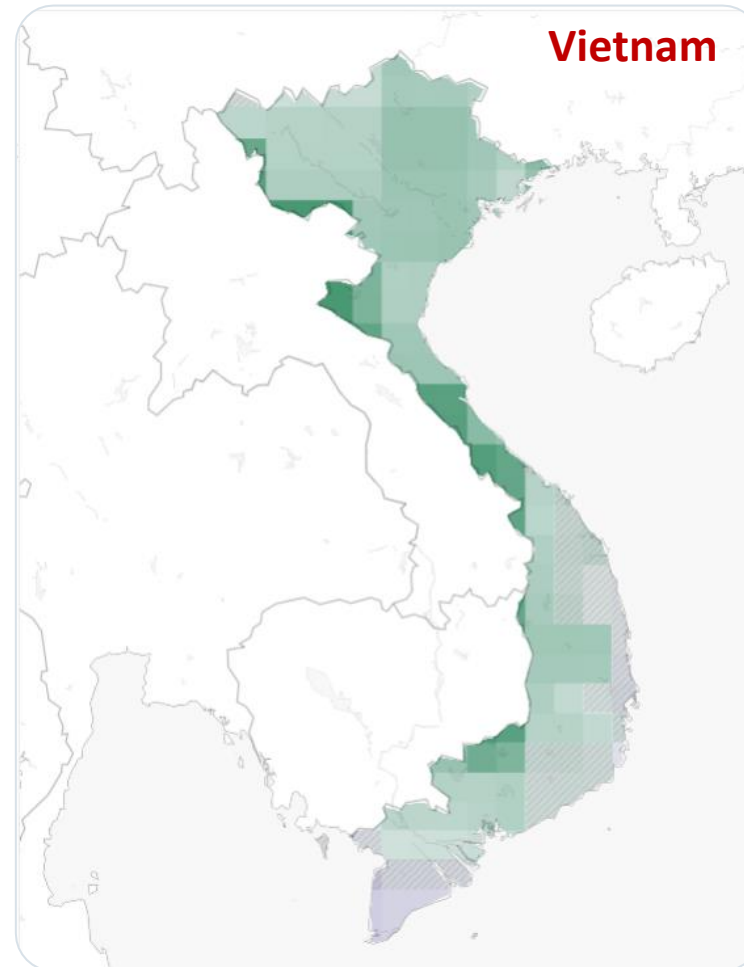
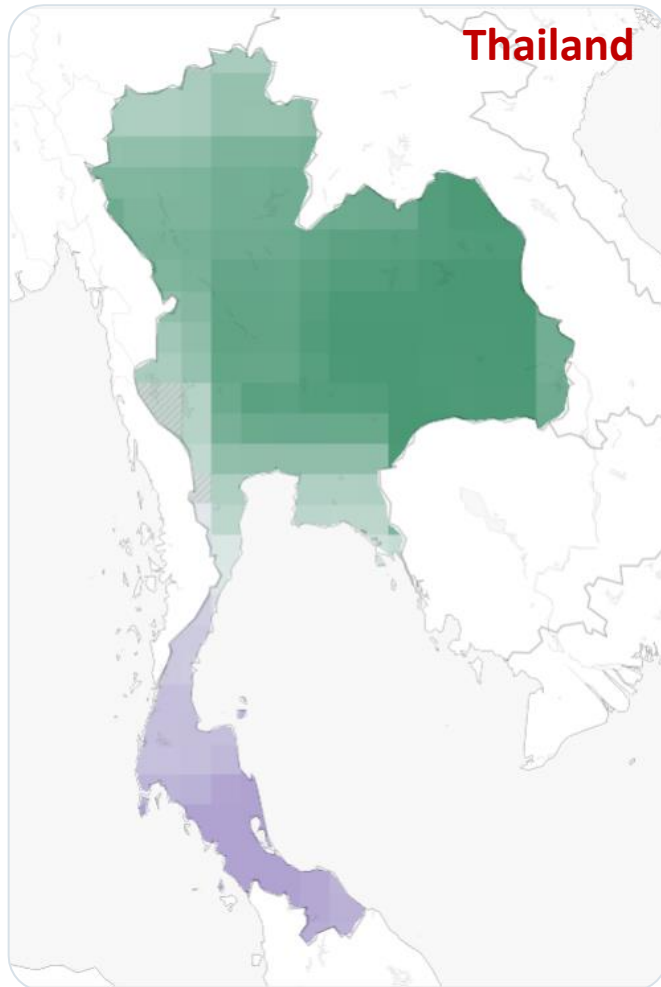


<https://climateanalytics.org/tools/>

Physical Risk Scenario: Extreme Weather

Wind Speed in 2030 versus 2050 under a RCP8.5 scenario

Change in Wind Speed in %



<https://climateknowledgeportal.worldbank.org/>

Summary: Physical Risks and Impacts Analysis

01

Water Stress

Impact

Existing water shortages and constraints on water supply
 Insufficient water supply, worsening on both severe harm and economic impact

Result

The max number of consecutive dry days in Australia is likely to increase the most under RCP 2.6 (8%) both in 2030 and 2050, as well as under RCP 8.5

Financial Implication

- Nava Nakorn Electricity Generating Case
- Create RATCH owned reservoir 0.6 MTHB
 - Water treatment cost 12 MTHB

Change in Max Number of Consecutive Dry Days (from 1995-2014 baseline)

	Baseline	RCP2.6		RCP8.5	
	1995-2014	2030	2050	2030	2050
Thailand	Green	Yellow	Yellow	Yellow	Yellow
Australia	Yellow	Red	Red	Red	Red
Vietnam	Green	Green	Green	Yellow	Yellow
Indonesia	Green	Green	Green	Green	Yellow

Source: CCKP. World Bank Group, Climate Change Knowledge Portal.

02

Flood

Impact

Damage on corporate assets e.g. company inventory, vehicles, fixtures, and fittings, and valuable machinery. These instruments can be damaged that the loss is beyond repair cost. Severe flooding possibly damage the transmission as a value part of supply chain.

Result

The max Days with Heavy Rain in Thailand, Vietnam and Indonesia are likely to increase the most under RCP 8.5 2050.

Financial Implication

- Nava Nakorn Electricity Generating Case
- Constructed floor to prevent flood 50 MTHB

Change in Max Number of Days with Heavy Rain (from 1995-2014 baseline)

	Baseline	RCP2.6		RCP8.5	
	1995-2014	2030	2050	2030	2050
Thailand	Yellow	Yellow	Red	Yellow	Red
Australia	Blue	Green	Green	Yellow	Yellow
Vietnam	Yellow	Yellow	Yellow	Yellow	Red
Indonesia	Green	Green	Yellow	Green	Red

Source: CCKP. World Bank Group, Climate Change Knowledge Portal.

03

Extreme Weather

Impact

Cause damage to infrastructure, machinery and equipment Cause injury to workers due to airborne objects Lighting strike damage electricity distribution line Hail storm cause minor damage to the infrastructure. However, result of assessment showed that this risk has no significant impact to RATCH

Result

The change in Extreme Weather, especially wind speed in Thailand, Vietnam and Indonesia are likely to increase the most under RCP 8.5 2050.

Financial Implication

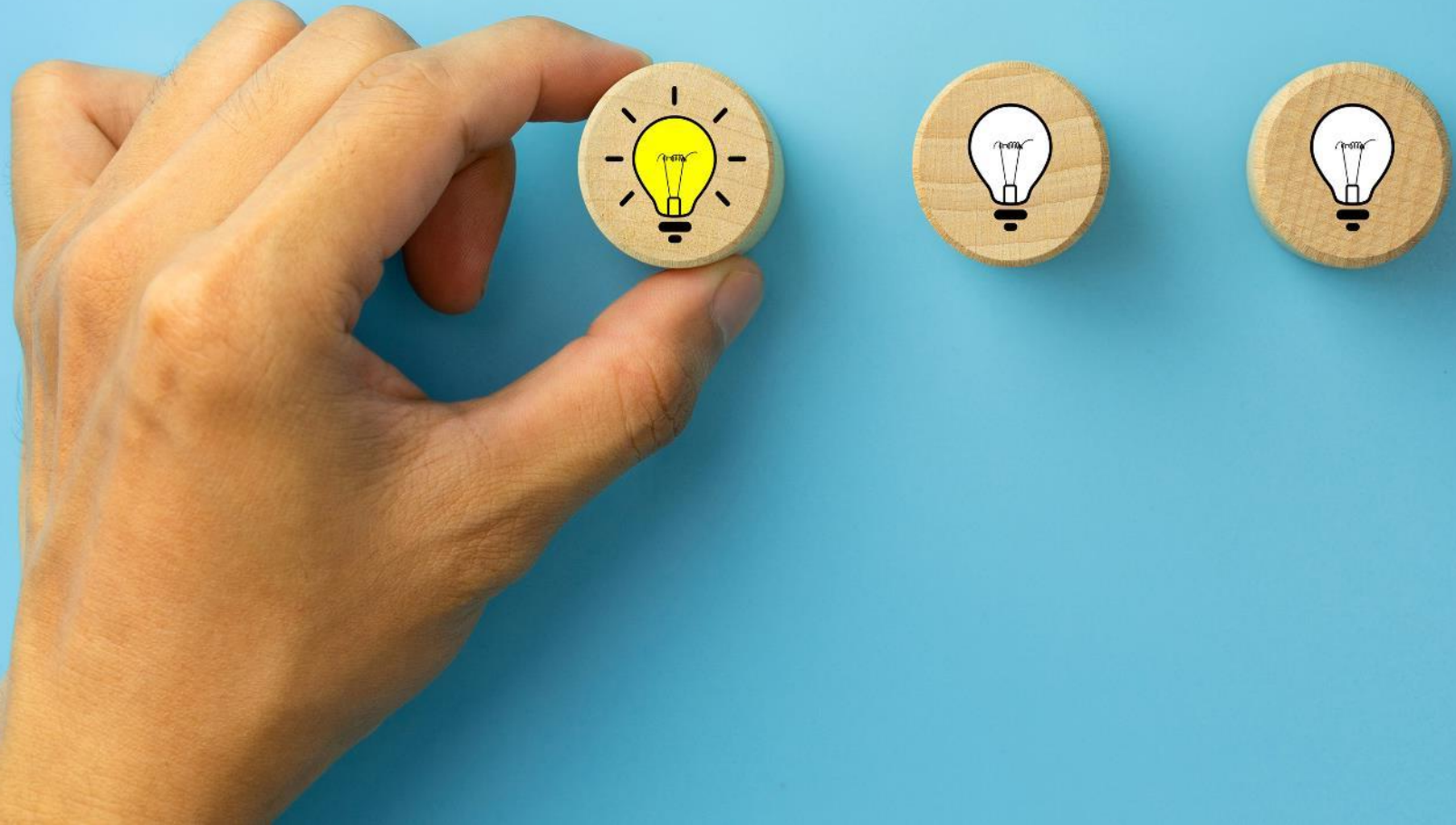
No significant impact

Change in Wind speed (from 1995-2014 baseline)

	Baseline	RCP2.6		RCP8.5	
	1995-2014	2030	2050	2030	2050
Thailand	Green	Green	Yellow	Yellow	Red
Australia	Yellow	Yellow	Yellow	Yellow	Yellow
Vietnam	Yellow	Yellow	Yellow	Yellow	Red
Indonesia	Green	Green	Yellow	Yellow	Red

Source: CCKP. World Bank Group, Climate Change Knowledge Portal.

Transition Risks Analysis



Scenario applied for transition risk analysis

Scenarios	Description	Net Zero Emission Target Year	Temperature Change by 2100
State Policy Scenarios (STEP)	<ul style="list-style-type: none"> The policies assessed in the Stated Policies Scenario cover a broad spectrum. These include Nationally Determined Contributions (NCD) under the Paris Agreement. Equal to the announced policies by Thai governments in 2015 after COP21 	<ul style="list-style-type: none"> Short term: Reduction 20% in 2030 from based year 2020 [0.8% / year] Long term: No commitment to net zero emission 	More than 2.0 C
Sustainable development Scenarios (SDS)	<ul style="list-style-type: none"> All current net zero pledges are achieved in full and there are extensive efforts to realize near-term emissions reductions; advanced economies reach net zero emissions by 2050, China around 2060, and all other countries by 2070 at the latest. Equal to the announced policies by Thai governments in 2021 after COP26 	<ul style="list-style-type: none"> Short term: Reduction 36.9% in 2030 from based year 2020 Long term: Net zero emission in 2065 Refer to the SBTI reduction pathway by interpolation between 2C and 1.5C 	1.5 – 1.7C
Net Zero Emission Scenarios (NZE)	<ul style="list-style-type: none"> The Net Zero Emissions by 2050 Scenario (NZE). This scenario also meets key energy-related United Nations Sustainable Development Goals (SDGs), in particular by achieving universal energy access by 2030 and major improvements in air quality. Equal to the RATCH commitment to achieve Net Zero Emission by 2050 	<ul style="list-style-type: none"> Short term: Reduction 42% in 2030 from based year 2020 Long term: Net zero emission in 2050 Refer to the SBTI reduction pathway well below 1.5 C 	Maintain at 1.5 C

Reference: [IEA, World Energy Model](#)

Scenario analysis of transition risk

Criteria for identifying risks with substantive impact:

The topics that can potentially cause significant impact on RATCH's strategy in terms of

- (1) financial,
- (2) health, safety and environment,
- (3) business partner/customer,
- (4) regulation,
- (5) brand/reputation/social, and
- (6) goal/achievement

Scope of assessment: RATCH equity-owned power projects

Time horizon:

- Short term (0 - 2 years)
- Medium term (3 - 5 years)
- Long term (6-10 years)

Risks	Risk Type	Time Horizon	Risk Description & Financial Implications	Management Measures
Carbon Tax Implementation	Transition Risk	Medium-term (3-5 years)	<ul style="list-style-type: none"> • Policies and regulations are progressing towards more strict control of GHG emission, resulting in the implementation of carbon tax scheme. • Increasing of the operational expense proportional to the amount of GHG emission. 	<ul style="list-style-type: none"> • Investing in low carbon/decarbonization technology for old assets with high GHG emission to remove emission from operations • Acquiring new assets which use renewable energy resource, green or low carbon business, fossil fuel with carbon capture technology project , green hydrogen project • Retiring coal assets from portfolio.

Opportunity analysis



Climate Opportunities

Criteria for identifying opportunities with substantive impact:

The topics that can potentially cause significant impact on RATCH's strategy in terms of (1) financial, (2) health, safety and environment, (3) business partner/customer, (4) regulation, (5) brand/reputation/social, and (6) goal/achievement

Scope of assessment: RATCH equity-owned power projects

Time horizon:

- Short term (0 - 2 years)
- Medium term (3 - 5 years)
- Long term (6-10 years)

Opportunities	Opportunity Type	Time Horizon	Opportunity Description & Financial Implications	Management Measures
Expand Non-power Business	Market	Medium-term	<ul style="list-style-type: none"> • The company a plan for green hydrogen technology in Australia and Thailand 	<ul style="list-style-type: none"> • Invest on green hydrogen products plants including the utility provider and infrastructure • Invest in research and development with partners
Current opportunity				
Shift toward renewable energy	Energy source	Medium-term	<ul style="list-style-type: none"> • The company has planned to expand investment in renewable power generation in order to responding to global and national promotion and emission reduction target. It targets to achieve renewable capacity to 30% and 40% of total capacity in 2030 and 2035 respectively. 	<ul style="list-style-type: none"> • The company puts focus on solar power generation in all forms (solar panel, solar rooftop, solar floating), solar-related businesses including installation, operation and maintenance service, and wind power generation.

Climate Strategy



The Fundamental of RATCH Climate Strategy



RATCH determinedly takes action to mitigate climate change impacts and strengthen the company resilience. In 2022, we announce the ambitious target to achieve **Carbon Neutrality in 2050**.

To develop the climate strategy, RATCH has performed impact assessment and adaptation based on short-, medium-, and long-term horizons considering the expected lifetime of the assets or activities. The scenario analysis study covered both physical and transition risks that may impact on the company's business in the long-run.

The physical risks assessment incorporates model setup and running simulations in scenarios of a 2°C and lower scenario as RCP2.6, and RCP8.5. Additionally, bespoke scenarios also used to analyze potential impacts from transition risk on RATCH's business including, State Policy Scenarios (STEP), Sustainable development Scenarios (SDS) and Net Zero Emission Scenarios (NZE).

Consequently, a set of practical mitigation measures and adaptation strategy is developed based on key analyzed findings and proposed for implementation to fit the impact type and level.

RATCH Climate Strategy Framework responding to the scenario consideration that embrace 3 pillars as shown in next page

Extended networking with external Organizations

- Seek collaboration with stakeholders - suppliers and customers - in promoting emission reduction and resource recycling
- Partner with industry associations, organizations and government offices



- 70% reduction of scope 1+2 emission by 2030 (baseline 2015)
- Carbon Neutrality by 2050

Operational uplifting through internal climate management

- Supervise climate change coping actions
- Consider rewarding employees at all levels for their climate actions
- Integrate the climate risk assessment process with the enterprise risk assessment process
- Set the internal carbon pricing (ICP), to define the monetary value of per-unit internal carbon emissions



Production efficiency enhancement

Remove pre-combustion and post-combustion GHG and reduce fossil fuel utilization



Diversification into green businesses

Expand renewable energy capacity and invest more in non-power businesses



Carbon offsetting and trading

Buy and apply for Renewable Energy Certificate (REC), carbon credit and reforestation for natural removal

Implementation of TCFD Recommendations

Metrics & Targets

Climate-related matrices, methodologies and standards

Methodologies and standards

1. IPCC Guidelines for National Greenhouse Gas Inventories, 2006
2. ISO 14064-1
3. Thailand Greenhouse Gas Management Organization: The National Guideline Carbon Footprint for organization
4. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
5. Corporate KPIs are linked to climate-related issues such as GHG emission reduction. RATCH provides incentives through monetary rewards for CEO, Corporate executive team, all employees for the emissions reduction target

Key Matrices

- Direct GHG Emissions (Scope 1 - MtCO₂ equivalent)
- Market-based energy indirect (Scope 2) GHG emissions (MtCO₂ equivalent)
- Location based energy indirect (Scope 2) GHG emissions (MtCO₂ equivalent)
- Other relevant indirect GHG emission (Scope 3: Upstream transportation and distribution) (MtCO₂ equivalent)

GHG Emissions in 2021-2023

RATCH set a target to reduce direct emissions (Scope 1) and indirect emissions (Scope 2) in 2025 by 70% from the base year 2015 (8,694,192 tCO₂e) based on the expiration of 1,470 MW gas-fired power plants.

Environmental Indicators	Unit	2021	2022	2023
Direct GHG emissions (Scope 1)	tCO ₂ e	6,412,471	8,515,892	4,984,325
Indirect GHG emissions from electricity (Scope 2) –Location Based	tCO ₂ e	38,918	31,367	28,362
Indirect GHG emissions from electricity (Scope 2) –Market Based	tCO ₂ e	0	0	0
Total Scope 3 GHG emissions	tCO ₂ e	2,662,156	3,113,000	1,549,089
GHG intensity (Scope 1+2)	tCO ₂ e/MWh	0.4308	0.4172	0.3962
Targets	Reduce emissions in Scope 1 and Scope 2 by 70% in 2025 (from the base year 2015)			
	To achieve carbon neutrality by 2050			

Source: [Sustainability Report 2023, page.97](#)

Boundary of GHG emission report	2021	2022	2023
Ratchaburi Power Plant (RGCO)	√	√	√
Nava Nakorn Power Plant (NNEG)	√	√	√
RATCH-Cogeneration Power Plant (RCO)	√	√	√
Berkprai Cogeneration Power Plant (BPC)	√	√	√
RATCH-Australia Power Plant (RAC)	√	√	√
RATCH Energy Rayong Power Plant (RER)	-	√	√
Sahacogen Group	-	√	√
Songkhla Biomass (SKB)	-	-	√

GHG reduction plan to achieve carbon neutrality in 2050

Time-frame	Strategic plans				Operational guidelines to reduce Scope 1-3 emissions
	Energy efficiency management	Green/ low-carbon businesses	Carbon offsetting/trading	Internal actions and external collaboration	
2023-2030				✓	Set GHG intensity-reduction target.
	✓				Improve production process for greater efficiency.
	✓				Raise internal use of renewable energy
				✓	Study carbon tax measures, impacts and opportunities.
		✓			Set target to raise renewable energy capacity to 30% of total capacity.
				✓	Report Scope 3 emissions by all activities.
			✓		Carry out reforestation or create natural ways of GHG sequestration.
	✓			✓	Study feasibility and application of CCS and hydrogen.
		✓		✓	Raise investment in low-carbon/BCG/future energy/innovation businesses.
				✓	Select suppliers based on GHG risks and impacts and monitor suppliers with GHG risks.
2031-2050				✓	Support/promote suppliers or collaborate in reducing emissions by upstream and downstream products and services.
				✓	Target to raise renewable energy capacity to 40% of total capacity.
				✓	Set GHG intensity-reduction target.
	✓				Improve production process for greater efficiency and raise internal use of renewable energy.
	✓			✓	Prepare for the energy transition through the application of hydrogen energy/investment in projects powered by hydrogen fuel or fuels that can be converted to hydrogen.
				✓	Follow up on the efficiency and progress of CCUS application in power generation process.
			✓		Consider carbon offsetting through carbon credits and/or REC.
			✓	✓	Carry out reforestation to create natural carbon sinks.
	✓			Raise investment in low-carbon/BCG businesses.	

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