

Climate Risk Assessments

Meeting regulatory requirements
and increasing operational resilience

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Contents

Introduction.....	3
Regulatory momentum is driving change.....	4
Exploring climate scenarios.....	5
How we support our clients	6
Lessons learned	7
Conclusion	8
Authors.....	9
References	10

Introduction

The global average temperatures are steadily increasing and approaching the +1.5 °C threshold recommended by leading climate scientists to limit the direct impact of climate change. As temperatures rise, the Earth becomes more susceptible to extreme climate events, leading to more frequent, intense, and volatile occurrences, as well as long-term persistent changes to annual climates. For businesses and financial institutions, these physical climate hazards can result in increased exposure to property damage, business interruptions, higher operating costs, and elevated insurance premiums or reduced coverage availability if current economic practices remain unchanged [1].

To combat human impact on climate change, there has been a global shift towards sustainability. Many countries have pledged to achieve net-zero emissions by 2050, with emissions being the leading driver in climate change [2, 3, 4]. The European Union Emissions Trading System (EU-ETS) has already seen carbon prices surpassing €100 per tonne of CO₂ [5], and the number of companies aligning with Science-Based Targets Initiative criteria doubled from 2022 to 2023 [6] signalling a broader commitment to reducing emissions and transitioning towards a low-carbon future.

As the sustainability transition continues, businesses are increasingly recognising the need to incorporate climate considerations into their strategic planning and operations. In this evolving landscape, businesses must understand the potential impact of direct climate hazards and the shift towards a net-zero economy. This involves assessing the risks and opportunities associated with climate change for different scenarios: whether we continue our current trajectory towards a +4 °C warming by the end of the century or move towards a sustainable economy to limit warming to +1.5 °C [7]. To gain a deeper understanding and assess their susceptibility to physical and transitional risks, companies and financial institutions are increasingly using climate scenario analysis, driven by regulators. This enables corporations to better prepare, revise, and adapt their business strategies in response to climate change and sustainability transitions.

Regulatory momentum is driving change

In Switzerland and the European Union (EU), ESG reporting regulations require companies to assess their exposure to climate related risks and opportunities.

In Switzerland, large public companies must disclose their climate risks in line with the Task Force on Climate-related Financial Disclosures (TCFD) [8]. This risk-centered focus allows for a comprehensive climate risk assessment, integrating both physical and transitional risks into strategic planning at the company level. The EU's Corporate Sustainability Reporting Directive (CSRD) requires companies to evaluate climate risks within their operations and value chains [9]. The European Sustainability Reporting Standards (ESRS) stipulate that transition risk disclosures align with a scenario that limits global warming to +1.5 °C, with physical risks disclosed for a +4 °C scenario. While the CSRD regulation is aligned with the reporting structure of the company, the EU Taxonomy requires companies to conduct climate risk and vulnerability assessments of physical risks per location of each business activity [10].

Figure 1 outlines the differences between Swiss and EU reporting regulations. While this article focuses on Swiss and EU regulatory standards, it's important to note that regulatory bodies globally are broadening climate disclosure requirements, including climate-risk assessments (e.g., SEC's recent ruling in the USA) [11].

Companies that gain insight into the risks and opportunities of climate change are better positioned to withstand future uncertainties. Conducting climate scenario analysis enhances businesses' preparedness for an uncertain future and improves their resilience to potential future events stemming from climate change.




	 SWISS CLIMATE ORDINANCE (CO)	 CSRD/ESRS	 EU TAXONOMY
Regulations	The Swiss Climate Ordinance requires disclosures aligned with TCFD recommendations.	ESRS E1 mandates extensive disclosure on both the company's impact on climate change and climate change's impact on the company, given its material relevance.	Under the EU Taxonomy Regulation companies in scope have to report on their contribution to the environmental objectives set out by the regulation.
Assets	All business activities and related assets	All business activities and related assets	Assets to run eligible EUT activities
Risks and/or opportunities	Physical and transition risks and opportunities	Physical and transition risks and opportunities	Physical risks
Scenario analysis	Required	Required	Required
Quantitative climate scenario analysis	Quantitative information should be provided whenever possible and appropriate	1-year phase-in for all companies, 3-year phase in for all companies with qualitative disclosures possible if quantitative disclosures are impracticable	Physical risk quantification required by 2025

Figure 1. Comparison of Swiss and EU climate risk regulations.

Exploring climate scenarios

Climate scenarios were initially developed to guide policymakers on the potential risks of climate change and to shape policy development towards solutions for climate-related challenges. Leading global organisations, such as the Network for Greening the Financial System and the International Energy Agency [12, 13], have developed 'integrated assessment models' that link macro-economic climate scenarios to help companies and financial institutions assess potential climate change impacts on their businesses (Figure 2). These scenarios are based on the latest scientific climate models from the Intergovernmental Panel on Climate Change (IPCC) [7].

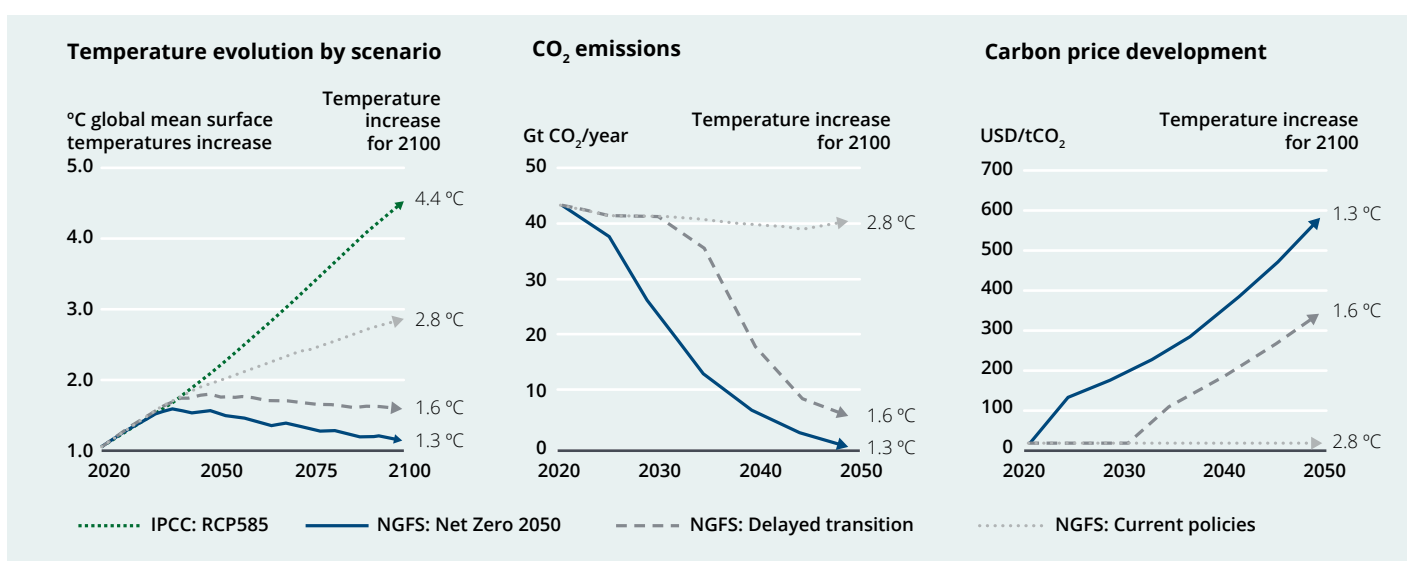


Figure 2. Three contrasting climate scenarios and their temperature, CO₂ emission, and carbon price evolution (Source: IPCC and NGFS [7, 12])

The NGFS and IEA scenarios depict plausible futures (not forecasts), outlining a range of future climate-related economic developments. These futures and associated physical and transition risks (see explanatory note) depend on global policy, market, technology, and decarbonisation choices.

While there are various scientifically derived future scenarios, they ultimately fall within two end-member scenarios:

- **Low-emissions, +1.5 °C scenario with dominant transition risks:** In this scenario, aggressive emission reductions require global efforts across governments, society, and industry for successful decarbonization. This involves accelerated transitions to renewable energy sources, stringent regulations on fossil fuel extraction and use, and rapid advancements in carbon removal technologies.
- **High-emissions, +4 °C scenario with dominant physical risks:** If current policies continue with continued fossil fuel use and suboptimal energy-intensive practices, physical risks will become more prominent. This would result in global temperatures rising towards +4 °C, making climate change more visibly apparent. In this scenario, substantial investments in adaptation measures become essential to safeguard assets, infrastructure, and communities.

Explanatory note on climate risk definitions

Physical risks refer to the direct impacts of climate change on businesses, assets, and operations, including increasing frequency and severity of extreme weather events (*acute physical risks*, e.g., coastal flooding or tropical cyclones) and long-term shifts in climate patterns (*chronic physical risks*, e.g., sustained increase in average temperature, heat stress, precipitation pattern). The CSRD and EU Taxonomy details the risks businesses should consider when conducting physical risk assessments (Figure 3).

Transition risks arise from transitioning to a low-carbon economy and implementing policies and measures to mitigate climate change. These risks are associated with changes in regulations (carbon pricing), market dynamics, technology, and consumer preferences.

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (inc. blizzards, dust, and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, groundwater)	Subsidence
			Glacial lake outburst	

Figure 3. Physical climate hazards are to be assessed following the EU Taxonomy description [14]. Hazards are categorised by their modelling feasibility using our approach: green (already available), grey (estimated by proxies), and orange (need to be addressed locally).

How we support our clients

Conducting a climate risk assessment involves two main components, a qualitative assessment of their impacts on a company's business operations and a quantitative impact assessment. The qualitative component sets the scope of the analysis (Figure 4) and ensures qualitative identification of risks and opportunities. Reviewing industry and peer climate risk analyses and disclosures, and relevant literature helps companies evaluate potential material climate risks for the future.

The quantitative component involves assessing the company's vulnerability and exposure to climate risks and assessing the monetary impact of these risks. This includes gathering data on key facilities, current GHG emissions, financial metrics, and the company's growth aspirations. Reviewing past events and mitigation measures provides valuable insights into the company's response to physical risks. By combining current data with growth projections, different 'business cases' are projected across short, medium, and long-term time horizons. These 'business cases' are then integrated into a scenario modelling framework using the latest scientific and macroeconomic scenarios from the IPCC, NGFS, and IEA. Physical and transition risks are analysed for each business case under different scenarios (e.g., low-emission +1.5 °C vs. high-emission +4 °C) and various risk indicators are correlated to assess exposures, operating expense risks, and other relevant metrics.

After understanding the physical and transition risks, companies can develop adaptation plans to mitigate these risks. This step increases resilience to climate

change and the sustainability transition through effective adaptation measures, such as infrastructure upgrades, process changes, and new policies. Engaging with stakeholders, including investors, customers, and employees, ensures alignment with broader sustainability goals. Risks and adaptation plans can then be integrated into the company's Enterprise Risk Management (ERM) process to continually track, monitor, and refine strategies based on evolving hazards and new insights.

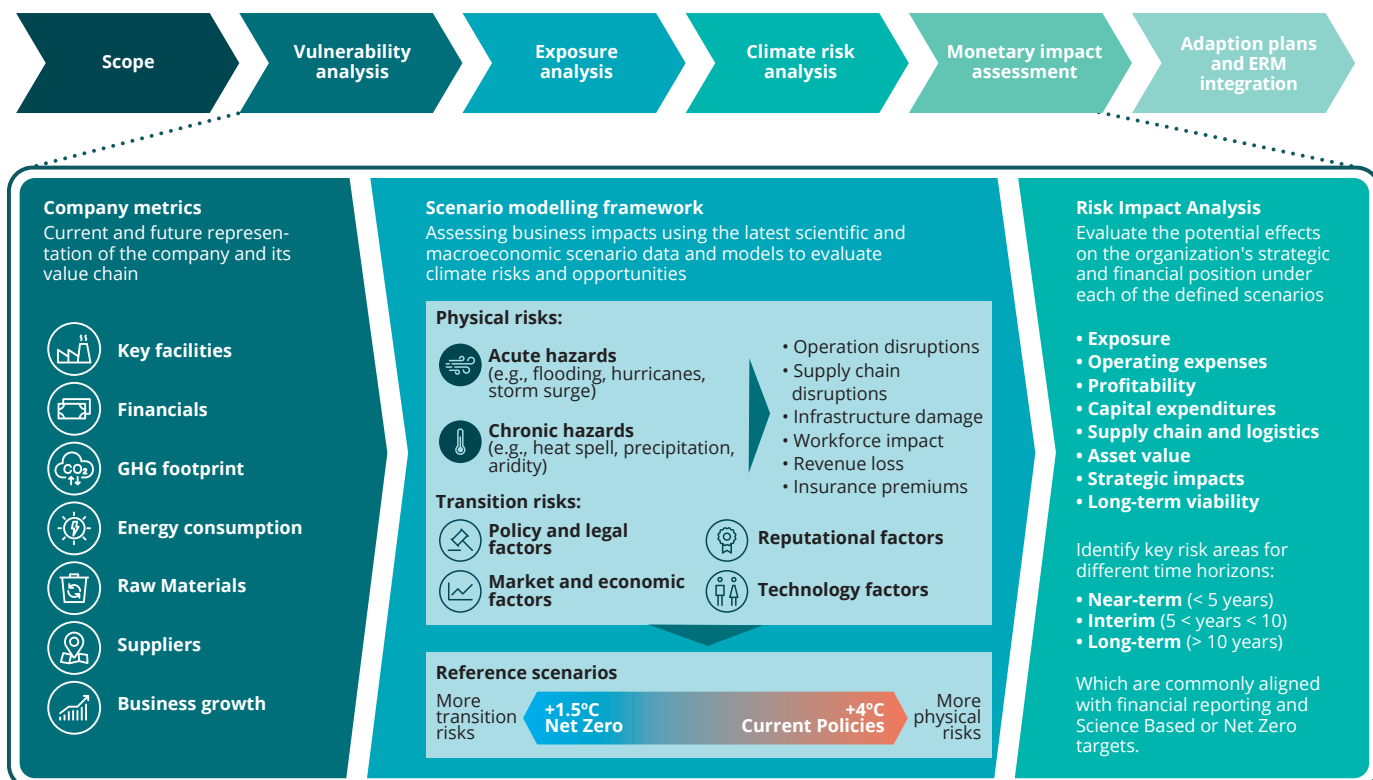


Figure 4. Our scenario analysis approach to assess climate risks (and opportunities).

Lessons learned

Drawing from our extensive client experience across different stages of the sustainability journey, we identified varying levels of engagement and understanding. To provide guidance through your climate scenario analysis, we have distilled five key insights from our engagements.

Reporting Quality: Ranges from basic qualitative analyses to advanced regional, quantitative disclosures. Leading pioneers provide detailed figures on revenue or asset exposure to physical climate risks and outline mitigation strategies. They also extend assessments to supply and value chains, including potential employee impacts, setting a high standard for comprehensive climate risk reporting.

Preparedness and Business Resilience: Enhancing resilience and sustainability involves understanding and managing both physical and transition risks. Leaders are integrating climate management into existing processes like supply chain and enterprise risk management. Investing in efficient production processes reduces carbon costs and overall product costs, benefiting competitiveness and customer value. Comprehensive climate risk assessments should lead to actionable strategies,

with the best results achieved when all concerned parties are involved (e.g., risk, plant, and operation managers), making preparedness and business resilience the ultimate goals.

The Price of Inaction: Operating with non-sustainable practices in a net zero world will result in significantly higher costs compared to an SBTi-aligned path. This is driven by carbon taxes and incentives, meaning companies that take no action may face a significant additional operation expense. This highlights the need for proactive planning and awareness raising, as inaction ultimately costs more.

Timing is Crucial: Delaying transition efforts amid rising carbon prices makes future actions more challenging. Timely action is essential to avoid higher costs and locked-in inefficiencies as the competitive landscape becomes saturated with simultaneous efforts.

Stay Ahead: Continuously review and refine strategies, policies, and practices to stay ahead in the rapidly evolving landscape. Effective action relies on maintaining sufficient training and understanding necessary measures, ensuring your business remains competitive and resilient.

Conclusion

Regulatory requirements in Switzerland and the EU mandate companies to assess their exposure to climate-related risks and opportunities, integrating both physical and transitional risks into strategic planning. Exploring climate scenarios enables companies to evaluate potential climate change impacts on their businesses. The process leads to the development of adaptation plans to mitigate identified risks and increase resilience to climate change and the sustainability transition.

Lessons learned from client engagements highlight the importance of reporting quality, preparedness, business resilience, the cost of inaction, the crucial timing of decarbonisation efforts, and the need to stay ahead in the rapidly evolving landscape. Understanding and managing both physical and transition risks enhance business resilience and sustainability, ensuring competitiveness and long-term viability in a changing climate and regulatory environment.

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