

# EGCO TCFD Disclosure

27 June 2022

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## 1. INTRODUCTION

The Electricity Generating Public Company Limited (EGCO) acknowledges the pivotal role of the power sector as part of global efforts in addressing climate change and pursuing efforts to limit global temperature rises to 1.5°C in line with the Paris Agreement. Consequently, climate change is a material issue for EGCO, and to demonstrate EGCO's commitment to climate action, EGCO has announced a long-term target to become Carbon Neutral by 2050. EGCO has been continuously making public disclosures on our performance and key initiatives demonstrating EGCO's commitment to all stakeholders to furthering this agenda.

To better understand and manage climate-related impacts on our business and inform our stakeholders on the progress, EGCO and has been developing climate-related disclosure in line with the Task Force on Climate-Related Financial Disclosures or TCFD and is also registered as a TCFD Supporter. TCFD is a widely and globally supported climate disclosure framework aiming to help companies disclose to their investors and other stakeholders the financial impacts from climate change and the company's resilience strategy to these impacts. The TCFD disclosure framework centers around four pillars: governance, strategy, risk management, and metrics and targets.

In this second year of TCFD disclosure, EGCO has increased the scope and deepened climate-related risks and opportunities assessment, as well as further developed our climate strategy to address the risks and meet long term greenhouse gas (GHG) emission reduction targets. To more rigorously assess the potential impact of climate-related risks and opportunities, EGCO has conducted scenario analyses of transition and physical risks and quantified the potential financial impact of selected priority risks to EGCO's business. Similarly, following EGCO's declaration of a Carbon Neutral target, EGCO has developed a roadmap to demonstrate the commitment and actions needed to meet this target.

EGCO is committed to continually improving our climate-related performance and associated disclosures to be in line with best international practices.

## 2. GOVERNANCE

In recognizing the critical role that the power sector has to play in driving climate action and the transition towards a low carbon economy and society, climate change issues has been incorporated into EGCO’s governance structure from the board level through to the managerial level. The roles and responsibilities of the Board, Board-level committees, and managerial functions are described below.

Figure 1 EGCO’s Organization Structure

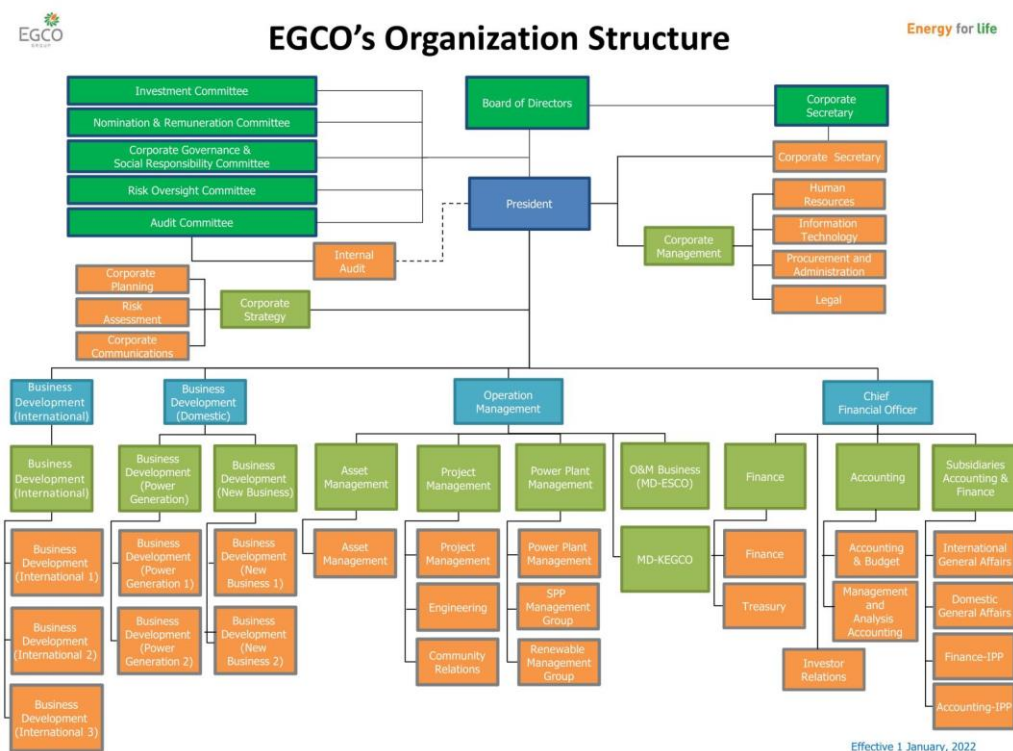


Table 1 EGCO’s Climate Governance

EGCO Functions	Climate Risks & Climate Strategy Roles and Responsibilities
Board of Directors	<ul style="list-style-type: none"> <li>Approves climate strategy and climate-related annual action plans, and KPIs, targets and goals</li> <li>Oversees progress against goals and targets related to climate change every six months</li> </ul>
Corporate Governance & Sustainability Committee (Sub-committee)	<ul style="list-style-type: none"> <li>Provides oversight over the implementation of climate strategy and climate-related risks and opportunities management at the corporate level</li> <li>Endorses climate strategy, climate-related policies, objectives, and annual plans in line with strategic plans, for the Board’s approval</li> </ul>
Risk Oversight Committee (Sub-committee)	<ul style="list-style-type: none"> <li>Assesses monthly the corporate risks, which includes climate-related risks and opportunities, and risk mitigation plans under the risk management systems and processes as presented by the Risk Assessment Division</li> <li>At least quarterly reviews the progress of climate-related issues and initiatives, corporate action plans, KPIs, targets and goals</li> </ul>
Executive Leadership	<ul style="list-style-type: none"> <li>Incorporates climate-related risks and climate strategy into EGCO business strategy</li> </ul>

EGCO Functions	Climate Risks & Climate Strategy Roles and Responsibilities
	<ul style="list-style-type: none"> <li>■ Approves and monitors the implementation of climate strategy, to align with strategic direction, areas of action, goals, targets, projects – and timely presentation to the Board</li> <li>■ Assigns responsibilities for climate strategy and risk management implementation</li> </ul>
Corporate Planning	<ul style="list-style-type: none"> <li>■ Coordinates with internal stakeholders for climate-related issues</li> <li>■ Is responsible for climate reporting and disclosure to external stakeholders</li> </ul>
Risk Management Committee	<ul style="list-style-type: none"> <li>■ Integrates climate-related risks and opportunities assessment and management into risk management systems and processes</li> <li>■ Oversees the risk management of EGCO and routinely reports to the Risk Oversight Committee and the Board of Directors</li> </ul>
Asset Management	<ul style="list-style-type: none"> <li>■ Oversees the overview of power plant operation (including Financial, Non-financial and Operation performance summary from power plants both subsidiaries and JVs)</li> <li>■ Monitors GHG emissions and climate related-risks and implementation of low carbon projects at each asset</li> <li>■ Monitors asset performance at a managerial and central level and liaises with internal stakeholders on physical and transition risks</li> </ul>
Business Development	<ul style="list-style-type: none"> <li>■ Incorporates climate-related risks and opportunities into strategic business decisions</li> <li>■ Integrates climate strategy into overall EGCO business strategy and in identifies business opportunities</li> </ul>
Power Plant Management	<ul style="list-style-type: none"> <li>■ Oversees operational management of EGCO subsidiaries' power plants only, including general management of each power plants and reporting of GHG emissions and climate-related risks at plant level</li> <li>■ Responsible for implementation of low carbon projects and climate-related risks management at operations</li> </ul>
Finance	<ul style="list-style-type: none"> <li>■ Assesses financial implications of climate-related risks and opportunities</li> <li>■ Integrates climate-related financial risks disclosures into mainstream reporting</li> </ul>

EGCO has established corporate-wide KPIs and targets related to climate change to drive climate action at the leadership and organizational level. Climate-related financial and non-financial KPIs have been set for executives, which are approved by the Board of Directors, and energy- and climate-related performance indicators have also been set at each asset to support a unified executive and managerial push for climate action. Climate-related KPIs include carbon intensity targets, increasing new generation capacity of renewable electricity, and others.

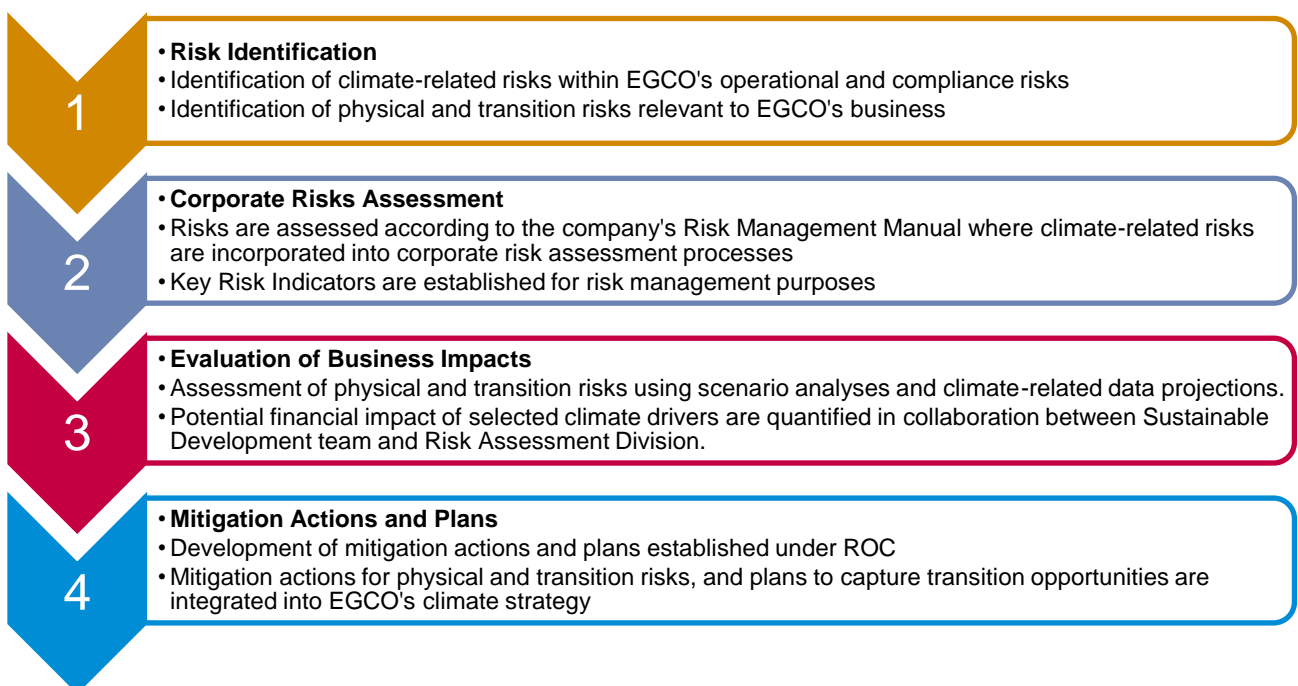
### 3. RISK MANAGEMENT AND CLIMATE STRATEGY

#### 3.1 Climate-Related Risks and Opportunities Management

EGCO has made climate-related risks and opportunities management as one of the company's primary goals. The Group identifies, assesses and manages climate-related risks (and opportunities) in accordance with the procedures defined in the company's **Risk Management Manual**, which was developed in line with the 2017 COSO-Enterprise Risk Management framework (COSO ERM). It is common for the Power sector that the climate-related risks are generally considered under Operational Risk (e.g. risk from water shortage caused by extreme climate conditions) and Compliance Risk (e.g. carbon tax). Climate change oversight has been allocated to the Corporate Sustainability Steering Committee which reports to the Corporate Governance and Sustainability Committee and incorporates performance against climate-related goals that are informed by climate risks and opportunities assessments into the company-wide KPIs to ensure a rigorous approach to the issue. EGCO has established key risk indicators (KRIs) which comprise the leading and lagging indicators in risk management and has also encouraged the employees to appropriately utilize these KRIs in their operation, along with monitoring and evaluating procedures, as well as periodic reporting to the Board and the Board Committees.

The Risk Assessment Division (RA) is responsible for monitoring, assessing and reporting Corporate Risk Management Performance to the Risk Management Committee (RMC) and the Risk Oversight Committee (ROC) according to the EGCO's risk management policy. Risk mitigation actions and plans are established under the purview of ROC upon determination of risk level and probably impact towards earning loss, business interruption and reputation.

**Figure 2 EGCO's Risk Management Process**



#### 3.2 Scenario Analysis

In 2022, EGCO has expanded the scope and deepened climate risks and opportunities assessment to better identify, evaluate, and manage their potential impacts. The assessment of climate-related risk scenarios is reviewed and categorized based on scenario patterns: the climate impact of key transitional and physical risks under specific scenarios. For this analysis, EGCO included the following inputs:

**Table 2 Scenario Analysis Inputs**

<b>Scope</b>	<ul style="list-style-type: none"> <li>For transition scenario analysis, group-wide impacts were assessed. For physical scenario analysis, a total of 25 assets were assessed, covering 84% of operations.</li> <li>Considered the impacts of climate change on three aspects of the EGCO's business operations: fossil-fuel based generation, green energy generation, supply chain (including upstream and downstream impacts).</li> <li>Business operations and value chain impacts were assessed.</li> </ul>
<b>Transition Scenarios</b>	<ul style="list-style-type: none"> <li><b>IEA Announced Pledges Scenario (APS):</b> a scenario which assumes all climate commitments made by governments around the world and longer-term net zero targets will be met in full and on time.</li> <li><b>IEA Sustainable Development Scenario (SDS):</b> a scenario which assumes that the goals of the Paris Agreement are met where the global temperature rise is well below 2 degrees above pre-industrial levels.</li> </ul>
<b>Physical Scenarios</b>	<ul style="list-style-type: none"> <li><b>Baseline:</b> based on historical data at EGCO's assets locations</li> <li><b>IPCC RCP 2.6:</b> to assess physical phenomena that occur when the transition to low carbon society is incorporated and Paris Agreement goals are met.</li> <li><b>IPCC RCP 8.5:</b> to demonstrate the physical impacts in the worst case scenario where no measures are taken to combat climate change.</li> </ul>
<b>Time Horizons</b>	<ul style="list-style-type: none"> <li><b>Short-term:</b> 1-4 years</li> <li><b>Mid-term:</b> 5-10 years and represented by <b>2030</b> to estimate impacts and prioritize mitigation actions, while considering the expected lifetime of assets and PPAs</li> <li><b>Long-term:</b> over 10 years and represented by <b>2050</b> to align with EGCO's Carbon Neutral target</li> </ul>

The previous year's transition scenario analysis focused on two drivers, projected emissions pathways across seven scenarios to 2030, and financial impact of carbon tax across two scenarios to 2030. This year, though we have reduced the number of scenarios to two, we have assessed nine drivers that incorporates both EGCO's business operations and value chain for a deeper and more holistic understanding. Similarly, for physical scenario analysis, we have expanded the number of assessed assets from 14 to 25 and assessed an additional scenario and additional time horizon. Please find more information about our previous year's scenario analysis at [EGCO Scenario Analysis 2021](#).

### 3.2.1 Transition Scenario Analysis

The scenario analysis on transition risks and opportunities is intended to comprehensively analyze EGCO's exposure to potential impacts arising from a global transition to a low carbon economy. Through internal stakeholder consultation, EGCO first identified transition drivers that were relevant to the business before conducting a semi-quantitative assessment and prioritization of transition drivers to EGCO's business and value chain under these selected scenarios. EGCO sought to ensure that both the upstream risks, such as carbon tax on suppliers, and downstream opportunities, such as decarbonization of the transportation sector, were included in this analysis to ensure a holistic understanding of the transition risks and opportunities that could impact EGCO. EGCO then quantified the potential financial impact of carbon tax and expected renewable electricity growth. Consequently, EGCO has developed response measures to mitigate expected risks and capture potential opportunities.

**Table 3 Transition Scenario Analysis Results and Implications**

Transition Drivers	Potential Impact <sup>1</sup>						Financial Impact (Without Any Intervention by EGCO) <sup>2</sup>	Implications for EGCO	Response Measures
	Fossil-Based Generation		Green Energy Generation		Supply Chain				
	2030	2050	2030	2050	2030	2050			
<b>Carbon Price (Risk)</b> <i>National carbon pricing regulations being introduced resulting in higher costs</i>							<ul style="list-style-type: none"> <li>• APS: operating costs increase by 28% in 2030 and 130% in 2050</li> <li>• SDS: operating costs increase by 28% in 2030 and 225% in 2050</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing OPEX for coal and NG electricity generation</li> <li>• Near-term generation linked to PPA, merit order, and planned phase out (2025)</li> <li>• Green electricity will become more cost-competitive</li> </ul>	<ul style="list-style-type: none"> <li>• Set up internal carbon price which reflects current or expected carbon pricing on operating and supplier jurisdictions</li> <li>• Engage with at-risk suppliers to reduce impact</li> <li>• Pursue opportunities in line with Carbon Neutral strategy to reduce emissions and impact</li> </ul>
<b>Fossil Fuel-Based Generation Decline (Risk)</b>							<ul style="list-style-type: none"> <li>• Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze electricity markets in relevant jurisdictions in terms of</li> </ul>	

<sup>1</sup> EGCO assesses the short-term impact of transition risks as part of its corporate risk management, which includes Government Policy, Legislative Change and Compliance Risk Due to Climate Change. Additional information can be found in [the Sustainability Report](#) p.60

<sup>2</sup> Percentage changes of financial impact is derived from several components. First, the changes in financial impact based on data indicators from IEA World Energy Model in each scenario at each time horizon. Second, a weighting is added to determine the relationship between data indicator and EGCO's business and value chain.



Transition Drivers	Potential Impact <sup>1</sup>						Financial Impact (Without Any Intervention by EGCO) <sup>2</sup>	Implications for EGCO	Response Measures
	Fossil-Based Generation		Green Energy Generation		Supply Chain				
	2030	2050	2030	2050	2030	2050			
<i>Development of renewable power generation leading to reduction in fossil-fuel based generation</i>									renewable capacity and national decarbonization strategies
<b>Carbon Capture, Utilization and Storage (Risk)</b> <i>Risk of delayed CCUS commercialization will reduce ability of existing power plants to support GHG emissions reductions targets</i>							<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Investments required for carbon capture, utilization and storage (CCUS) increase CAPEX but also allow existing plants and fuel types to continue operation and generate revenue at low net emissions.</li> </ul>	<ul style="list-style-type: none"> <li>To continue monitoring the commercial viability and costs of CCUS in operating jurisdictions.</li> <li>If deployment of CCUS is expected to delay, consider phasing out carbon intensive plants at a faster rate.</li> </ul>
<b>Sustainability-Linked Loans (Risk)</b> <i>Increasing climate-related assessments/requirements to access capital</i>							<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Fossil-based generation poses risks to access to capital, especially in plants without CCUS due to sustainability and climate-related requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate clear and strong efforts to reduce carbon emissions, e.g. setting emission reduction targets, future capacity expansion in green and renewable business ventures.</li> <li>Clearly identify limitations (e.g. long-term PPAs), and action items to mitigate GHG emissions generated.</li> </ul>
<b>Renewable Electricity Growth (Opportunity)</b> <i>Increased revenue from the growing demand of renewable electricity</i>							<ul style="list-style-type: none"> <li>APS: opportunity in revenues of 12% by 2030 and 22% by 2050</li> <li>SDS: opportunity in revenues of 32% by 2030 and 239% by 2050</li> </ul>	<ul style="list-style-type: none"> <li>As electricity demand is expected to rise, expect growth in both fossil and renewable generation in short-medium terms</li> <li>Under SDS, the financial impact is the maximum potential assuming no ceiling on the capacity and demand, which is dependent on electricity demand growth.</li> </ul>	<ul style="list-style-type: none"> <li>Integrate national decarbonization strategies and renewable electricity targets analyses in jurisdictions of planned investments.</li> <li>As part of EGCO's climate existing strategy to increase revenue from low carbon businesses and contributing to smart grid and smart city, EGCO may push for new business collaborations in public charging</li> </ul>

Transition Drivers	Potential Impact <sup>1</sup>						Financial Impact (Without Any Intervention by EGCO) <sup>2</sup>	Implications for EGCO	Response Measures
	Fossil-Based Generation		Green Energy Generation		Supply Chain				
	2030	2050	2030	2050	2030	2050			
<b>Electrification of Other Sectors (e.g. EV uptake) (Opportunity)</b>  <i>Increase access to new markets and partnerships e.g. with transport sectors</i>							<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Increased demand for green electricity as part of sectorial decarbonization plans, leading to additional revenues.</li> <li>Transport electrification may rely heavily on green electricity &amp; batteries, increasing cost of shipping and thus OPEX.</li> </ul>	<ul style="list-style-type: none"> <li>infrastructures to support growing demand for EVs.</li> <li>EGCO may also register renewable energy plants with the relevant electrical authorities to issue RECs.</li> </ul>
<b>ROI on Low-Emissions Technology (Opportunity)</b>  <i>Investments in technical development (i.e. R&amp;D in battery storage capacity)</i>							<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Investments and technology developments e.g. energy storage, can help reduce cost and enhance applicability of green electricity, such as energy storage.</li> <li>Fuel distributors may increase cost of shipping and OPEX</li> </ul>	<ul style="list-style-type: none"> <li>Feasibility studies for low-carbon technologies, including how it may be integrated with current and future EGCO business strategy.</li> <li>Conducting piloting studies with relevant business partners to accelerate commercial viability of low-emission technology, such as battery storage.</li> </ul>
<b>Hydrogen Use (Opportunity)</b>  <i>Large scale deployment of hydrogen as a clean energy source</i>							<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>CAPEX will be incurred to retrofit existing plants for hydrogen</li> <li>Increased shipping costs for suppliers</li> </ul>	<ul style="list-style-type: none"> <li>Conduct analysis on the readiness of blue or green hydrogen, expanding upon 2 existing facilities generating power on hydrogen fuel.</li> <li>Identify opportunities to supply renewable electricity to the production of green hydrogen.</li> </ul>
<b>Shareholder and Stakeholder Sentiment (Opportunity)</b>  <i>Increased external stakeholder pressure to disclose climate-related activities.</i>	N/A						<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>EGCO's reputation and access to capital may be impacted by stakeholder demands for climate action.</li> <li>EGCO's continued implementation and disclosure of the low carbon transition will positively impact EGCO's reputation, creating business and investment opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>Continue and improve EGCO's sustainability and climate journey disclosure through credible frameworks.</li> <li>Continue engaging with key stakeholders and policymakers to encourage transition to low carbon society.</li> </ul>

Risk/Opportunity Score Colour Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

**Combining Transition Risk & Opportunity** EGCO has a clear upside from a transition to a low carbon company if the world moves in line with SDS trajectory. EGCO has potential profitability risks of -1% under APS and opportunity of 35% higher profitability under SDS by 2030. Long-term revenue growth potential of 4% under APS and 242% under SDS by 2050 (SDS upside dependent on the demand and supply of greener form of energy).













### 3.2.2 Physical Scenario Analysis

Acute and chronic risks of climate change from a variety of conditions, such as riverine flooding, cyclone/wind, water scarcity/water stress, coastal flooding and sea level rise, and extreme heat are evaluated as physical risk factors. EGCO prioritized 25 assets to be assessed against physical climate impacts, whereby each asset's location was reviewed and the related regional and country-level physical risks were assessed and evaluated. At this level, a "hot spot" site-level risk analysis was conducted, and EGCO seeks to expand this risk analysis further in the upcoming years. In this initial stage, EGCO has identified two core risk areas and quantified their potential financial impact to EGCO's business under various scenarios. It is important to note that this risk and impact analysis is conducted under the assumption of **no intervention conducted** by EGCO. Through this, EGCO has developed group-level strategic responses address and mitigate these risks.

Figure 3 Physical Scenario Analysis Heat Map

Asset	Water Scarcity					Riverine Floods					Coastal Floods					Extreme Heat					Cyclone and Wind					
	BSL	RCP 2.6		RCP 8.5		BSL	RCP 2.6		RCP 8.5		BSL	RCP 2.6		RCP 8.5		BSL	RCP 2.6		RCP 8.5		BSL	RCP 2.6		RCP 8.5		
	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050		
<b>Coal</b>																										
Philippines	High	Low	Low	Low	Low	Medium	Low	Low	Low	High	High	Low	Low	Low	Medium	High	Low	Low	Low	Low	High	Low	Low	Low	Low	
Thailand	High	Low	Low	Low	Low	High	N/A				High	Low	Low	Low	Low	High	Low	Low	Low	Low	High	N/A				
<b>Geothermal</b>																										
Indonesia	Medium	Low	Low	Low	Low	High	N/A				N/A				Medium	Low	Low	Low	Low	Low	High	N/A				
<b>Hydro</b>																										
Laos	High	Low	Low	Low	Low	High	Low	High	High	High	High	N/A				Medium	Low	Low	Low	Low	High	Low	Low	Low	Low	
<b>Natural Gas</b>																										
Thailand	High	Low	Low	Low	Low	Medium	High	High	High	High	High	N/A				High	Low	Low	Low	Low	High	Low	Low	Low	Low	
South Korea	High	Low	Low	Low	Low	High	N/A				N/A				High	Low	Low	Low	Low	High	Low	Low	Low	Low	High	
USA	High	Low	Low	Low	Low	High	Low	High	High	High	N/A				High	Low	Low	Low	Low	High	Low	Low	Low	Low	High	
<b>Solar</b>																										
Thailand	High	Low	Low	Low	Low	Medium	High	High	High	High	N/A				High	Low	Low	Low	Low	High	Low	Low	Low	Low	High	
<b>Wind</b>																										
Australia	Medium	Low	Low	Low	Low	High	N/A				N/A				Medium	Low	Low	Low	Low	High	High	High	N/A			
Thailand	High	Low	Low	Low	Low	High	N/A				N/A				Medium	Low	Low	Low	Low	High	High	High	N/A			
Taiwan	N/A					N/A					High	Low	Low	Low	Low	High	Low	Low	Low	Low	High	High	High	High	High	

Note: BSL – Baseline<sup>3</sup> and N/A – not applicable

Baseline Hazard Rating		Forecast hazard rating	
High			Significant Increase
Medium			Moderate Increase
Low			Minimal Increase
No Hazard			Near Normal
N/A			Minimal Decrease
			Moderate Decrease
			Significant Decrease

<sup>3</sup> Baseline scenario refers to **short term** scenario reflecting 1-4 year timeframe.

Table 4 Physical Risks Impact and Business Implications

Hazard	High Exposure Assets	Key Findings	Business Implications	Potential Financial Impact	Response Measures/Adaptation Plan
<b>Coastal Floods and Sea-Level Rise</b>	<ul style="list-style-type: none"> <li>Coal in the Philippines</li> <li>Coal in Thailand</li> <li>Wind in Taiwan</li> </ul>	<ul style="list-style-type: none"> <li>In recent years, an increasing number of <b>coastal floods due to sea level rise is expected to impact the South-East Asia region</b>, which may cause coastal floods in the future.</li> <li>Due to the location of EGCO's assets, the assets that may receive the <b>highest impact are in Taiwan followed by the Philippines and Thailand.</b></li> <li>While baseline risk is already high for these assets, in <b>RCP8.5 scenario, this risk is expected to increase moderately to significantly in 2030 and 2050.</b></li> </ul>	<p><b>Physical Damages</b></p> <ul style="list-style-type: none"> <li>Damage to coastal infrastructure, tools and equipment and increase in associated costs</li> <li>Loss of land due to permanent inundation</li> </ul> <p><b>Business/Supply Chain Interruptions</b></p> <ul style="list-style-type: none"> <li>Impact on accessibility</li> <li>Downstream transmission and distribution network to EGCO's sites can be susceptible to coastal disturbances and storm surges.</li> </ul> <p><b>Health, Safety and Environment</b></p> <ul style="list-style-type: none"> <li>Electrical safety hazard for solar farms</li> </ul>	<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Coastal flood risk assessments to identify vulnerable key assets</li> <li>Implement any additional mitigation measures</li> </ul>
<b>Extreme Heat</b>	<ul style="list-style-type: none"> <li>Natural Gas in Thailand</li> <li>Solar in Thailand</li> </ul>	<ul style="list-style-type: none"> <li>Climate change projections indicate higher maximum temperature and longer warm spell duration in the future.</li> <li>Projected to have <b>significantly increased hazard impact</b> on all asset types except Coal and Geothermal.</li> <li>The impact is <b>particularly high for Solar and Natural Gas plants</b>, where a moderate to significant increase is expected on top of an existing high risk hazard.</li> </ul>	<p><b>Physical Damages</b></p> <ul style="list-style-type: none"> <li>Reducing capacity/efficiency and potential shutdown of thermal power plants, such as coal and natural gas</li> <li>Solar panels/batteries quality degradation</li> </ul> <p><b>Business/Supply Chain Interruptions</b></p> <ul style="list-style-type: none"> <li>Increased downstream transmission losses</li> <li>Reduced availability of water for cooling plants or fuel transportation, reducing output.</li> </ul>	<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Provide training to employees to identify symptoms of heat stress and provide first aid</li> <li>Analysis on two current mitigation measures of reducing generation capacity or increasing technology cost</li> </ul>

Hazard	High Exposure Assets	Key Findings	Business Implications	Potential Financial Impact	Response Measures/Adaptation Plan
			<ul style="list-style-type: none"> <li>Temperature of water discharged does not exceed regulation, leading to business interruption/increased cost to ensure discharged water temperature to maintain generation capacity</li> </ul> <p><b>Health, Safety and Environment</b></p> <ul style="list-style-type: none"> <li>Potential discomfort due to heat stress leading to reduced efficiency and harm to employees</li> </ul>		
<b>Riverine Floods</b>	<ul style="list-style-type: none"> <li>Hydro in Laos</li> <li>Natural Gas in Thailand</li> </ul>	<ul style="list-style-type: none"> <li>It is observed that <b>Assets located in South-East Asia are more prone to Flood hazard</b>. Climate projections indicate an increasing trend in extreme rainfall in these region.</li> <li>Significant change in <b>extreme rainfall</b> is projected under climate change scenarios, increasing hazard impact for <b>EGCO's Hydro and Natural Gas plants</b> from an already high risk baseline.</li> <li>The increased rainfall may lead to riverine / urban drainage inundation and water logging in low lying areas, potentially leading to operational and supply chain disruptions.</li> </ul>	<p><b>Physical Damages</b></p> <ul style="list-style-type: none"> <li>Water damage to electrical/ electronic components, including PV panels, and increase in associated costs</li> <li>Sediment load, reducing capacity of dams and reservoirs and damage turbines.</li> <li>Erosion of foundation and collapse of supporting structure</li> </ul> <p><b>Business/Supply Chain Interruptions</b></p> <ul style="list-style-type: none"> <li>Riverine / urban drainage inundation and water logging in low lying areas, potentially leading to operational and downstream disruptions</li> <li>Interruption to hydropower plants -&gt; inability to release water</li> <li>Raw materials for biomass, stock may be reduced (cost or supply) due to flood</li> </ul> <p><b>Health, Safety and Environment</b></p>	<ul style="list-style-type: none"> <li>Financial impacts on assets assessed are varied, but <b>all see an increase in revenue loss</b> due to flood risk.</li> <li>The financial impact of flood risk is <b>most varied for a coal plant in Philippines</b>, with losses rising by 28% in 2030 under RCP2.6) but peaking in 2050 under RCP8.5 (46%)</li> <li><b>A solar plant in Thailand sees the steepest increase in losses in RCP 8.5</b> by 2050, with an increase of 69%.</li> </ul>	<ul style="list-style-type: none"> <li>Installed flood protection infrastructure. For instance, at a co-generation power plant in Thailand EGCO has installed flood walls with management costs of ~10 million THB.</li> <li>Evaluate existing spill management plans and measures at hydropower plants</li> <li>Alternative feedstock sourcing for biomass plants to ensure supply</li> <li>Insurance</li> </ul>

Hazard	High Exposure Assets	Key Findings	Business Implications	Potential Financial Impact	Response Measures/Adaptation Plan
			<ul style="list-style-type: none"> <li>Safety of employees</li> <li>Electrical safety hazard for solar farms</li> <li>Migration of hazardous material/waste from natural gas and coal fired plants to the off-Site areas, risk of contamination.</li> </ul>		
<b>Cyclone and Wind</b>	<ul style="list-style-type: none"> <li>Coal in Thailand</li> <li>Coal in Philippines</li> <li>Wind in Taiwan</li> </ul>	<ul style="list-style-type: none"> <li>It should be noted that in recent years an increasing number of cyclones have been reported to affect some parts of the Globe.</li> <li>Considering the locations of the assets, <b>minimal to moderate change in cyclone hazard</b> is expected. Future cyclone trend indicates significant increasing trend in South-east Asia and East Asia region.</li> <li><b>Assets in Philippines and Taiwan are most exposed to cyclone and wind hazard</b> and should expect a minimal to moderate increase to the risk and impact of the hazard.</li> <li>Increase in strong winds and cyclones may disrupt business operations due to damages to equipment.</li> </ul>	<p><b>Physical Damages</b></p> <ul style="list-style-type: none"> <li>Damage to coastal infrastructure, particularly in plants in Southeast Asia and East Asian regions, tools and equipment and increase in associated costs</li> <li>Damage to PV panels</li> <li>Loss of land due to permanent inundation</li> </ul> <p><b>Business/Supply Chain Interruptions</b></p> <ul style="list-style-type: none"> <li>Disruption of value chain and associated revenue loss</li> <li>Supply chain - Unloading of coal during storm/cyclone in coastal plants</li> </ul> <p><b>Health, Safety and Environment</b></p> <ul style="list-style-type: none"> <li>Safety of employees</li> </ul>	<ul style="list-style-type: none"> <li>Not yet calculated</li> </ul>	<ul style="list-style-type: none"> <li>Comply with international best practices for wind load for design and construction of structures</li> <li>Implement monitoring mechanisms with regional meteorological agencies for early warning system</li> <li>Develop response mechanism to plan operations and take preventive steps to reduce impact</li> <li>Insurance</li> </ul>
<b>Water Scarcity</b>	<ul style="list-style-type: none"> <li>Natural Gas in Thailand</li> <li>Coal in Thailand</li> <li>Solar in Thailand</li> </ul>	<ul style="list-style-type: none"> <li>Climate change projections indicate minimal changes from baseline on water scarcity across EGCO's assets. The water availability of water at local level (e.g. at site) may be affected by water usage patterns in and around the site area.</li> </ul>	<p><b>Business/Supply Chain Interruptions</b></p> <ul style="list-style-type: none"> <li>Reduced generation capacity in coal-fired due to water use in boilers, co-gen (due to steam production) power plants due to municipal water protection</li> </ul>	<p>The <b>expense to water scarcity in 2030</b> from a 2021 baseline:</p> <ul style="list-style-type: none"> <li><b>Natural Gas Small Power Producer in Thailand</b> expects an</li> </ul>	<ul style="list-style-type: none"> <li>For plants at risk of water scarcity, such as EGCO Cogen, we have constructed water reserves to ensure water availability</li> <li>Conduct detailed water risk assessment to</li> </ul>

Hazard	High Exposure Assets	Key Findings	Business Implications	Potential Financial Impact	Response Measures/Adaptation Plan
	<ul style="list-style-type: none"> <li>Wind in Thailand</li> </ul>	<ul style="list-style-type: none"> <li>Across <b>almost all of EGCO's assets</b>, the baseline risk for water scarcity is <b>medium to high</b>. This risk continues to be a <b>high risk hazard</b> to all of EGCO's assets.</li> <li>EGCO may need to consider conducted detailed site-level water risks assessments and water stewardship programs to reduce potential business disruptions.</li> </ul>	<ul style="list-style-type: none"> <li>Reputational risk during water stressed periods</li> <li>Low water flows or high water temperatures reduce hydropower generation</li> <li>Water for solar panel cleaning</li> </ul> <p><b>Health, Safety and Environment</b></p> <ul style="list-style-type: none"> <li>Unavailability of water including for communal drinking and sanitation</li> </ul>	<p>25.7% increase in RCP4.5<sup>4</sup> and 36.7% increase under RCP8.5</p> <ul style="list-style-type: none"> <li><b>Natural Gas Independent Power Producer in Thailand</b> expects an 30.4% increase under RCP4.5 and 43.4% increase under RCP8.5.</li> </ul>	<ul style="list-style-type: none"> <li>evaluate water risks on availability, infrastructure, and governance at asset level</li> <li>Explore opportunities to reuse recycled wastewater within the plant or from nearby communities</li> </ul>

In the upcoming years, EGCO seeks to develop a deeper understanding of the risks posed to sites through site-specific physical climate risk assessments, focusing on key assets and key hazards. As part of ongoing efforts to mitigate and adapt to physical risks, EGCO considers appropriate insurance products to cover damages and losses due to potential natural hazards at given locations and have set up site-based mitigation plants.

EGCO has prioritized assets' water management as an integral part of physical risks mitigation and adaptation, which is further supported by the physical risks scenario analysis results where EGCO's assets have significant risk exposure to water-related risks, such as scarcity and floods. To better understand the impact of these risks, EGCO has conducted demonstrational quantification of financial impact of water scarcity and riverine floods in a scenario where no mitigation or adaptation efforts have been implemented by EGCO.

In implementing appropriate response measures, for plants located in areas at risk of water scarcity, such as at EGCO Cogen, EGCO has constructed water reservoirs to ensure year-round water supply and implemented fuel reservation plans to avoid operational disruptions. In areas that are exposed to flood risks, EGCO has implemented prevention action plans and emergency response measures, such as construction of flood control structures. Additional adaptation efforts can be found in EGCO's public disclosure on [adaptation to climate risk](#) and sustainability reports.

<sup>4</sup> RCP 4.5 is only used in quantifying financial impact of water stress due to data availability. All other physical risks assessments are based on RCP 2.6 and RCP 8.5.



### 3.3 Climate Strategy

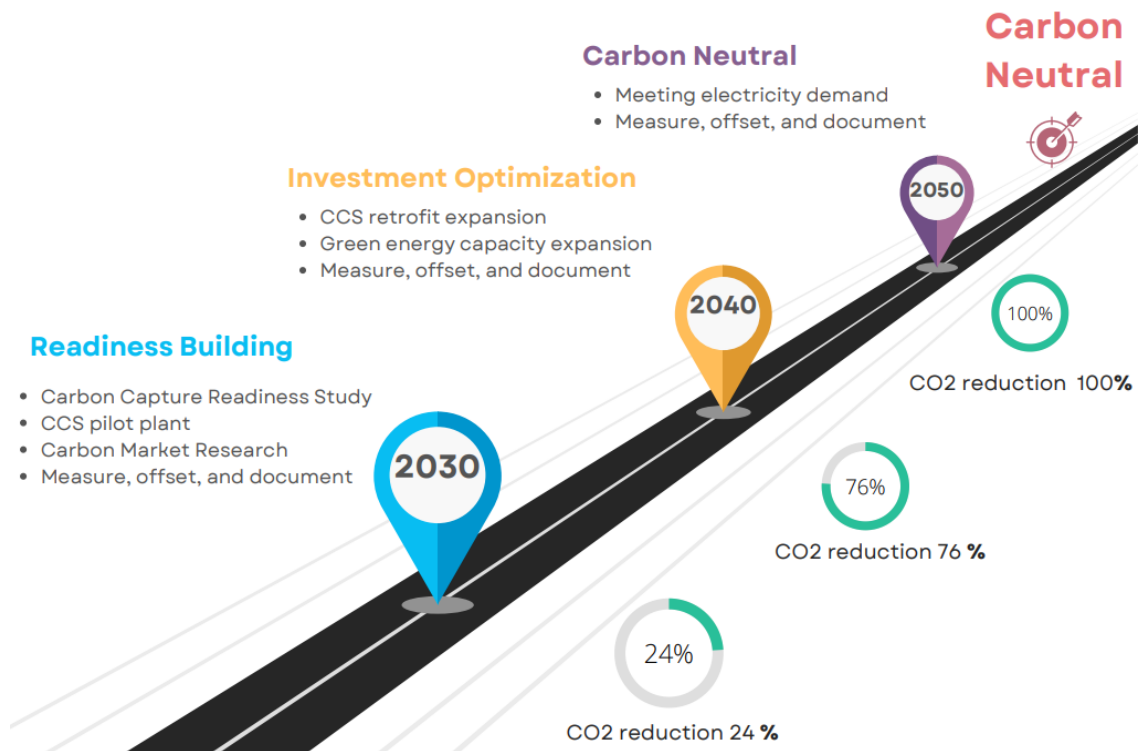
EGCO takes results of the climate risks and opportunities assessments and transforms them into action plans and strategic framework. As a consequence of such assessments in recent years, EGCO has developed a climate strategy effective through 2021-2030 with a strategic focus on the achievement of the GHG goals and implementation of key elements to pursue stellar climate change management. With the EGCO 2030 Strategic Climate Vision: “Accelerating the Energy Transition to a Low Carbon Society with Superior Innovation”, EGCO's goals are focused on three key strategic pillars:

- **Resilient Portfolio** is based on phasing out carbon-intensive electricity generation in favor of increasing renewable electricity generation, with a target of 30% installed renewable energy capacity and 10% carbon intensity reduction within 2030. As resilience is a key element of ensuring growth in a transition towards a low-carbon society, based on our transition risks and opportunity assessment, renewable electricity growth and decarbonization of downstream sectors are expected to be key opportunities that EGCO seeks to capture under this Pillar.
- **Accelerate the development of innovative businesses** by increasing revenue from low-carbon businesses, while also planning to promote decentralized renewable generation to contribute to Smart Grid and Smart Cities. To enhance the Group's drive towards innovative business, EGCO has set an annual investment target of 3 projects in new businesses. As evident by EGCO's analysis of global technological trends and opportunities assessment, hydrogen use has been identified as a key strategic focus for this pillar. EGCO seeks to pursue clean hydrogen in 2 of EGCO's plants and explore further capacity expansion.
- **Enabling Programs** to support capacity building and stakeholder engagement through improving internal climate risk and opportunity management. This also contributes to an organization's climate reputation. EGCO has developed KPIs and targets for capacity building and engagement initiatives, expects all conventional power plants to use 100% Best Available Technology, and is dedicated to becoming a CDP A-List member.

Further details under these three core strategic pillars can be found through [EGCO's public disclosure of the climate strategy](#) and pages 86-89 of [EGCO's 2021 Sustainability Report](#).

To support EGCO's carbon neutral ambitions and drive EGCO's climate strategy, this year, EGCO has developed a Carbon Neutral Roadmap.

Figure 4 Carbon Neutral Roadmap



The first phase, **Readiness Building**, continues up until 2030. Key activities in this phase consist of:

- Readiness analysis and feasibility studies on EGCO's assets for CCS retrofitting
- Purchase carbon credits to prevent increase in emissions during the first phase
- Expand renewable electricity generation portfolio to 30% by 2030

The second phase, **Investment Optimization**, details EGCO's key actions in the mid-term between 2030 and 2040. Key activities include:

- Optimize investment strategy into new plants as PPAs begin to expire
- Synthesize best practices for CCS retrofitting
- Expand renewable energy generation and source low-emission hydrogen
- Offset necessary GHG emissions to reach yearly target

The third phase, **Carbon Neutral**, lays out EGCO's priorities in the long term in order to achieve the Carbon Neutral target.

- Carbon credit processes are routine and continuously improved
- Invest in low-emission new capacity to meet electricity demand
- Offset residual emissions to achieve carbon neutral target

## 4. METRICS AND TARGETS

### 4.1 Climate-Related Metrics

EGCO aspires to be a major sustainable Thai energy company with full commitment to environmental protection and social development support. In 2021, EGCO re-examined its business direction and announced its low-carbon society commitment under the concept “Cleaner, Smarter, and Stronger to Drive Sustainable Growth”. EGCO also committed to building trust with the stakeholders by reporting climate related metrics and targets below.

**Table 5 GHG Emissions Data**

Performance	Unit	2019	2020	2021
<b>Direct (Scope 1) GHG emissions</b>	Metric tons CO <sub>2</sub> e	7,034,130	6,529,416	6,241,230
<b>Energy indirect (scope 2) GHG emissions</b>	Metric tons CO <sub>2</sub> e	7,127	10,474	17,044
<b>GHG emissions intensity (Scope 1 &amp; 2)</b>	Metric tons CO <sub>2</sub> e per MWh	0.49	0.49	0.49

**Table 6 Climate-Related Risk and Opportunity Metrics**

Opportunity Metrics	Unit	2019	2020	2021
<b>Renewable Energy</b>				
Total renewable energy generated	Megawatts (MW)	1032.8	1,042.5	1,050.3
Share of renewable energy generation compared to total energy generation	%	18.9	19.2	19.0

Risk Metrics	Unit	2019	2020	2021
<b>Water-Related Risk</b>				
Production plants in water-stressed areas	%	N/A	0	0
Cost of goods sold (COGS) in water-stressed areas	%	N/A	0	0

For other climate-related metrics please refer to EGCO's [environmental performance report](#). As EGCO's climate journey progresses, further climate risks and opportunities metrics and targets will be publicly disclosed.

### 4.2 Climate-Related Targets

**Table 7 Climate-Related Targets**

Emissions-Related Targets
<ul style="list-style-type: none"> <li>■ Reduce carbon emission intensity by 10% by 2030 from 2020 baseline</li> <li>■ Become carbon neutral in 2050</li> </ul>
Other Climate-Related Targets
<ul style="list-style-type: none"> <li>■ Increase the portion of renewable energy to 30% of the total generating capacity by 2030</li> <li>■ Power generated from coal to be maintained at 20-21% of the portfolio</li> </ul>

## 5. TCFD CONTEXT INDEX

TCFD Recommendation	EGCO's Public Disclosure
<b>Governance</b> - Disclose the organization's governance of climate-related risks and opportunities.	
a) Describe the board's oversight of climate-related risks and opportunities	<a href="#">Sustainability Management   Electricity Generating (egco.com)</a> <ul style="list-style-type: none"> <li>■ Sustainability Management Structure</li> </ul> <a href="#">EGCO Sustainability Reports 2021</a> <ul style="list-style-type: none"> <li>■ Climate strategy, pp. 86</li> </ul> <a href="#">2022 TCFD Disclosure - Governance</a>
b) Describe management's role in assessing and managing climate-related risks and opportunities	<a href="#">Sustainability Management   Electricity Generating (egco.com)</a> <ul style="list-style-type: none"> <li>■ Sustainability Management Structure</li> </ul> <a href="#">EGCO Sustainability Reports 2021</a> <ul style="list-style-type: none"> <li>■ Risk governance structure, pp. 52</li> </ul> <a href="#">2022 TCFD Disclosure - Governance</a>
<b>Strategy</b> - Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	
a) Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term	<a href="#">2022 TCFD Disclosure - Strategy</a> <ul style="list-style-type: none"> <li>■ 3.2 Scenario Analysis</li> </ul>
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	<a href="#">EGCO Annual Report 2021</a> <ul style="list-style-type: none"> <li>■ Emerging Risks p.60</li> <li>■ Risk from Raw Water Shortage, pp.56</li> <li>■ Climate Strategy p.86-90</li> </ul> <a href="#">Adaptation plan to climate risk</a>

TCFD Recommendation	EGCO's Public Disclosure
	<p><u>2022 TCFD Disclosure – Risk Management and Strategy</u></p> <ul style="list-style-type: none"> <li>■ 3.2 Scenario Analysis</li> <li>■ 3.3 Climate Strategy</li> </ul>
<p>c) Describe the resilience of the organization's strategy, taking into consideration different climate related scenarios, including a 2°C or Lower scenario.</p>	<p><u>EGCO Annual Report 2021</u></p> <ul style="list-style-type: none"> <li>■ Emerging Risks p.56</li> <li>■ Climate Strategy p.86-90</li> </ul> <p><u>2022 TCFD Disclosure – Risk Management and Strategy</u></p> <ul style="list-style-type: none"> <li>■ 3.2 Scenario Analysis</li> <li>■ 3.3 Climate Strategy</li> </ul>
<p><b>Risk Management</b> - Disclose how the organization identifies, assesses, and manages climate-related risks</p>	
<p>a) Describe the organization's processes for identifying and assessing climate-related risks</p>	<p><u>EGCO Annual Report 2021</u></p> <ul style="list-style-type: none"> <li>■ Risk Governance Structure p.52</li> <li>■ Risk Management Philosophy and Policy p.53</li> <li>■ Assessing Corporate Key Risks, Emerging Risks and Risks Mitigation p.54-56</li> </ul> <p><u>2022 TCFD Disclosure – Risk Management and Strategy</u></p> <ul style="list-style-type: none"> <li>■ 3.1 Climate-Related Risks and Opportunities Management</li> </ul>
<p>b) Describe the organization's processes for managing climate-related risks</p>	
<p>c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management</p>	
<p><b>Metrics &amp; Targets</b> - Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material</p>	
<p>a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process</p>	<p><u>Performance Summary: Environment</u></p> <ul style="list-style-type: none"> <li>■ Direct (Scope 1) GHG emissions</li> <li>■ Indirect (Scope 2) GHG emissions</li> <li>■ GHG emissions intensity</li> <li>■ Reduction of GHG emissions</li> </ul>
<p>b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, and the related risks</p>	

TCFD Recommendation	EGCO's Public Disclosure
	<ul style="list-style-type: none"> <li>■ Water withdrawal</li> <li>■ Water consumption</li> </ul> <p><u>2022 TCFD Disclosure – Metrics and Targets</u></p> <ul style="list-style-type: none"> <li>■ Climate-Related Metrics</li> </ul>
c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets	<p><a href="#">EGCO Annual Report 2021</a></p> <ul style="list-style-type: none"> <li>■ Business Targets p.18</li> </ul> <p><a href="#">EGCO Sustainability Report 2021</a></p> <ul style="list-style-type: none"> <li>■ Climate Strategy: Goal and Performance p.87</li> </ul> <p><u>2022 TCFD Disclosure – Metrics and Targets</u></p> <ul style="list-style-type: none"> <li>■ Climate-Related Targets</li> </ul>

