



Climate Change Impact on Financial Reporting – A Theoretical Approach

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Abstract: *Climate change has a dual effect on the financial dimension of companies: on one hand companies spend more to meet the requirements of climate impact and meeting climate targets and on the other hand the climate regulations have increased the burden of financial regulation and financial reporting. This paper aims to discuss the theoretical approach that has been suggested in the literature to tackle the increased burden of disclosing financial information related to climate change. The paper discusses the main Climate-Related Risks, Opportunities, and Financial Impacts and what the preparers of financial statements have to keep in mind while publishing financial and non-financial information. Based on thorough research of recent theoretical and empirical publications the author finds that the most impacted financial reporting standards are standards on financial instruments, standards on Insurance Contracts on items such as asset impairment, changes in the useful life of assets, changes in the fair valuation of assets due to climate-related and emerging risks, increased costs and/or reduced demand for products and services, potential provisions and contingent liabilities arising from fines and penalties; and changes in expected credit losses for loans and other financial assets. As the requirement to disclose more financial and non-financial information related to climate impact is expected to increase in the future, the author concludes with several recommendations that will very soon be relevant for big and medium companies.*

1. INTRODUCTION

The global shift towards sustainable development economies and the mitigation of climate change are paramount challenges faced worldwide. Recently, there has been a surge in initiatives aimed at fostering sustainable development across both public and private sectors, including in the financial markets. This surge mirrors an increasing awareness of the substantial potential economic and financial repercussions of climate change, as well as risks related to environmental, social, and governance (ESG) factors. Certain jurisdictions are actively implementing policy or regulatory measures to bolster the role of the financial system in the shift towards sustainable development. From the perspective of growth and emerging markets, sustainable finance is deemed pivotal in the evolution of sustainable capital markets, thereby propelling sustainable growth and innovation.

Sustainable finance essentially examines the interplay between finance (investment and lending) and economic, social, and environmental dimensions. It essentially entails the integration of ESG factors into financial decision-making processes. There is no one-size-fits-all approach to ESG components across various stakeholders, resulting in divergent disclosure approaches for each component across different industries and nations. Given these discrepancies, ESG factors have surfaced as a pivotal trend in the financial services sector, instigating innovation, provoking numerous questions and methodological hurdles, as well as influencing business

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operations and investment strategies. Consequently, sustainable finance has garnered considerable attention from a growing array of market players, policymakers, prudential supervisors, and securities regulators.

An increasing number of regulators, supervisors, and businesses are acknowledging climate-related risks as a significant source of financial risk, capable of impacting not just individual firms or sectors, but also the broader financial system stability. Both the tangible impacts of escalating temperatures and the shift towards a low-carbon economy can unleash risks with "unique characteristics compared to other structural risks." These traits encompass their "extensive reach in terms of scope and scale, their predictability, their permanence, and their reliance on immediate actions." This recognition has heightened the attention of several prudential regulators and supervisors on these matters, falling within their remit of ensuring the financial system's resilience against significant risks.

2. CLIMATE-RELATED RISKS, OPPORTUNITIES, AND FINANCIAL IMPACTS

2.1. Climate-Related Risks

Climate-related risks can be divided into two main categories: transition risks and physical risks.

Transition risks are risks associated with the transition to a lower-carbon economy. These risks can arise from changes in policy, law, technology, and markets. For example, organizations may face policy risks if governments implement carbon pricing or other regulations that make it more expensive to emit greenhouse gases. They may also face legal risks if they are sued for failing to mitigate or adapt to climate change. And they may face market risks if there is a shift in demand for their products or services due to climate change.

Physical risks are risks that arise from the physical impacts of climate change. These risks can include damage to assets from extreme weather events, such as floods or hurricanes. They can also include changes in water availability, food security, and temperature patterns that can disrupt businesses.

Both transition risks and physical risks can have a significant impact on an organization's financial performance. Organizations that are not prepared for these risks may face financial losses, damage to their reputation, or even bankruptcy.

Here is a table that summarizes the two types of climate-related risks:

Table 1. Types of climate-related risks

Risk Type	Description	Examples
Transition risks	Risks associated with the transition to a lower-carbon economy	Policy risks, legal risks, market risks, technology risks
Physical risks	Risks that arise from the physical impacts of climate change	Damage to assets from extreme weather events, changes in water availability, food security, and temperature patterns

Source: Own processing

It is important for organizations to understand the climate-related risks that they face and to take steps to mitigate these risks. This includes understanding the potential impacts of climate

change on their operations, supply chains, and markets. It also includes developing strategies to adapt to climate change and to reduce their own greenhouse gas emissions.

Organizations that are prepared for climate-related risks will be better positioned to succeed in the future.

2.2. Climate-Related Opportunities

Efforts to mitigate and adapt to climate change can also create opportunities for organizations. These opportunities can include:

Resource efficiency: Organizations can reduce their operating costs by improving efficiency across their production, distribution, and transportation processes. This can be done by using less energy, water, and materials.

Low-emission energy sources: Organizations can switch to low-emission energy sources, such as solar and wind power, to reduce their greenhouse gas emissions.

New products and services: Organizations can develop new products and services that help to mitigate climate change. For example, they could develop energy-efficient appliances or renewable energy technologies.

New markets: Organizations can access new markets by providing products and services that are in demand in the transition to a low-carbon economy. For example, they could provide energy efficiency consulting services or renewable energy financing.

Resilience: Organizations can build resilience to the impacts of climate change by making their operations more adaptable to extreme weather events and other changes. This could involve investing in infrastructure that can withstand flooding or drought or developing contingency plans for supply chain disruptions.

The specific opportunities that are available to an organization will depend on its industry, location, and other factors. However, all organizations can benefit from taking steps to mitigate and adapt to climate change.

Some additional details about each of the opportunities are: resource efficiency, low-emission energy sources, new products and services, new markets, and resilience.

Climate change is a complex and challenging issue, but it also presents opportunities for organizations that are willing to take action. By taking steps to mitigate and adapt to climate change, organizations can reduce their risks, improve their bottom line, and make a positive impact on the environment.

2.3. Financial Impacts

Improving the disclosure of the financial impacts of climate-related risks and opportunities on an organization is a primary objective of the Task Force on Climate-related Financial Disclosures (TCFD, 2017). For more enlightened financial decision-making, investors, lenders, and

insurance underwriters must comprehend how climate-related risks and opportunities could influence an organization's future financial standing, as depicted in its income statement, cash flow statement, and balance sheet. Although climate change impacts almost all economic sectors, the exposure level, risk type, and impact of climate-related risks vary across sectors, industries, geographies, and organizations.

3. FINANCIAL REPORTING CONSIDERATIONS

Climate-related and emerging risks can lead to financial implications such as asset impairment, altered asset life, revaluation of assets, increased costs, reduced demand, recognition of provisions for onerous contracts, potential fines, penalties, and altered credit losses for loans and financial assets. Besides financial reporting, companies are increasingly focusing on sustainability due to critical issues like climate change, biodiversity loss, population growth, and global economic development. This has led to increased spending on sustainability initiatives and communication of efforts to stakeholders. The increasing issuance of environmental and sustainability reports raises questions about the rationale and benefits of such reporting. The decisions, investments, and activities related to climate change have significant financial impacts, necessitating stakeholders to closely monitor climate-related decisions, activities, financial developments, and expectations. Various recommendations, frameworks, and standards guide climate change-related business reporting. International financial reporting standards discuss provisions and explanations related to climate change, providing necessary information and examples for enterprises to report on climate change.

3.1. Climate Change and IFRS Standards

Companies must factor in climate change, incorporating the associated risks and evaluations into their financial statements. In preparing financial statements, organizations should evaluate climate-related events when determining what to recognize, how to appraise approved assets and liabilities, and the details to disclose. This stems from the stakeholders' expectation that the immediate financial consequences of major climate-related concerns be transparently communicated within the financial statements. Sharing the fiscal repercussions of climate-related matters equips users with superior data, facilitating more informed and efficient engagement, assessment, decision-making, and capital distribution. Revealing these climate concerns also allows markets to gauge climate change's probable future financial repercussions more adeptly.

This aids in the necessary capital resource shift towards a more carbon-efficient economy (CDSB, 2020, p. 8) Following this, the standards set by the International Accounting/Financial Reporting Standards (IFRS, 2021) concerning climate change are detailed:

3.1.1. International Accounting Standards (IAS) 1 Presentation of Financial Statements

In IAS 1, it is stated that financial statements should include important information in order to be understandable. IAS 1 requires disclosure in footnotes of information that is not presented elsewhere in the financial statements but is intended to be understood. If the information can be reasonably expected to influence decisions made by investors, it will be relevant. According to IAS 1 116, an entity shall disclose in the footnotes at the balance sheet date information about key assumptions about the future and the main sources of estimation uncertainties that pose significant risks of causing material adjustments to the book values of assets and liabilities in the following financial year.

IAS 1 article 23 states that the financial statements will be prepared according to the concept of continuity. Moreover, the following statement regarding continuity is included in the IAS 1 article 24. “In assessing the suitability of the business continuity concept, management considers the available information at least for twelve months after the balance sheet date, although it is not limited to this. In assessing whether a continuity of preparedness basis is appropriate, information on climate matters, along with other uncertainties, should be taken into account (Ernst Young, 2020, p. 2). This will become an increasingly important issue, especially for businesses operating in carbon-intensive industries or exposed to significant physical climate risks (CDSB, 2020, p. 16).

3.1.2. IAS 37 Provisions, Contingent Liabilities and Contingent Assets

Climate-related risks and uncertainties can impact the estimation of new and existing provisions as per IAS 37. A provision is recognized when there is a present obligation from a past event, a probable outflow of economic benefits to settle the obligation, and the liability can be reliably estimated. Provisions are reviewed and adjusted at the end of each reporting period to reflect the best available estimate. Businesses may need to account for new provisions due to new climate-related liabilities, such as premature decommissioning of emission-generating assets, or existing obligations now deemed likely, like losing a pollution-related lawsuit. Provisions for environmental rehabilitation, common in the mining sector, may arise in other sectors. IAS 37 article 10 defines a constructive obligation as a liability arising from the entity's commitment to others, creating a valid expectation that it will fulfill these responsibilities. Even without legal obligations, a well-publicized environmental policy and commitment to clean up pollution can create an assumed obligation for a corporation.

3.1.3. IAS 36 impairment of Assets

Per IAS 36 article 9, "Every reporting period requires an entity to check for signs that an asset might be impaired. If such signs are present, the entity determines the recoverable value of the asset." If the impairment assessments overlook the repercussions of climate-related factors, the recorded value of an entity's assets or cash-generating units (inclusive of goodwill) might be inflated. Entities must consistently check for impairment signs during every reporting cycle. Climate-related exposures might suggest that an asset (or a collection of assets) has diminished in value. For instance, if there's declining demand for products that release greenhouse gases, it could suggest potential challenges for a manufacturing plant. Adjustments in climate-related regulations must also be acknowledged. These elements must be recognized when conducting the yearly goodwill impairment analysis (Ernst Young, 2020, p. 3). Recognizing these as impairment indicators necessitates companies to decide the effects of such risks on their cash flows during their impairment assessments (CDSB, 2020, p. 19).

IAS 36 mandates that when the recoverable amount is derived from its value in use, it should rest on credible and defensible premises that echo the management's optimal predictions of prospective economic scenarios. Organizations must ponder whether climate-related events influence these premises. Details about the incorporation of climate threats in recoverable value evaluations are relevant for financial statement users, especially when such risks, like new emission-cutting laws that raise operational expenses, could greatly impact a business. Furthermore, in particular cases, the foundational premises utilized in calculating the recoverable value, and data regarding conceivable variations in these premises, should be unveiled. Climate-related factors might feasibly impact what's regarded as potential variations (Ernst Young, 2020, p. 3).

3.1.4. IAS 16 Tangible Fixed Assets

The challenges posed by climate-related factors may necessitate adjustments in business expenditure to modify operational activities. Entities should discern if such costs qualify as assets and decide if they should be classified under tangible or intangible assets. IAS 16 Article 51 mandates companies to reassess the anticipated residual values and the projected useful lifespans of assets at least once a year (Ernst Young, 2020, p. 2). As a result, those compiling financial reports must evaluate how climate-driven factors could influence the longevity and residual worth of the assets in possession. Alterations in these parameters impact the annual depreciation amount and might also signal potential asset impairment (CDSB, 2020, p. 21). For instance, if a company aiming to shift to a low-carbon production model sets a goal of achieving "net zero" emissions by 2030, it might have to transition to machinery aligned with this objective. This transition can subsequently modify the asset's estimated useful life, impacting its residual value and depreciation timeframe. Costs dedicated to research and innovation by companies to align with this new model will only be categorized as intangible assets if they meet specific benchmarks; otherwise, they'll be treated as expenditures (Gedik, 2021).

3.1.5. IFRS 13 Fair Value Measurement

Climate-related issues could influence the valuation of assets and liabilities at their fair value within financial statements. The perception of market participants regarding potential climate-related regulations, for instance, may impact the fair value of assets or liabilities. Additionally, disclosures concerning fair value measurements might be affected by climate-related considerations. In particular, measurements that fall under level 3 of the fair value hierarchy, which rely on unobservable inputs essential for these valuations, may be influenced by such factors (Anderson, 2019).

The measurement of fair value is required in numerous contexts in IFRS financial statements, and IFRS 13 is referenced as the source of guidance for that measurement.

When determining fair value, it's crucial to recognize that the financial consequences of ongoing physical climate risks, like increasing sea levels, are typically foreseen over a longer period. Therefore, their present value might be somewhat diminished due to the time value of money. However, these risks present both widespread and unique challenges to investors. In instances where physical climate risks, whether sudden or prolonged, are identified, they must be factored into the fair value calculation.

Table 2 sets out an illustration of how climate-related risks and opportunities can be reflected in the three typical valuation approaches of Fair Value:

In practice, terminal values are usually derived by extending the last year's cash flow projections using a terminal or perpetual growth rate. For this method to be valid, the cash flow projections' final year should mirror a company's consistent operational or developmental phase. If a company hasn't achieved a stable state concerning the effects of climate-related factors, extending the explicit cash flow forecast period or adjusting for anticipated future climate-related impacts might be necessary. Choosing a suitable terminal growth rate involves significant judgment, as minor variations in this rate can substantially alter the terminal value. Companies facing climate change challenges and failing to effectively mitigate these risks might experience reduced or even negative long-term perpetual growth rates.

Table 2. Climate-related risks and opportunities in the three typical valuation approaches

Approaches	Market	Income	Cost
Typical valuation technique	Earnings and book value multiples	Discounted cash flows	Replacement cost or net asset value
Key inputs	Earnings (e.g. Revenue, EBITDA, net earnings, etc.) Book value Market multiples (i.e. Transaction or trading)	Forecast P&L and cashflows (including capex) Discount rate Terminal growth rate	Cost to replace or redevelop the asset Functional and economic obsolescence
How climate risks may impact key inputs	Climate risks may impact the revenue (e.g. lower volume or pricing) and/or cost base (additional maintenance, fines, emission taxes, etc.). Market multiples are obtained from traded comparable companies or comparable transactions. However, it may not be clear if/how climate risks are reflected by those comparators. Careful consideration should be given to the valuation subject given the asset-specific nature of climate risks.	Climate risks can affect the cash flows involved in this calculation in several ways, such as by decreasing cash inflows (through reduced volume or pricing) or increasing cash outflows (due to extra maintenance, penalties, emission taxes, capital expenditures, etc.). If cash flows are not modified to reflect climate-related risks, the discount rate might be altered instead, incorporating an appropriate risk premium or discount. The long-term prospects of an asset or business could also be influenced, leading to the use of an adjusted terminal growth rate or a different method for calculating terminal value. Considering the unpredictability of climate events, employing an expected value approach or simulating various scenarios might be necessary.	Greater obsolescence may occur as a result of technology substitution (transition risk). The asset in question may be redundant for a future net-zero business.

Source: Integrating climate-related matters into financial reporting, CDSB & KPMG, 2021

3.1.6. IFRS 9 Financial instruments and IFRS 7 Financial instruments: Disclosures

The impairment guidelines of IFRS 9 necessitate the consideration of future-oriented data to account for anticipated credit deficits. For entities implementing these guidelines, especially financial institutions like banks, identifying if the credit risk has risen notably since its first acknowledgment is essential for estimating anticipated credit deficits. This entails the bank evaluating any real or forecasted negative shifts in the borrower's regulatory, economic, or technological backdrop that might substantially impact their debt repayment capacity. When banks fund projects or provide loans to entities susceptible to climate change effects, it's crucial to analyze how their vulnerability to climatic risks might influence the anticipated deficits on these loans and investments (Anderson, 2019). Factors related to climate, such as environmental calamities or policy shifts, can influence both the bank's risk of credit losses and the borrower's capacity to fulfill their debt obligations. Such climate-driven concerns can also magnify the bank's risk of facing credit losses.

Classification and measurement of financial assets

Measuring and classifying financial assets, such as trade receivables, investments, and derivatives, has become more complex due to the rise of green and sustainable products, which were not initially accounted for in IFRS 9. This includes green loans and bonds, loans linked to green indices, and loans with borrower-specific ESG features. Assessing these features necessitates evaluating credit risk, profit margin, and de minimis features, as they can impact the loan's probability of default and financial institutions' SPPI assessment.

3.1.7. IFRS 17 – Insurance Contracts

Climate-related factors could influence the primary assumptions used in calculating insurance liabilities. This could affect aspects like the frequency, severity, or timing of insured incidents, including business disruptions, property damage, illnesses, and deaths.

Additionally, climate-related factors are likely to affect disclosures under IFRS 17. This standard mandates the disclosure of significant judgments and any changes therein when implementing IFRS 17, as well as details about the nature and extent of risks from contracts covered by IFRS 17 (IFRS 17.93). Insurers might also need to report how climate-related issues affect risk exposure (IFRS 17.124), and risk concentration (IFRS 17.127), and provide sensitivity analysis data showing potential impacts on profit, loss, and equity due to reasonably possible changes in risk exposures at the end of the reporting period (IFRS 17.128).

Lastly, as major asset holders, insurers' investments are likely vulnerable to climate risk factors. However, the guidelines for measuring and disclosing information related to these investments are not part of IFRS 17 but are addressed in other accounting standards like IFRS 7, 9, and 13.

4. FUTURE OF CLIMATE CHANGE IMPACT ON FINANCIAL REPORTING

The future of climate change's impact on financial reporting is likely to see a continued convergence of these frameworks and standards. As the demand for climate-related information grows, organizations will need to find ways to provide more comprehensive and transparent reporting. This will require the development of new standards and tools, as well as the collaboration of different stakeholders.

Here are some of the key trends that are likely to shape the future of climate change's impact on financial reporting:

Increased demand for climate-related information: Investors, lenders, and other stakeholders are increasingly demanding information about the climate-related risks and opportunities facing organizations. This is due to many factors, including the growing awareness of the risks posed by climate change, the increasing regulation of climate-related activities, and the growing demand for sustainable investments.

Development of new standards and tools: As the demand for climate-related information grows, organizations will need to find ways to provide more comprehensive and transparent reporting. This will require the development of new standards and tools, such as the [\(TCFD, 2017\)](#) framework.

Collaboration of different stakeholders: The development of climate-related financial reporting standards and tools will require the collaboration of different stakeholders, such as regulators, accounting firms, and investors. This is because climate change is a complex issue that requires a multi-stakeholder approach.

The future of climate change's impact on financial reporting is uncertain, but it is clear that this is an area that is rapidly evolving. Organizations that are prepared to adapt to these changes will be well-positioned to succeed in the years to come.

5. CONCLUSION

Climate change and its impact have been for long the foreword in many discussions and articles extending well beyond the economic topics. In this article, the measures and approaches that are suggested throughout the literature to tackle the increased burden of disclosing financial information related to climate change were discussed. One major area where climate change has already made an impact is the financial reporting requirements including Financial Statements, Notes, and Disclosures.

Disclosures are presented so that those reviewing the financial statements can comprehend how the management evaluates various primary sources of upcoming uncertainties and estimations. As such, it's crucial to offer information about the assumptions concerning climate change's impact, especially when there's a notable risk that it might lead to significant changes in the recorded values of assets and liabilities in the forthcoming fiscal period and/or influence the choices of investors.

The risks and financial consequences of policy changes vary depending on their nature and implementation timing. Legal or litigation risk is another significant concern, evidenced by the recent increase in climate-related litigation cases initiated by property owners, municipalities, states, insurers, shareholders, and public interest groups.

The financial implications of climate-related challenges for organizations are often not straightforward or immediate. Many organizations find it difficult to identify relevant issues, evaluate potential impacts, and incorporate material concerns into financial reports. This challenge is generally attributed to (1) limited understanding of climate-related issues within organizations; (2) a focus primarily on short-term risks, neglecting those that might emerge over a longer period; and (3) the complexity in quantifying the financial impacts of climate-related matters.

To assess the financial repercussions and meet the required duty, it's essential to mention any uncertainties about when or how much resources might be expended, if relevant. New potential liabilities tied to climate issues might have to be revealed, especially for those liabilities or existing uncertainties previously deemed as having a distant likelihood. This could require revealing a potential liability concerning possible lawsuits and penalties stemming from environmental and related rules if the organization might have breached a regulation but has less than a 50% probability of making a payment (Anderson, 2019).

Heightened risk due to physical climate impacts could signal an asset's impairment. Physical climate risks come in two forms: chronic and acute. Chronic risks relate to long-term shifts in climate patterns, like persistent increases in sea levels or temperatures. On the other hand, acute risks are event-driven, involving more severe and frequent occurrences of extreme weather conditions, such as floods or wildfires.

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