



Integrating climate-risk assessment into corporate decision models: An actionable framework



01 The Context

From disclosure to decision

Investor and stakeholder expectations across financial institutions and large corporates are rapidly evolving. Climate and sustainability performance is no longer a matter of reputation; it is becoming a direct determinant of capital access and cost. The cost of capital is increasingly linked to a company's climate alignment, reflecting how effectively its strategy, governance, and investments anticipate transition and physical risks.

For the Gulf Cooperation Council (GCC), this conversation holds particular urgency. The region faces dual exposure: transition risks arising from the global move away from hydrocarbons, and physical risks linked to rising temperatures, water scarcity, and extreme weather events. The Gulf's economic landscape, characterized by state-linked enterprises, export-oriented industries, and large sovereign investment flows, makes climate factors an integral part of national diversification plans, credit assessments, and financing conditions. These pressures make it imperative for regional organizations not only to disclose, but to actively understand and manage their climate vulnerabilities.

Yet today, climate considerations in many organizations remain fragmented. Environmental specialists manage emissions, while financiers and investors handle risk - often in parallel, rarely in integration. Emerging data, however, show that climate factors can present material financial hazards that are underestimated or overlooked in conventional models. The evidence is clear: climate risk is business risk.

Therefore, the challenge before corporations is not merely to comply with disclosure rules but to bridge the gap between reporting and real decision-making. Climate and sustainability data must move from sustainability reports into the decision matrix influencing investment appraisals, capital budgeting, and everyday operational choices.

02 Understanding climate risk through a financial lens

Before exploring how climate risks can be embedded into decision-making models, it is essential to pause and truly understand what makes climate risk a *business risk*. Too often, environmental teams handle “climate,” while financiers handle “risk.” This separation obscures a fundamental truth: climate change is not an environmental issue alone, it is a financial and strategic one. Climate risks manifest in two broad but inter-connected forms: physical risks and transition risks.



Physical risks: When weather becomes a balance-sheet issue

Physical risks arise from climate-driven events that damage assets, interrupt operations, and strain value chains. Rising global temperatures, flooding, drought, and sea-level rise have direct financial consequences in lost revenues, higher insurance premiums, asset impairment, and recovery costs.

A recent example unfolded in Dubai in April 2024, when the UAE experienced its heaviest rainfall in 75 years - about 142 mm in 24 hours, roughly *18 months' worth of rain in a single day* [1]. Dubai International Airport (DXB), one of the world's busiest, faced over 1,200 flight cancellations and extensive operational shutdowns as runways and access roads flooded. Logistics chains were paralyzed, hotels overflowed, and regional cargo hubs were disrupted. For businesses dependent on the airport (airlines, freight forwarders, catering, and hospitality operators), the financial impacts included lost revenues, unplanned downtime, and large recovery expenditures.



02 Understanding climate risk through a financial lens

The broader systemic implications of such disruptions extend well beyond the immediate operational footprint of the affected facility. Such effects typically include:



Supply-chain delays across air-cargo and just-in-time networks, affecting pharmaceuticals, perishables, industrial inputs, and e-commerce flows.



Working-capital pressure, driven by extended receivables cycles, delayed deliveries, and the need to rebuild safety-stock buffers.



Inventory and contractual impacts, including inventory write-downs, liquidated-damages clauses, and rescheduling or expediting costs for importers and exporters.



Profitability impacts, as service-level agreement breaches and contract penalties affect earnings across multiple sectors.



Logistics cost escalation, as freight rates and fuel or congestion surcharges rise due to capacity constraints and rerouting requirements.



Insurance and risk-transfer effects, with higher premiums and tighter reinsurance terms following major disruption events.

Empirical analysis of the April 2024 Dubai floods illustrates this transmission effect. One study notes that the event “can potentially disrupt Ghana’s trade activities and economic growth,” demonstrating how a localized climate shock at a global hub can translate into cross-border supply-chain and balance-sheet exposure [2]. In this sense, climate-driven disruptions should be understood not as isolated operational incidents, but as system-wide business risks with material financial implications for companies far removed from the original event.

02 Understanding climate risk through a financial lens



Transition risks: When the world moves faster than you do

If physical risks reflect *what the climate does to a business*, transition risks reflect what the world does in response. As governments, investors, and consumers accelerate decarbonization, companies that fail to adapt face escalating costs and shrinking opportunities.

Transition risks typically arise through:



Policy tightening:

New carbon pricing or emissions standards;



Market shifts:

Demand moving toward low-carbon substitutes;



Technological disruption:

Rapid adoption of cleaner alternatives; and



Reputational and legal exposure:

Investors and courts holding firms accountable for misleading climate strategies.

Consider the European energy sector, where several utilities, including RWE and E.ON, faced billions in stranded asset losses when coal plants became economically unviable under tightening carbon regimes [3]. Similar dynamics are emerging globally from auto manufacturers investing heavily in EV transitions to financial institutions exiting high-emission portfolios to avoid regulatory and reputational penalties.

In quantitative terms, studies estimate that fossil-fuel-linked companies may face asset impairment risks exceeding 60 % of book value under aggressive transition scenarios [4]. These losses materialize through write-downs, higher financing costs, or reduced investor appetite, thereby negatively influencing corporate valuation and weighted average cost of capital (WACC).



03 Reviewing leading methodologies:

From frameworks to financial relevance

All the business disruptions and financial losses witnessed in recent years have reshaped how investors perceive climate risk no longer as a distant environmental concern but as one of the most realistic and material business risks. As a result, an increasing number of countries, regulators, and stock exchanges now require companies to identify and disclose their climate-related risks, assess their financial implications, and demonstrate how these risks influence strategic and operational decisions.

Over the past decade, a proliferation of sustainability frameworks has created what many describe as an “alphabet soup” in climate related analysis and disclosure. Around the world, different standards and scenario models have been developed to help organizations understand and quantify how climate change could affect business value. Among these, several have emerged as particularly influential in aligning climate and financial perspectives: TCFD, ISSB, NGFS, IEA, and GRI.

 Framework / Scenario	 Focus Area	 Primary Users	 Key Contribution	 Relevance to GCC Companies
TCFD (Task Force on Climate-related Financial Disclosures)	Governance, Strategy, Risk Management, Metrics & Targets	Listed companies, financial institutions	Introduced the core concept of linking climate risk with financial disclosure; served as the foundation for most modern standards	Has effectively completed its mandate, with its responsibilities now integrated into ISSB standards
ISSB (IFRS S2)	Enterprise value–focused sustainability disclosures	Listed companies, financial institutions, investors	Consolidates TCFD, SASB, and CDSB principles; connects climate metrics directly to financial statements	Already mandatory in Qatar and several GCC jurisdictions, with adoption expected to expand further across the region

03 Reviewing leading methodologies:

From frameworks to financial relevance (cont'd)



Framework / Scenario

Focus Area

Primary Users

Key Contribution

Relevance to GCC Companies

NGFS (Network for Greening the Financial System)

Climate scenario analysis for central banks and supervisors

Financial regulators, banks

Provides macroeconomic and sectoral transition/physical risk pathways; used for stress testing

Useful for regional banks, sovereign funds, and regulators assessing portfolio exposure and systemic risk

IEA Scenarios (e.g., Net Zero by 2050, STEPS)

Energy system transformation and transition trajectories

Energy companies, policymakers

Offers detailed assumptions for decarbonization pathways, sectoral demand, and pricing

Critical for GCC hydrocarbon and energy-intensive sectors when assessing long-term transition scenarios

GRI (Global Reporting Initiative)

Impact materiality and sustainability performance

Multi-sector corporates, NGOs

Expanding toward financial relevance to align with ISSB expectations

Helps bridge impact materiality with financial materiality for integrated reporting in the region

Even with these standards, many companies find it challenging to turn disclosure into decision-use, particularly when applying the guidance to investment planning, capital budgeting, and risk management. The frameworks often explain what to disclose but less so how to embed those insights into day-to-day decisions.

To close this gap, we have developed a Climate-Risk Decision Framework designed to help organizations interpret these global methodologies and translate them into practical, finance-linked decision models suitable for the GCC business environment.

04 The four-step integration model:

Turning disclosure into decision

While international frameworks have advanced the understanding of climate disclosure, the real challenge for many businesses in the Gulf is to translate that awareness into practical decision-making within their daily operations. With the ISSB standards now mandatory in Qatar and gaining traction across other GCC markets, investors expect companies to demonstrate how climate considerations are identified, quantified, and managed as part of core financial strategy.

To address this need, the Four-Step Climate-Risk Integration Model provides a structured sequence that translates global standards into an actionable decision framework. The model follows four key stages as “Identify, Quantify, Integrate, and Govern” linking sustainability insights directly to corporate-finance processes and enabling climate variables to become tangible inputs in investment evaluation and strategic planning.



4.1 Step 1 - Identify

Mapping climate exposure across the business

The first step is to identify where climate risks intersect with business operations, assets, and value creation.



Key Action

Process

Example

01

Map exposure across the value chain

- Identify vulnerabilities towards *physical risks*
- Identify vulnerabilities towards *transition risks*

- Examine vulnerabilities to *extreme heat, flash floods, sea-level rise, and water scarcity*
- Identify dependencies on carbon-intensive exports (oil, gas, aluminum, petrochemicals), potential exposure to EU Carbon Border Adjustment Mechanism (CBAM), and forthcoming domestic efficiency and disclosure mandates in markets like Qatar and Saudi Arabia.

02

Establish risk interdependencies

- Examine how a single event can cascade through upstream and downstream networks.
- Trace how disruptions in logistics, raw-material supply, or demand patterns might amplify business volatility.

- List core operational functions and their upstream and downstream connections, identify shared dependencies such as common suppliers, logistics routes, or utilities, and document where a disruption in one node could affect multiple business units or partners.

03

Link to financial exposure

- Translate identified risks into potential financial categories.
- Develop a preliminary “climate-risk map” showing which parts of the business model are most sensitive to physical or transition drivers.

- Review financial exposure factors such as revenue at risk, cost volatility, asset impairment, credit exposure, margin pressure, liquidity constraints, and financing cost impact.

04

Prioritize material risks

- Apply dual-materiality lens.
- Rank exposures by probability and magnitude.

- Consider both enterprise-value impact and systemic relevance to national-vision goals.
- Highest combined scores should be the candidates for detailed financial modeling and scenario analysis in Step 2.

By the end of this stage, a company holds a structured map of where climate variables intersect with its business model, supply chain, and financial metrics forming the diagnostic base for quantification.

4.2 Step 2 - Quantify

Converting climate drivers into financial metrics

Once the main areas of exposure are identified, the next task is to translate those risks into measurable financial terms and then test how they behave under different climate futures. This step builds the analytical bridge between sustainability data and corporate-finance metrics.

4.2.1 Translate drivers into financial variables

This stage transforms climate data into a diagnostic view of the business model. The goal is to reveal where profitability and asset value are most sensitive to climate-related movements in cost, productivity, and demand. Rather than introducing new metrics, the process reframes existing ones. Temperature, water use, and carbon price are expressed directly in operating and financial terms, exposing the company's internal "pressure points."

Business dimension	 Energy and utilities	 Labor and operations	 Logistics and supply	 Asset base
Typical climate sensitivity	Rising carbon prices or fuel-subsidy reform	Heat-stress or water scarcity affecting productivity	Disruption from extreme weather or trade-route congestion	Coastal, flood-prone, or high-emission assets
Insight gained	Identifies exposure of EBITDA margin to carbon cost; supports internal shadow-pricing policy.	Quantifies threshold where operating efficiency and labour cost start eroding output.	Highlights dependency on single-point suppliers and working-capital strain.	Reveals where balance-sheet impairment risk may concentrate.

The outcome is a financial sensitivity map showing how incremental shifts in climate variables affect cash flow and margins. Executives can now see which elements of their cost or revenue structure drive resilience, and which amplify volatility.



4.2 Step 2 - Quantify

Converting climate drivers into financial metrics

4.2.2. Apply scenario analysis

Once financial sensitivities are visible, the next step is to test their durability under different climate and policy futures. Scenario analysis serves as a strategic stress test, replacing single-point forecasts with a range of plausible worlds that challenge core business assumptions. Each scenario reflects a distinct combination of global policy ambition, technology adoption, and physical change.

For instance:

- Current Policies scenarios examine operations in a world of limited carbon regulation but increasing physical disruption;
- Announced Pledges represent moderate transition pathways where adaptation investment becomes a major cost center; and
- Net Zero 2050 cases impose steep decarbonization curves and rapid repricing of high-emission assets.

Feeding these variables into the sensitivity model reveals how far current strategy can stretch before margins, liquidity, or valuation are compromised.

Scenario analysis thus shifts the conversation from compliance to risk appetite:

- What level of transition speed can the firm absorb?
- At what point does financing cost rise materially?
- Where do asset write-downs begin to threaten balance-sheet integrity?

Used this way, scenario analysis becomes a decision-confidence tool helping leadership quantify not only the potential downside but also the strategic options that enhance resilience and long-term value creation.



4.2 Step 2 - Quantify

Converting climate drivers into financial metrics

4.2.3. Quantify value impact

With scenario results defined, the next task would be to understand how climate dynamics reshape the fundamentals of enterprise value. Here, traditional financial metrics such as Net Present Value (NPV), Internal Rate of Return (IRR), and Weighted Average Cost of Capital (WACC) are treated not as static calculations but as diagnostic lenses that reveal how climate forces stress or strengthen the business model.

Financial lens	How climate alters the metric	Strategic insight
NPV	Shifts in carbon pricing, resource cost, or adaptation capex modify projected cash flows and asset lives.	Shows which revenue streams or asset classes lose value earliest under transition pressure.
IRR	Profitability fluctuates as efficiency gains, compliance spending, or market-share erosion reshape returns.	Exposes which projects remain viable across scenarios and which require design or timing adjustments.
WACC	Investor risk perception and green-finance access change the cost of capital.	Quantifies how climate alignment or exposure translates into financing advantage or penalty.

Instead of asking “What is the project’s return?”, executives would ask “How stable is this return once climate risk is priced in?” This shift transforms financial analysis into a resilience test, clarifying where to protect value and where to re-deploy capital.

4.2.4. Summarize decision-ready results

The final step is to distil findings into a concise, decision-use format that management and boards can interpret quickly. Climate data becomes a set of investment-governance signals rather than standalone reports.

Decision Output	Purpose / Application
Climate-adjusted NPV / IRR dashboard	Ranks projects by risk-adjusted value, highlighting those that remain profitable across scenarios.
Exposure heat map	Visualizes concentration of climate-sensitive assets, supply chains, or business lines.
Scenario performance summary	Compares portfolio outcomes under different transition speeds or policy regimes.
Resilience index / rating	Communicates preparedness to investors, lenders, and regulators.

These tools allow leaders to see, at a glance, which parts of the portfolio are resilient, which require adaptation, and which may no longer fit long-term strategy.

By converting scenario analysis into decision-ready metrics, the company embeds climate risk directly into capital allocation, funding, and governance discussions making climate resilience a financial, not only environmental, competency.

4.3 Step 3 - Integrate

Embedding climate intelligence into financial decisions

Once climate risks have been quantified, the next challenge is to embed those insights into the organization's core decision architecture. Integration ensures that climate considerations influence capital allocation, risk management, and strategic planning rather than remaining isolated in sustainability reports. At this stage, climate-adjusted metrics become a standard input alongside cost, return, and risk data in every major financial or strategic decision.

4.3.1. Integrate into capital budgeting and investment appraisal

Climate-adjusted financials reshape how investment proposals are screened, ranked, and approved. The objective is to ensure that no material capital decision proceeds without testing its resilience to climate assumptions.

 Integration Channel	 Application	 Illustrative Use
Project Feasibility and NPV/IRR Models	Incorporate climate-adjusted cash flows and carbon costs directly into valuation templates.	New industrial expansion evaluated under alternative carbon-price and heat-stress scenarios.
Investment Thresholds	Use climate-adjusted IRR or payback thresholds that reflect policy or financing risk.	Energy-intensive projects require higher hurdle rates to compensate for potential carbon penalties.
Portfolio Prioritization	Rank projects by resilience score as well as return.	Balanced portfolio between low-carbon efficiency upgrades and core operations.

This integration turns climate analysis from a compliance checkpoint into a capital-discipline tool ensuring resources flow to projects aligned with long-term transition and resilience goals.



4.3 Step 3 - Integrate

Embedding climate intelligence into financial decisions

4.3.2. Integrate into risk management and financial planning

Risk management processes adapt by embedding climate variables into credit, liquidity, and insurance models. Finance teams link scenario outputs to the company's enterprise risk management (ERM) framework to capture exposure at both project and portfolio level.

 Integration Channel	 Application	 Illustrative Use
Corporate Risk Register	Add quantified climate variables (temperature, carbon price, flood probability) with defined triggers.	Heat or policy thresholds linked to operational or market-risk categories.
Liquidity and Cash-Flow Forecasts	Model working-capital pressure from supply or pricing shocks.	GCC importers simulate liquidity impact of carbon-border costs or shipping delays.
Insurance and Hedging Strategy	Align coverage and hedge positions with climate-driven asset and commodity volatility.	Adjust reinsurance layers or commodity hedges based on physical-risk profiles.

By integrating climate inputs into risk models, CFOs and CROs move from reactive disclosure to proactive financial protection.

4.3.3. Integrate into strategy and performance management

At the strategic level, climate risk intelligence supports long-term competitiveness, regulatory readiness, and investor communication. The company links scenario findings with corporate-plan assumptions, pricing strategy, and key performance indicators.

 Integration Channel	 Application	 Illustrative Use
Strategic Planning Cycles	Embed scenario insights into five-year business-plan updates.	Stress-test revenue projections against regional energy-transition timelines.
KPI and Incentive Design	Tie management incentives to climate-adjusted financial or efficiency metrics.	Bonus criteria include emission intensity reduction or energy-cost efficiency.
Investor and Regulator Dialogue	Communicate resilience and alignment with ISSB/TCFD expectations.	GCC listed companies link financial performance to climate-risk disclosures.

When integrated effectively, climate analysis becomes part of how the company thinks about growth, not just how it reports risk. Executives begin to view climate resilience as a driver of value protection, cost optimization, and financing advantages, especially in regions where policy and investor scrutiny are intensifying.

4.4 Step 4 - Govern

Institutionalizing climate accountability and oversight

Effective governance ensures that climate-risk management moves beyond modelling into the culture, policies, and decision routines of the organization. Governance is the stage where the company converts analytical insight into accountability, transparency, and continuous improvement. It defines who owns climate-related decisions, *how progress is measured*, and *how results feed back* into risk and capital cycles.

4.4.1. Establish Clear Ownership and Board Oversight

Climate responsibility must be anchored at the top of the corporate structure. Boards and executive committees integrate climate risk into the same governance channels that oversee finance, audit, and enterprise risk.

 Governance Mechanism	 Objective	 Illustrative Practice
Board-level Sustainability or Risk Committee	Provide strategic direction, approve climate-risk appetite, and monitor integration outcomes.	Regular review of climate-adjusted capital plans and exposure heat maps.
Executive Sponsorship (CFO + CRO + Sustainability Lead)	Ensure climate metrics inform budgeting, funding, and disclosure.	Joint ownership of climate-adjusted NPV/IRR models and reporting.
Cross-functional Climate Taskforce	Coordinate finance, operations, and risk functions for consistent data and assumptions.	Common carbon-pricing and scenario-testing methodology across divisions.

This structure embeds accountability at every tier, ensuring that climate decisions carry the same governance rigor as financial and operational ones.



4.4 Step 4 - Govern

Institutionalizing climate accountability and oversight

4.4.2. Integrate governance into policies, controls, and disclosure

Strong oversight requires codifying climate-risk principles in corporate policies and performance management systems. The goal is to make climate alignment an assurance topic within governance, not a voluntary initiative.

 Governance Channel	 Integration Focus	 Example Application
Risk-management policy	Include quantified climate variables and escalation thresholds.	Automatic review triggered if project IRR falls below climate-adjusted hurdle rate.
Capital-allocation policy	Mandate climate-adjusted NPV/IRR as a condition for investment approval.	Projects must meet both financial and emissions-intensity criteria.
Disclosure and reporting cycle	Align with ISSB S2 and TCFD structures to ensure transparency.	Annual climate-risk dashboard integrated into financial statements.

These controls institutionalize climate thinking, linking internal decision-making with external investor expectations and regulatory requirements.

4.4.3. Review, learn, and adapt

Governance is not static as climate dynamics evolve. Periodic review enables the organization to recalibrate its assumptions and refresh its decision tools.

 Review Element	 Purpose	 Illustrative Practice
Annual Climate-Risk Audit	Verify accuracy of models and assumptions.	Independent validation of scenario parameters and exposure estimates.
Performance Feedback Loop	Integrate lessons from real events and deviations.	Update cost-of-capital assumptions following extreme weather losses or policy shifts.
Capability Building	Enhance technical literacy of finance and risk teams.	Regular training on ISSB reporting, scenario analysis, and carbon accounting.

This continual review process transforms governance from compliance to learning ensuring that the company's climate strategy evolves as markets, technologies, and regulations change.

When governance is fully embedded, climate-risk management becomes indistinguishable from corporate governance itself. Board discussions, financial planning, and disclosure cycles all operate on shared assumptions about climate risk and resilience. This alignment not only meets investor and regulatory expectations but also strengthens the company's strategic credibility and access to sustainable capital - a decisive advantage in an economy where resilience increasingly defines value.

05 Conclusion

Climate risk is a business mandate, not an environmental gesture

Climate risk is no longer a distant or abstract concept; it is reshaping the foundations of financial strategy, competitive positioning, and long-term value creation. For Gulf-based companies, the convergence of physical climate pressures and global transition dynamics makes structured climate-risk integration not an optional exercise but a strategic imperative. The four-step framework outlined in this paper- Identify, Quantify, Integrate, and Govern- provides a practical path for embedding climate insight into the financial and operational systems that guide corporate decision-making.

Yet the technical tools alone are not enough. The longer organizations postpone the integration of climate considerations, the narrower their strategic options become and the greater the cost of adjustment- not only for the company, but for the wider economy that depends on resilient infrastructure, competitive industries, and stable financial markets. Climate integration requires investment in training, data, capabilities, and cross-functional collaboration; it demands time and discipline. But most importantly, it requires a shift in mindset. Climate risk cannot remain framed as an environmental add-on or a goodwill gesture to sustainability expectations. It is a core business variable-one that influences cost structures, market access, capital flows, and ultimately societal wellbeing.

Companies that recognize this and begin the transition now will be better positioned to protect value, secure financing, and capture new opportunities in a global economy that is rapidly redefining resilience. Those that delay may find themselves reacting to risks that could have been anticipated, managed, or transformed into strategic advantage. Integrating climate risk into corporate decision models is not philanthropy for the planet; it is a foundational investment in economic stability, business continuity, and collective prosperity.



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