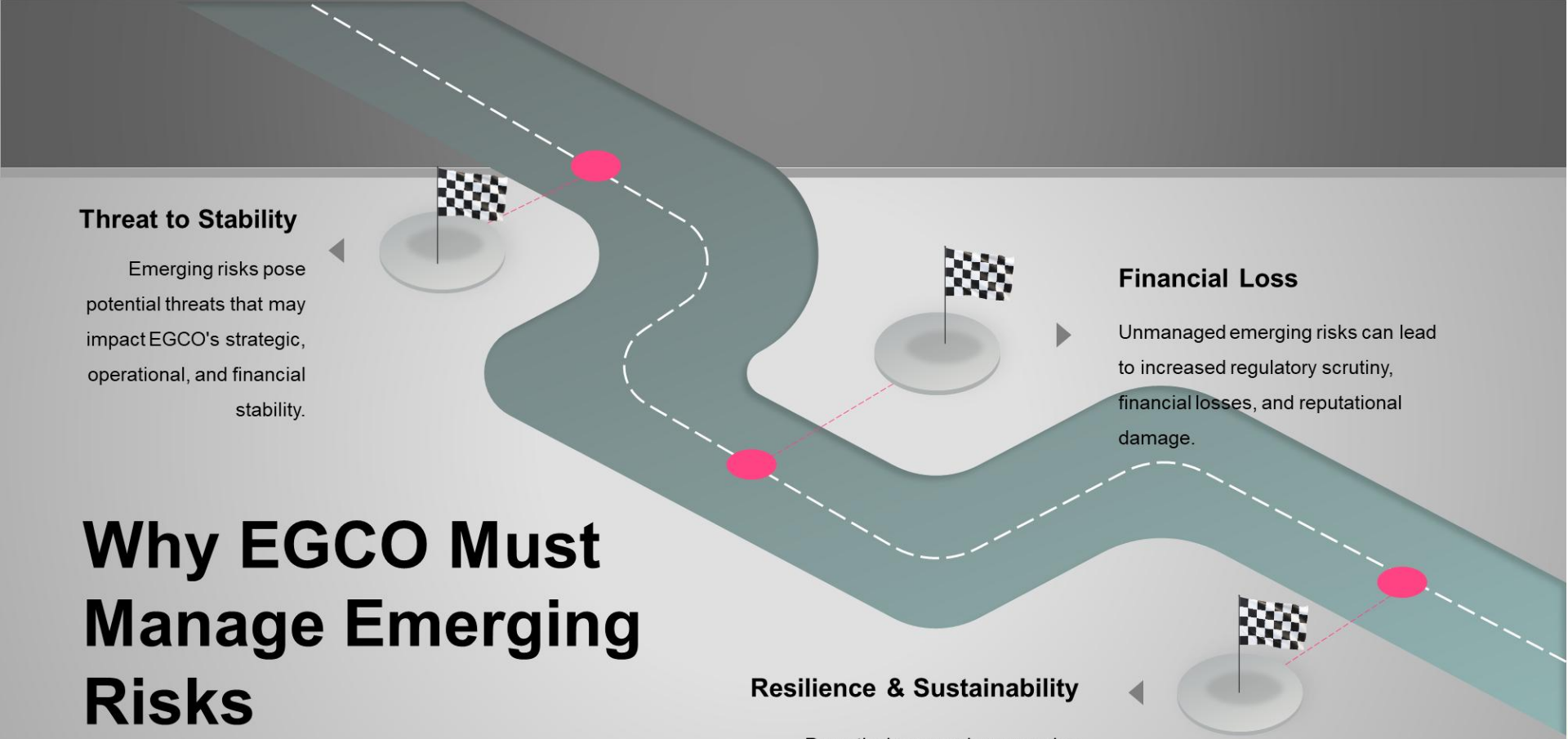
Emerging Risks in Utility Sector: Implications for EGCO Group

2025 Public Report

Why EGCO Must Manage Emerging Risks



Threat to Stability

Emerging risks pose potential threats that may impact EGCO's strategic, operational, and financial stability.

Financial Loss

Unmanaged emerging risks can lead to increased regulatory scrutiny, financial losses, and reputational damage.

Resilience & Sustainability

Proactively managing emerging risks enhances EGCO's resilience and long-term sustainability.

Definition of Emerging Risks to EGCO

Emerging risks are uncertain risks that:

- ***Are newly developing or evolving.***
- ***Have the potential to significantly impact EGCO's operations.***
- ***Require proactive monitoring and management due to their unpredictability***

Screening Criteria for Emerging Risks:

Unprecedented

Risks that have never occurred before in EGCO's operations .

Never Been Managed Before

Risks that lack established mitigation measures.

Significant and Specific to Power Plant Business

Risks uniquely affecting power generation operations.

External Risk

Risks originating from outside EGCO's direct control.

Not a Common Shared Risk

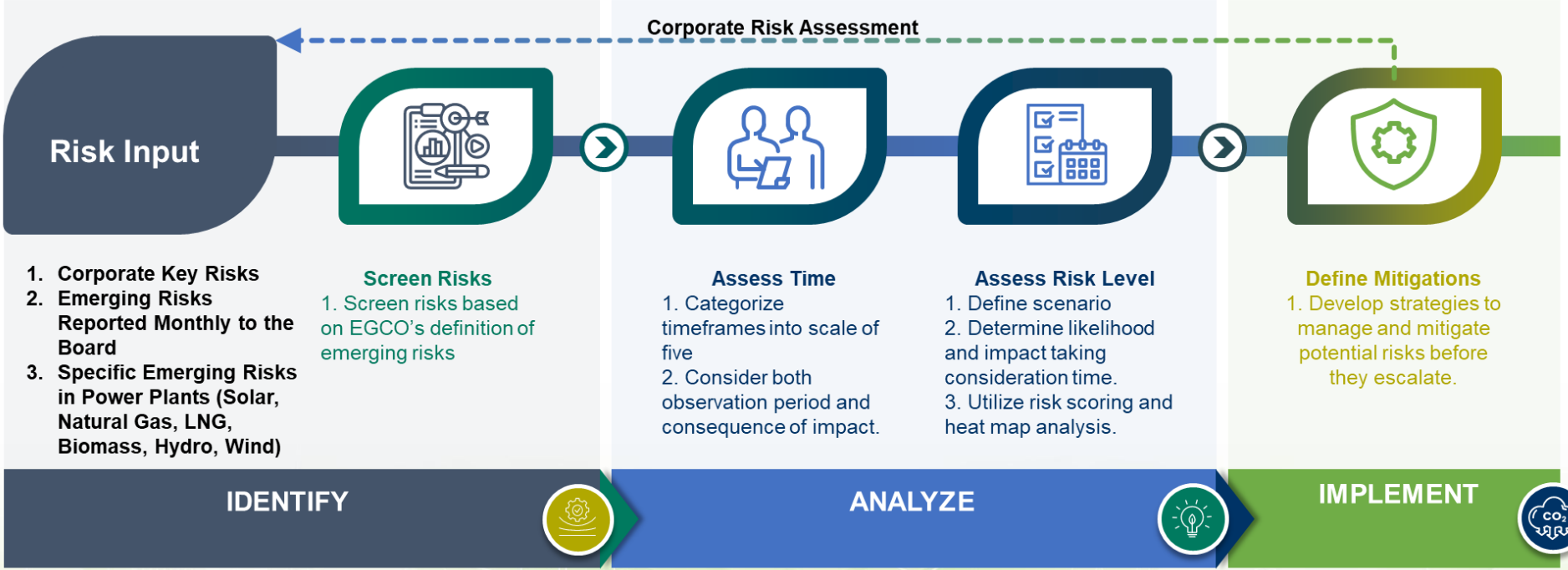
Risks that do not influence the entire industry

Long-term (3-5 years+)

Risks that unlikely to have a significant immediate impact, but potentially may have begun to have consequences for the company today

Method to Define and Assess Emerging Risks

EGCO identifies and assesses emerging risks through a cross-functional, as part of company-wide risk management process. Risks are reported monthly to the Board and screened using EGCO's internal definition. They are evaluated through a unified process, including timeframe analysis, scenario planning, and risk scoring. Mitigation strategies are developed at the corporate level to ensure consistent actions.



Risk Time Assessment

List of Risks Assessed

ST.1	ROE
ST.2	Credit risk rating
OP.2	Construction
FN.1	Investment
OR.3	Reputation
OP.3	Climate change (drought, flood, severe weather)
OP.1	Earning and dividend
FN.2	Share price
FN.3	Liquidity
OR.2	Rating
OR.1	Human capital
ST.3	Carbon intensity reduction
Em.1	Extreme weather events
Em.2	Infectious disease outbreaks
Em.3	Interstate arms conflicts
Em.4	Fluctuated energy commodities prices
Em.5	Economics slowdown risks
Em.6	AI and cybersecurity threats
Em.7	Technological disruption risk
Em.8	Solar geoengineering
Em.9	Geopolitical risks in LNG supply chains
Em.10	Biogenic CO_2
Em.11	Solar storm-induced panel degradation
Em.12	Wind resource shifts
Em. 13	Next-generation fuel technologies
Em. 14	Non-weather-related natural disasters (earthquakes, volcanoes, tsunamis, solar flares, etc.)

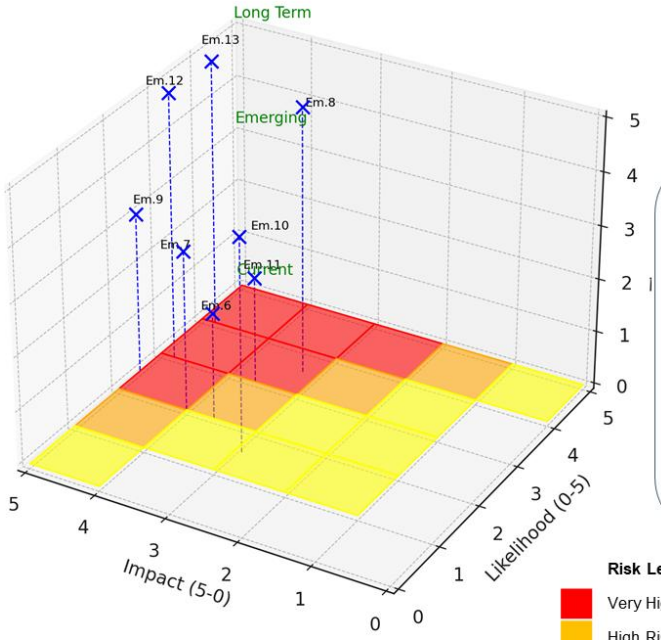
Consequences of Impact

EGCO Emerging Risks Matrix

Emerging Risk

- Current (Immediate impact) – 0 years
- Near Future – 1-3 years
- Foreseeable Future – 3-5 years
- Distant Future – 5-10 years
- Unknown Future – Beyond 10 years

Time (Observation Period and Consequence of Impact Period)



Emerging Risks

Em.5	Macroeconomic Risk (Regulatory Uncertainty Related to Energy Transition)
Em.6	AI Governance Alliance, Generative AI and Cyber Risk
Em.7	Technological Disruption Risk Energy Transition
Em.8	Solar Geoengineering Regulatory Uncertainty
Em.9	Geopolitical Risks in LNG Supply Chains
Em.10	Biogenic CO_2 Accounting & Regulatory Uncertainty
Em.11	Solar Storm-Induced Panel Degradation
Em.12	Wind Resource Shifts
Em. 13	Next-generation Fuel Technologies

EGCO Selected Emerging Risk Summary

Risk Level

Geopolitical Risks in LNG Supply Chains

- Risk Description: Global political instability, trade sanctions, and maritime chokepoint vulnerabilities increasingly threaten LNG supply routes..
- Impact: Very High
- Impact Period: 3-5 years
- Mitigations: Diversify LNG supply sources, establish contingency plans.

3-5 years

Very High
High

Solar Geoengineering Regulatory Uncertainty

- Risk Description: Changing regulations impact solar geoengineering projects.
- Impact: Medium
- Impact Period: more than 10 years
- Mitigations: Monitor regulatory trends, engage in policy advocacy.

5-10 years

Low
High

Wind Resource Shifts

- Risk Description: Changing climate patterns affect wind power generation.
- Impact: Medium
- Impact Period: more than 10 years
- Mitigations: Invest in adaptive technologies, enhance forecasting capabilities.

5-10 years

Moderate
High

AI Governance Alliance, Generative AI and Cyber Risk

- Risk Description: Unregulated AI models pose security and operational risks.
- Impact: High
- Impact Period: 1-3 years
- Mitigations: Develop AI governance frameworks, implement security protocols.

1-3 years

Moderate
Moderate

Next-generation Fuel Technologies

- Risk Description: Rapid advancements in fusion, LFTRs, green hydrogen, LDES, and Power-to-X may disrupt conventional generation
- Impact: Medium
- Impact Period: more than 10 years
- Mitigations: Implement strategic R&D, partnership in scalable low-carbon technologies.

5-10 years

Moderate
Very High

Source: Calculation of risk over time is based on The Role of Time in Risk and Risk Analysis: Implications for Resilience, Sustainability, and Management which considers observation and consequence period

Geopolitical Risks in LNG Supply Chains

Category: Geopolitical Impact Period: 3-5 years

Risk Description and Scenario

- **Supply Chain Disruptions:** Conflicts such as the Russia–Ukraine war, U.S.–China rivalry, South China Sea tensions, and unrest in the Middle East may disrupt LNG shipping, causing delivery delays and shortages.
- **Sanctions and Trade Restrictions:** Sanctions on LNG-producing nations (e.g., Russia, Iran) could significantly reduce available supplies, causing price volatility.
- **Infrastructure Vulnerabilities:** Critical maritime routes (Strait of Hormuz, Suez Canal) could be disrupt LNG imports.

EGCO's exposure:

EGCO relies on imported LNG for gas-fired plants in Thailand and has invested in LNG infrastructure.

Impact

- **Operational Vulnerability:** Disruptions could halt gas plant operations or require costlier backup fuels..
- **Financial Risks:** Sudden LNG price increases due to geopolitical events
- **Contractual Complexity:** Potential disputes or renegotiation of LNG supply contracts due to shipment delays
- **Energy Security:** Persistent risks may impact supply stability and long-term planning.

Mitigating Actions and Opportunities

- **Supply Diversification:** Secure multiple, geographically diversified LNG suppliers to reduce reliance
- **Flexible Contract Structures:** Incorporate geopolitical risk clauses and flexibility into procurement contracts.
- **Alternative Energy Sources:** Accelerate investments in renewable and alternative energy technologies to decrease dependence on imported LNG.

Solar Geoengineering Regulatory Uncertainty

Category: Technological Impact Period: More than 10 years

Risk Description and Scenario

- **Emerging Technology:** Solar geoengineering involves techniques like stratospheric aerosol injection (SAI) and marine cloud brightening (MCB) aimed at reflecting sunlight to mitigate global warming.'
- **Regulatory Void:** No comprehensive governance frameworks exist to regulate these technologies, leading to potential uncoordinated deployment.
- **Impact on Solar Energy:** If deployed, solar geoengineering could alter solar radiation levels, potentially reducing the efficiency of solar power generation.

Impact

- **Operational Disruptions:** Changes in solar irradiance could lead to decreased output from solar installations, affecting energy supply commitments.
- **Financial Implications:** Reduced solar efficiency may impact revenue streams and profitability.
- **Strategic Uncertainty:** EGCO's expanding solar portfolio may be affected, while lack of clear regulations may hinder EGCO's ability to plan and invest confidently in future solar projects.
- **Market Perception:** Investors may view regulatory uncertainty as a risk factor, potentially affecting EGCO's market valuation.

Mitigating Actions and Opportunities

- **Policy Engagement:** Actively participate in policy discussions and advocate for solar geoengineering.
- **Research and Adaptation:** Invest in research to understand potential impacts of solar geoengineering and develop adaptive strategies for solar operations.
- **Stakeholder Communication:** Maintain transparent communication with investors and stakeholders about risks and mitigation strategies related to solar geoengineering.

EGCO's exposure:

EGCO has a significant stake in solar energy, with substantial investments in Thailand and the US. EGCO's renewable energy capacity is growing, with plans for further expansion in solar power. This confirms EGCO's potential vulnerability to any technology that could affect solar radiation levels.

Wind Resource Shifts

Category: Environmental Impact Period: More than 10 years

Risk Description and Scenario

- **Climate Variability:** Climate change alters atmospheric circulation, leading to unpredictable wind speeds and directions that affect energy output.
- **Forecasting Challenges:** Historical wind maps used for site selection may become obsolete, impacting planning and operational efficiency.

Impact

- **Reduced Energy Output:** Lower wind speeds can lead to suboptimal turbine performance.
- **Financial Underperformance:** Wind assets may generate less revenue than projected, impairing returns and increasing payback periods.
- **Operational Reassessment:** Existing wind farms may require reevaluation, repowering, or hybridization with storage or other renewables.
- **Planning Uncertainty:** Site development strategies may need to be adjusted due to wind shifting.

Mitigating Actions and Opportunities

- **Advanced Wind Forecasting:** Adopt dynamic forecasting models and updated climate projections to inform asset planning and performance management.
- **Storage and Grid Flexibility:** Review plan to integrate battery energy storage and smart grid systems to manage intermittency and ensure dispatchability.
- **Site Optimization:** Explore emerging wind resource zones and revalidate existing sites based on updated climate data.

EGCO's exposure:

EGCO has wind assets in Thailand and Taiwan, exposed to regional wind variability.

AI Governance Alliance, Generative AI and Cyber Risk

Category: Technological Impact Period: 1-3 years

Risk Description and Scenario

- **Generative AI Risks:** The rapid adoption of generative AI in operational controls could introduce unpredictable vulnerabilities or operational disruptions in energy management systems.
- **Cybersecurity Vulnerabilities:** Increased digitalization and AI integration heighten exposure to cyber threats, potentially compromising critical infrastructure, grid stability, and data security.
- **Technological Disruption:** External innovation in digital automation and AI-driven systems may rapidly outpace existing infrastructure, requiring frequent adaptation.
- **Operational Overreliance on AI:** Growing dependence on AI for power grid control, renewable energy forecasting, smart grid modernization, and asset management may introduce new operational risks such as misjudgements in critical operations.

Impact

- **Operational Instability:** Cyber incidents or AI system failures could cause operational disruptions, leading to power outages or plant downtimes.
- **Financial Implications:** Significant costs may arise from recovery efforts, cybersecurity upgrades, regulatory compliance, and potential penalties.
- **Compliance Challenges:** Emerging global AI governance policies may increase regulatory complexity and impact future technology deployment strategies.

Mitigating Actions and Opportunities

- **Proactive AI Governance:** Adopt robust AI governance policies aligning with global frameworks such as the AI Governance Alliance.
- **Enhanced Cybersecurity Infrastructure:** Regularly update cybersecurity protocols, implement real-time monitoring systems, and perform frequent penetration testing to guard against AI-driven cyber threats.
- **Strategic Digital Transition:** Gradually integrate generative AI into controlled pilot projects before broader deployment to manage operational risks.
- **Training and Awareness:** Provide specialized cybersecurity training for operational staff, emphasizing secure management of AI-integrated systems.

EGCO's exposure:

EGCO is actively incorporating AI into various aspects of power plants, from monitoring solar panel efficiency to inspecting machinery. While this digitalization brings many benefits, it also makes EGCO more vulnerable to the cybersecurity risks associated with AI.

Next-generation Fuel Technologies

Category: Technological Impact Period: More than 10 years

Risk Description and Scenario

- **Disruptive Innovation:** Advanced technologies such as nuclear fusion and liquid fluoride thorium reactors (LFTRs) are still in development but may radically transform the energy landscape, potentially displacing existing thermal and renewable assets.
- **Rapid Adoption:** The scalability of green hydrogen, long-duration energy storage (LDES), and power-to-X (P2X) may accelerate faster than anticipated.
- **Regulatory Evolution:** New regulatory and safety frameworks will be needed, creating planning uncertainty

Impact

- **Asset Obsolescence:** EGCO's existing power plants (especially thermal assets) may lose competitiveness or face early retirement as next-gen fuels reach commercialization.
- **Financial Exposure:** High capital costs may be needed to upgrade infrastructure or participate in new technology markets.
- **Operational Complexity:** New technologies require different technical expertise, regulatory compliance, and system integration.

Mitigating Actions and Opportunities

- **Strategic R&D Collaboration:** Partner with research institutions and innovators to monitor and evaluate emerging technologies such green hydrogen, LDES, and P2X systems.
- **Policy Engagement:** Participate in international and domestic policy dialogues to shape emerging regulatory frameworks.
- **Internal Capability Building:** Develop future-ready technical and managerial capabilities to support technology transition.
- **Readiness:** Monitor, prepare for, and analyze emerging next-generation fuel technologies to stay ahead of new fuel trends and ensure long-term adaptability.

EGCO's exposure:

The emergence of these new technologies presents both opportunities and challenges. EGCO's portfolio includes traditional and renewable assets that may face obsolescence without adaptation and the need for significant investment in new infrastructure, seem plausible given the transformative nature of these technologies.

EGCO GROUP

Thank you