Climate-Related Risk Management Report 2023

Prepared in accordance to the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD)

Our Vision: To become a leader in the alternative energy business

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1. CLIMATE-RELATED RISK AND OPPORTUNITY ASSESSMENT IN ACCORDANCE WITH THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD)

INTRODUCTION

The Company has set up the Corporate Governance and Sustainability Committee to consider potential risks, impacts, and opportunities relating to climate change which may affect our business. We have analyzed and assessed both potential risk and opportunities from climate-related issues according to the Task Force on Climate-related Financial Disclosures (TCFD) framework which includes four core elements of organizational operation: governance, strategy, risk management and metrics and targets as shown in the Figure 1 below.

Figure 1: Core Element of Recommended Climate-Related Financial Disclosures

Recommendations and Supporting Recommended Disclosures

Source: Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, October 2021

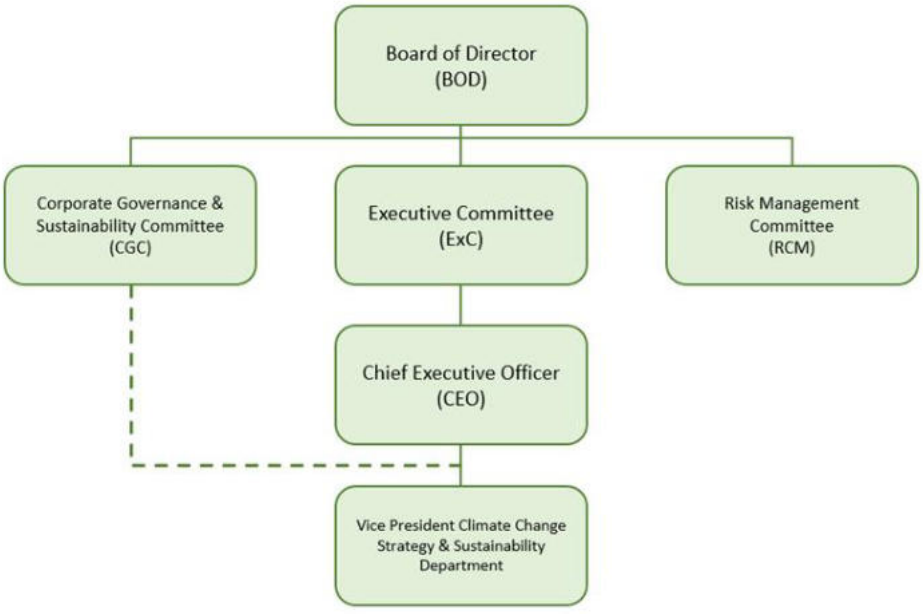
1.1 GOVERNANCE

The Company realizes the significance of having management structure that is aligned with the long-term strategy of driving the Company's business so that it can operate efficiently, transparently, business operation and maintain a balance of care for stakeholders. The Company has determined the management structure that is appropriate for the size, type and complexity of the business, as well as checks and balances to ensure the stakeholder's involving in the management of the Company's business.

The Board of Directors provide visions, missions, directions, and operational strategies with climate-related risks and opportunities directly and additionally through the Corporate Governance and Sustainability Committee (CGC). The Board's resolution and oversight are implemented accompanied by operating result targets, monitoring and assessing the results at CGC's meeting (4 times per year).

EA Group has appointed the Corporate Governance and Sustainability Committee to be in charge of planning strategies, management approaches, overseeing of climate-related issues, implement and follow up sustainability and climate strategies to achieve the sustainability goals. Moreover, we have the Risk Management Committee which they are responsible for assessing, and managing climate-related risks and opportunities, as well as preventing potential impacts.

Figure 2: The Organization Chart



Remarks : Vice President Climate Change Strategy & Sustainability Department Responsibilities to manage Climate related issues within EA Group, as well as monitoring and reporting of sustainability performance (including climate change initiatives, GHG emissions) to ensure that the company's environmental management practices achieve the targets and enhance effectiveness.

1.2 STRATEGY

EA has committed to develop the standard of business operations and general management to be in line with our Sustainable Environment Management Policy. The focuses will be on safety environmental and health in workplaces including the social responsibility. The policy will cover all Company›s operations which emphasize on resource management covering all business activities products, services, transportation and distribution, as well as waste management. Furthermore, this commitment is the direct responsibility of all executives, employees, business partners, contractors and the relevant stakeholders.

Additionally, We have set up a framework for climate change management covering our entire supply chain including management commitment, assess the impact of risks and opportunities according to the TCFD framework, define targets and policies, implement, measure results, and communicate with stakeholders.

Figure 3: Climate Change Management Framework

EA Group has identified the climate-related risks and opportunities, and impact on the organization and finance according to the TCFD framework in two scenarios, including above 2 °C scenario such as IEA STEPS, IEA CPS, RCP 8.5 and below 2 °C scenario such as NDC, IEA 2DS, IEA 450, RCP 2.6 as follows:

Climate Related Risks	Scenario	Description	Impact to Business	Time horizon*
Transition Risk				
Policy & Legal	Business as Usual (BAU)	Thailand committed to reach carbon neutrality by 2050 and net zero emissions by 2065. Thailand also pledged to enhance the NDC to reduce Greenhouse Gases (GHG) emissions by 30-40% in	Reputation and recognition from environmentally conscious consumers. The company must be pay penalty in case does not comply with the changed	Medium and long-term

Climate Related Risks	Scenario	Description	Impact to Business	Time horizon*
		2030 from the previous target of 20-25%, in order to attain carbon neutrality and net zero goals. This may have to take part in the efforts to reduce GHG emission to support the government's commitment to achieve net zero emissions.	climate laws and regulations. Estimated financial implication of the risk before taking action: higher than 1 million baht as well as suspension of business operation temporally and/or permanently. The estimate costs for these actions are 60,000 THB	
	Well below 2 °C	● Increased operational costs from mandatory climate change regulations or changes in environmental legislation ● Implementation of cap-and-trade or carbon tax in jurisdictions in which the company operates ● Carbon pricing policies / Mechanism ● Enhanced emissions reporting obligations	Increased Operating Cost of climate change operations throughout the supply chain.	All time frames
Technology	BAU	Existing technologies or no change in decarbonizing to reduce GHG emissions that unsuccessful investment in new technologies.	Lose opportunities to invest in new energy technologies to reduce GHG emissions.	Medium-term
	Well below 2 °C	New technologies that can reduce GHG emissions more effectively and disrupt Markets such as Hydrogen and carbon capture, utilization, and storage (CCUS).	● Higher costs of conducting studies and investing new technologies, which must be implemented earlier than anticipated. ● Increased cost for develop lower emission technologies.	Medium-term
Market	BAU	Changing customers behavior.	Revenue from customers decreases through lower carbon competitors.	Short-term
	Well below 2 °C	Changes in consumer preferences from high carbon intensive to low carbon technologies.	Increase cost of production or raw materials.	Medium-term

Climate Related Risks	Scenario	Description	Impact to Business	Time horizon*
Reputation	BAU	Stakeholder concern and expect the company to conduct activities to reduce GHG emission.	Recognition from environmentally conscious consumers and risk of loss of trust and confident in management.	All time frames
	Well below 2 °C	Increase Stakeholder expectations for the business to achieve GHG emissions reduction targets or conduct activities to reduce climate change impact.	Reputation, brand value or revenue may decrease if the company does not have a clear direction to drive climate change goals.	All time frames
Physical Risk				
Acute	BAU	Increase severity and frequency of extreme weather events such as cyclones and floods etc.	● Business interruption estimated financial implication of the risk before taking action: 11,683.17 million baht. ● Impact on the Company's assets, cost of repairing or replacing damaged equipment my loss estimated 50,781.15 million baht. ● The estimate costs for these actions are 104.71 million baht.	Short and medium-term
	Well below 2 °C	Abrupt physical impacts, natural disasters, damages to equipment.	Decreased revenues.	Short and medium-term
Chronic	BAU	More frequent of severe extremes events, Equipment damages due to climatic conditions and variability leading to business disruption.	Damages from business disruption.	Medium and long-term
	Well below 2 °C	Risk of sea level rise and riverine flooding for sites located in high-risk areas.	Cost of preventive measures or new technologies.	Medium and long-term

Climate Related Opportunities	Scenario	Description	Impact to Business	Time horizon
Resource Efficiency and Energy Source	BAU	Improve resource and energy efficiency.	Increase in revenues and production capacity.	Medium and long-term
	Well below 2 °C	Use of new technologies, reduce waste disposed and use circular economy solutions.	Reputation and Reduce operating costs.	Medium and long-term
Products and Service	BAU	Promote and develop more low-carbon products and services.	● Increase revenues from the carbon credit markets. ● Earn a reputation for the business.	Medium and long-term
	Well below 2 °C	Develop new low-carbon products and services through R&D and innovation.	● Development of climate-related innovations. ● Improve competitive position on shifting consumer preferences ● Gain a good reputation for the business and Increased brand value. ● We are one of Thailand's leading renewable energy companies, recognizing the importance of renewable energy and constantly seeking new opportunities in this field. Our ventures extend to other businesses as well, such as our 1 GWh battery factory, which began operations in 2021 and is currently expanding its capacity to 2 GWh by 2024. Additionally, we have pioneered the production and distribution of electric vehicles, including over 2,000	Medium and long-term

Climate Related Opportunities	Scenario	Description	Impact to Business	Time horizon
			electric buses for bus operators. Moreover, we are committed to reducing fossil fuel consumption by developing BHD as a substitute, with plans to extend this to SAF in the future. The aviation industry is one of the highest carbon-emitting industries, making our efforts in this area particularly crucial.	
Markets	BAU	Market interest in low-carbon products and services.	Increase reputation and brand value.	Medium-term
	Well below 2 °C	Access to new markets and use of public-sector incentives.	Increased revenues through access to new markets or carbon credit sales. Revenue increase from carbon credit sales. The company's carbon credit revenue is approximately 15.75 million baht/year (the lowest expected carbon credit selling price (Reference : TVERs credit 20 baht/tonCO_2e)	Medium and long-term
Resiliency	BAU	Prepare for climate adaptation plan.	Investment in construction to against impacts of climate change such as flooding, storm.	Medium and long-term
	Well below 2 °C	Government's regulations related to climate change adaptation.	Increased reliability throughout supply chain and prevent business disruption from climate change.	Medium and long-term

Remark: Short-term (0-3 years), Medium-term (3-6 years), Long-term (6-10+ years)

GHG Emission Reduction and Low-Carbon Strategies

The Company has implemented plans to reduce GHG emissions and low carbon projects as below;

Research and development of raw materials to replace the main raw materials in the future Developing value-added products such as Green Diesel or applying environmentally friendly technologies to increase energy efficiency.

Raw materials

Expanding investments in lithium-ion battery plants and energy storage systems and electric vehicle plants.

Electric Vehicle (EV)

Expanding the infrastructure network of the charging station to contribute to the success of the new S-Curve electric vehicle industry

Infrastructure

Energy storage systems

Application of energy storage systems in renewable energy power plants. reduce the fluctuation of electricity less and create more stable power supply It also helps push Thailand into a Low Carbon Society. In particular, reducing pollution and global warming to achieve goals according to COP26.

Joined as a founding member of the “RE100 Thailand Club” (RE100TH) in order to show the intention of determination and become a key driver of energy efficiency, including aiming to solve the global warming problem and maintain the capability in enhancing Thailand’s competitiveness

RE100TH

Renewable Energy

Company continued to install renewable energy as solar farm and wind farm to reduce GHG emission. In 2023, the following renewable energy projects can reduce GHG emissions by 787,492 tonCO_2e

EA operates businesses that embrace social and environmental sustainability which lead to the development of Green Bond Framework to refinance projects which generate clean energy with environmental benefits.

Green bond

1.3 RISK MANAGEMENT

The Company has put in place organization risk management covering risk identification, risk assessment, determination of risk management plan, as well as monitoring and management of key risks in overall to ensure efficiency and effectiveness of its risk management. The Risk Management Committee has prepared risk management handbook so that the Risk Management Working Group will understand the risk assessment guidelines and perform risk monitoring, status report, and consistent review of the adequacy and efficiency of risk management measures to allow for the Company's timely and appropriate risk management.

The Company recognizes and gives importance to management of risks in all perspectives under changing circumstances from both internal and external factors which may affect its business operation. This aims to build confidence among its stakeholders, and enable smooth and continuous operation as planned, and with highest efficiency according to the objective of being a leader in alternative energy business by using the modern technology and environmentally friendly for the best benefit of consumers, shareholders, partners, and fairness to employees. Major risks in the year in subject which may affect business operation of the Company and its group of companies can be divided into 7 areas as follows:

1. Strategic Risk
2. Operational Risk
3. Financial Risk
4. Compliance Risk
5. Business Operation Risk
6. Social Risk
7. Emerging Risk

Figure 4: Risk Management Framework

Risk Assessment Matrix

Risk Assessment Matrix			Likelihood				
			Very Low	Low	Medium	High	Very High
			1	2	3	4	5
Impact	Very High	5					
	High	4					
	Medium	3					
	Low	2					
	Very Low	1					

Description table of risk management according to the level of the company's risk.

Risk Level	Color Represent	Risk Description
Very High		Risk Level that significantly exceeds the level of organization risk appetite with urgent risk mitigation required.
High		Unacceptable risk level that require immediate risk mitigation to an acceptable level.
Medium		Acceptable level but must be vigilant. Internal control may be implemented for more efficient.
Low		Acceptable of risk, no attention required.

1.4 METRICS AND TARGET

The company has set sustainability goals according to the UN Sustainable Development Goals (SDGs). The climate-related target is under environmental dimension. We have set a goal to reducing GHG emissions at least 25% by 2027 and 50% by 2037 compared to base year 2020. The long-term goal of achieving carbon neutrality by 2045 and net-zero emissions by 2060. However, we are considering the target to be adjust in order to better align with global aspirations to achieve carbon neutrality by 2040 and Net Zero by 2050 according to its goal of limiting global warming to well below 2, preferably to 1.5 degrees Celsius, which is in line with the Paris Agreement, the UN Sustainable Development Goals (SDGs).

Figure 5: Sustainability Goals

CLIMATE-RELATED PERFORMANCE

To determine the GHG emissions of EA Group, the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) was used on Global Warming Potential (GWP). The Company conducted assessment according to ISO14064-1:2018 and the guidelines of Thailand Greenhouse Gas Management Organization (TGO). The data was verified by Bureau Veritas Certification (Thailand) Co., Ltd.

GHG Emissions

Reduction Target long term : Become carbon neutrality by 2045 and net zero GHG Emissions by 2060.

Reduction Target short term : Reduce 25% by 2027 (from base 2020) (Scope 1 & 2)

Reduce 50% by 2037 (from base 2020) (Scope 1 & 2)

GHG Emission Target 2023 : Scope 1 50,000 tonCO_2e Scope 2 25,000 tonCO_2e and Scope 3 120,000 tonCO_2e

GHG Emissions of EA Group

	Unit	2020	2021 (1)	2022 (2)	2023(3)
Target: Direct and Indirect GHG emissions (Scope 1 & 2) per Revenue	tonCO_2e/MB	3.39	2.70	2.65	2.60
Direct GHG emission (Scope 1)	tonCO_2e	45,305	39,326	40,854	53,375
Energy Indirect GHG emissions (Scope 2) - Base on Location-based method	tonCO2e	12,965	13,559	25,977	27,232
- Base on Market-based method	tonCO2e	12,965	13,559	25,977	27,232
Other Indirect GHG emissions (Scope 3) (4)	tonCO_2e	68	143,502	247,867	117,494
Total Direct and Indirect GHG emissions (Scope1 & 2)	tonCO_2e	58,270	52,885	66,831	80,607
Total Direct and Indirect GHG emissions (Scope 1, 2 & 3)	tonCO_2e	58,338	196,387	314,698	198,101
Total Revenue	MB	17,199	20,558	27,547	31,598
GHG Emission per Revenue (Scope 1 & 2)	tonCO_2e/MB of Revenue	3.39	2.57	2.43	2.55
GHG Emission per Revenue (Scope 1, 2 & 3)	tonCO_2e/MB of Revenue	3.39	9.55	11.42	6.27

Remark :

(1) Since 2021, reporting of GHG emissions from other indirect activities (Scope 3) have been conducted, covering all significant activities.

(2) In 2022, reporting boundaries were expanded to include newly acquired or expanded business units.

(3) In 2023, the data underwent external verification by accredited independent agencies recognized by TGO, currently undergoing certification approval from TGO.

(4) For Scope 3, we evaluated and verified all categories. However, we only report significant emissions after screening them.

GHG EMISSION REDUCTION ACTIVITIES 2023

Activity	Objective	Scope	GHG Emission Reduction ($tonCO_2e$/Year)
Energy Efficiency	To reduce natural gas consumption, we improved the hot oil boiler (Tail Gas for Steam Boilers), resulting in an energy saving of 8,734,560.05 MJ/Year.	Scope 1	490.88
Energy Efficiency	To replace the material of the cooling tower fan blades led to reduce the energy consumption by 126,327.96 kWh/Year.	Scope 2	63.15
Electricity Consumption from Renewable Energy (Solar Rooftop)	To reduce electricity purchases from the grid system, we have installed renewable energy sources (solar rooftops) for the office, parking lot, and warehouse at our locations in Nakhon Sawan, Phitsanulok, and Chaiyaphum. In 2023, we installed solar cells generating a total of 191,711.9 kWh/Year.	Scope 2	95.84
Electricity Consumption from Renewable Energy (Floating Solar)	To reduce electricity purchases from the grid system, we have installed renewable energy sources (Floating solar panels) at our locations in Lopburi. In 2023, we installed solar cells generating a total of 37,212.7 kWh/Year.	Scope 2	18.60
Low Carbon Procurement	Changing the raw material purchasing to low-carbon materials in order to reduce greenhouse gas emissions. We are determined to reduce greenhouse gas emissions through various mechanisms in alignment with our Supply Chain Code of Conduct.	Scope 3	118,983.08
Total GHG Emission Reduction			**119,651.55**

Additionally, EA adopted an Internal Carbon Pricing (ICP) to set a shadow price at 115 THB/tonCO_2e to support assessments and making decisions to invest in low-carbon projects. We aim to reflect the environmental costs of our operations, encouraging more responsible resource allocation and investment decisions. Within our organization, the shadow price serves as a tool to assess the financial implications of carbon emissions across various projects and activities such as stress test investment and invest in low-carbon technology. It is integrated to ensure potential carbon-related risks and opportunities are well considered along with existing and upcoming GHG regulations. By incorporating the shadow price into our decision-making framework, the company can continue to advance its energy efficient operations, while driving sustainable value for stakeholders both within and outside organization.

2. CLIMATE RISK ADAPTATION

The climate change situation has intensified and affected many continents of the world, which is partly a result of greenhouse gas emissions from human activities. Many countries have turned their attention and are aware of the disaster, which can reduce the severity of climate change by collaborating to reduce GHG emissions.

According to one of the Task Force on Climate-related Financial Disclosures (TCFD)'s key recommended disclosures focuses on the resilience of an organization's strategy, taking into consideration different climate-related scenarios. Therefore, the Company has set up process to assessed both physical risks and transition risks associated with climate change. According to the physical risk assessment , We have prepared an adaptation plan to prevent or minimize the damage of climate-related as below;

Responses	Timeline
1. Study on feasibility of investment by choosing the plant location that is least vulnerable to climate change. There is a comprehensive plan to prevent the high impacts of future climate change risks.	All time frames
2) Storm: ● Solar Farm Business: Install wind speed device in 3 locations to detect the wind speed as well as set the wind speed rate at 15 (m/s) in order to sending a signal to the sensor to put the tracker is in sleep mode and help to reduce the damage of the PV panel from the storm. ● Wind Power Business: Install the sensor to adjust the turbine when the wind speed reaches a certain point that is expected to pose a danger to turbine.	Medium-term (3-6 years)
3) Flood: Construction of drainage systems around the plant, floodgates, drainage canals, etc.	Medium-term (3-6 years)

3. CLIMATE - RELATED MANAGEMENT INCENTIVES

The company has encouraged work challenges through “EA Inside EA Program,” a creative work and innovation competition which aims at multi-faceted improvement, such as faster delivery, improved quality, higher productivity, and sustainability. Moreover, we set key performance indicators as Climate-Related Management Incentives for executives and employees to drive efforts to achieve EA's goals.

Level	Type of Incentive	KPI / Program related to climate change issues
Chief Executive Officer (CEO)	Monetary	% Increase of GHG Emissions Reduction
Business Unit Manager	Monetary	EA Inside EA Program (Energy Efficiency / Emissions Reduction, etc.)
Employee	Monetary	EA Inside EA Program (Energy Efficiency / Emissions Reduction, etc.)

EA Inside EA Program 2023

Project	Objective	Benefit	KPI	Reward
Replace the material of the cooling tower fan blades	● To reduce Energy Consumption and GHG Emission ● To reduce operating costs	● Energy saving 126,327.96 kWh/Year ● Cost saving 470,737 THB/Year ● GHG Emission Reduction 63.15 tCO2e/Year	● Efficiency ● Energy reduction ● Emission reduction	To Manager, Supervisor, Officer, Operation 20,000 THB
Improve the efficiency of operations in order to reduce maintenance costs for Solar Inverter equipment	To reduce operating costs	Cost saving 3,010,500 THB/Year	Efficiency	To Manager, Supervisor, Officer 60,000 THB
Reduce Battery Supply Usage for UPS WTG	● To reduce waste generation and Indirect GHG Emission (Scope 3) from battery disposal ● To reduce battery usage to suitable for operations	Cost saving 3,628,800 THB/Year	Efficiency	To Manager, Supervisor, Officer 40,000 THB

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