Kaunas University of Technology

School of Economics and Business

Study on the Quality of Climate-Related Disclosure in Corporate Financial Statements

Master's Final Degree Project

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Summary

Concerns about Climate-Related disclosures by companies are on the rise due to changes in regulations that require companies to be open about financial sustainability through structured financial reports such as IFRS S1 and IFRS S2. Whether this information meets the requirements of investors and other stakeholder's remains empirically underexplored, particularly in the banking and energy sectors in Europe.

This study uses the specific case of six European companies, three from the energy sector (Enel, Iberdrola, and Ignitis) and three from the banking sector (Swedbank, Banco Santander, and FinecoBank), to examine how the quality of Climate-Related disclosures varies Data are drawn from 2024 annual, sustainability, and integrated reports. A structured scoring mechanism based on the four pillars of TCFD and IFRS S2 was applied across four categories: governance, strategy, risk management, and metrics.

In summary, both the energy and banking sectors have different degrees of maturity when it comes to climate governance reporting. The energy sector has an average total score of 11.7 out of 12 (Enel and Iberdrola being the highest performing companies achieving full scores and Ignitis scoring 11.0), while the banking sector had an average total score of 7.3 out of 12 with scores ranging from a high of 9.0 (Swedbank and Santander) and a low of 4.0 (FinecoBank). Governance was the most developed dimension within both sectors, while there was considerable variation in strategy integration and metric development as well as large inter sector differences.

The study found that the greatest inter sector differences exist between banking and energy. Findings were interpreted through three analytical concepts which are disclosure quality, comparability, and standardisation grounded in theories of information asymmetry, stakeholders, legitimacy, and institutions. Quality and comparability were highest in the energy sector and more variable in banking, standardisation was strong in energy but only moderate in banking, particularly regarding strategy and metrics.

The study found that organizations can achieve measurable transparency using structured reporting frameworks. However, IFRS S2 alone does not provide uniform reporting patterns across organizations. The main challenge between organizations and regulators is the wide gap between governance systems and fully integrating Climate-Related financial risks, which presents a challenge to banks, regulators and future researchers.

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Santrauka

Susirūpinimas įmonių su klimatu susijusiais atskleidimais auga dėl reguliavimo pokyčių, kurie įpareigoja įmones skaidriai atskleisti finansinio tvarumo informaciją per struktūrizuotas finansines ataskaitas, tokias kaip TFAS S1 ir TFAS S2. Ar ši informacija atitinka investuotojų ir kitų suinteresuotųjų asmenų reikalavimus, vis dar nėra pakankamai empiriškai ištirta, ypač Europos bankų ir energetikos sektoriuose.

Šiame tyrime analizuojami šeši Europos įmonių atvejai: trys iš energetikos sektoriaus (Enel, Iberdrola ir Ignitis) ir trys iš bankų sektoriaus (Swedbank, Banco Santander ir FinecoBank), siekiant ištirti, kaip skiriasi su klimatu susijusių atskleidimų kokybė. Duomenys gauti iš 2024 m. metinių, tvarumo ir integruotų ataskaitų. Struktūrizuotas vertinimo mechanizmas, pagrįstas keturiais TCFD ir TFAS S2 ramsčiais, buvo taikomas keturiose kategorijose: valdymas, strategija, rizikos valdymas ir metrikos.

Apibendrinant, tiek energetikos, tiek bankų sektoriai pasižymi skirtingais klimato valdymo ataskaitų teikimo brandos lygiais. Energetikos sektoriaus vidutinis bendras balas yra 11,7 iš 12 (Enel ir Iberdrola, kaip aukščiausiai įvertintos įmonės, surinko maksimalų balą, o Ignitis surinko 11,0), tuo tarpu bankų sektoriaus vidutinis bendras balas buvo 7,3 iš 12, o balai svyravo nuo aukščiausio 9,0 (Swedbank ir Santander) iki žemiausio 4,0 (FinecoBank). Valdymas buvo labiausiai išplėtota dimensija abiejuose sektoriuose, tuo tarpu strategijos integravime ir metrikų kūrime pastebėta didelė variacija, taip pat dideli tarpsektoriniai skirtumai.

Tyrimas nustatė, kad didžiausi tarpsektoriniai skirtumai egzistuoja tarp bankų ir energetikos sektorių. Rezultatai buvo interpretuojami remiantis trimis analitiniais konceptais: atskleidimų kokybe, palyginamumu ir standartizavimu, grindžiamais informacijos asimetrijos, suinteresuotųjų šalių, legitimumo ir institucijų teorijomis. Kokybė ir palyginamumas buvo aukščiausi energetikos sektoriuje ir kintamesni bankų sektoriuje, standartizavimas buvo stiprus energetikos sektoriuje, tačiau tik vidutinis bankų sektoriuje, ypač strategijos ir metrikų srityse.

Tyrimas nustatė, kad organizacijos gali pasiekti išmatuojamą skaidrumą naudodamos struktūrizuotus ataskaitų teikimo pagrindus. Tačiau TFAS S2 vienas pats neužtikrina vienodų ataskaitų teikimo modelių visose organizacijose. Pagrindinis iššūkis tarp organizacijų ir reguliuotojų yra didelis atotrūkis tarp valdymo sistemų ir visiško su klimatu susijusių finansinių rizikų integravimo, o tai kelia iššūkių bankams, reguliuotojams ir būsimiems tyrėjams.

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Abbreviations:

CSRD: Corporate Sustainability Reporting Directive

ESG: Environmental, Social, and Governance

ESRS: European Sustainability Reporting Standards

EU: European Union

gCO2/kWh: Grams of carbon dioxide per kilowatt hour

GHG: Greenhouse Gas

GRI: Global Reporting Initiatives

ICAAP: Internal Capital Adequacy Assessment Process

IEA: International Energy Agency

IFRS: International Financial Reporting Standards

ISSB: International Financial Reporting Standardsd

KPI: Key Performance Indicators

PCAF: Partnership for Carbon Accounting Financials

RBSCC: Responsible Banking, Sustainability and Cultural Committee

SBTi: Science Based Targets initiative

SSP: Shared Socioeconomic Pathway

TCFD: Task Force on Climate-Related Financial Disclosures

tCO2eq: Tonnes of Carbon Dioxide Equivalent

TWh: Terawatt hour

Terms:

Carbon intensity: The total number of greenhouse gas emissions that are produced per unit of production or activity (gCO2/kWh for example, for power generation) allows for determining how efficiently the use of resources has improved without taking into account the scale of production or activity.

Coercive isomorphism: Is an example of institutional pressures that influence the ways businesses operate by requiring or mandating particular actions based upon being required to do such now or in the future by powerful authorities (like regulators). One of the three mechanisms outlined in institutional theory.

Comparability: This is the ability to compare Climate-Related disclosures between different entities based upon the use of a common definition for the climate risk that is described as such, as well as

the use of the same or similar metrics and methodologies used to arrive at those numbers. As part of the definition of quality in the International Financial Reporting Standards (IFRS).

Content analysis: This systematic methodology can be employed to analyse written forms of communication (for example, emails, letters, memorandums) in order to identify and evaluate the presence, meaning and depth of particular themes or categories. In this research, this approach will be used to determine the depth of climate risk-related disclosures from various organisations.

Climate-Related disclosure: The disclosure of Climate-Related data provides a company's framework for evaluating the impact of climate change on its current and future risks, strategy, and performance.

Decoupling: Discrepancy between the formal adoption of practice of organization, as opposed to if the practice is actually implemented. The relationship between structural compliance with a standard and whether high quality disclosures are made via that standard can be discussed considering institutional theory.

Decision usefulness: The ability of disclosed information to be used by investors, creditors and other stakeholders to support their financial decision making and investment decision making. This is the main goal of financial reporting as per IFRS.

Disclosure quality: The extent to which Climate-Related information disclosed is clear, specific, complete and useful in making decisions for external stakeholders. This is different to disclosure volume, which is only a measurement of the amount of information disclosed.

Double materiality: Reporting perspective where companies are required to report under CSRD and ESRS, both on how sustainability issues impact their financial performance (financial materiality) and how companies impact the environment and society (impact materiality).

Financed emissions: Financial institutions, through their lending, investment, and underwriting activities, engage indirectly in greenhouse gas emissions, a proportional estimate of the emissions produced by their clients and investees through the Application of PCAF methodology.

Financial materiality: Materiality to primary financial report users (investors and creditors) is measured based on the title guidelines established under IFRS S1 and IFRS S2. This means that if primary users make decisions based on financial reporting that were to omit or materially misrepresent information, such decision-making could reasonably have been influenced given the above materiality thresholds.

GHG Protocol: Corporate greenhouse gas emissions are measured under the Greenhouse Gas Protocol Corporations Accounting and Reporting Standard which defines the three emission categories that exist, which are Scope 1, 2 and 3 emissions.

Information asymmetry: An imbalance of information exists when a company's management holds more or superior information than investors or the general public about a given corporation, making capital allocation and pricing of risk less efficient.

Legitimacy theory: The theory of social legitimacy seeks to explain how organisations try to behave in a socially acceptable manner relative to established norms, values and expectations of the society in which they do business, in order to achieve and maintain a social licence to operate.

Net zero: A long-term Climate-Related objective by which an entity reduces GHG (greenhouse gas) emissions as far as possible and then neutralises any remaining emissions through verified carbon removals. Therefore, the entity should not add any additional GHG emissions to the environment

Physical risk: Financial risk created from the impact of climate change including both direct physical impacts of climate change (acute events such as floods, storms, wildfires) and chronic changes (rising temperatures or sea level) which affect operation or assets.

Purposive sampling: The sampling method where cases are pre selected based on criteria important to the research question rather than randomly selecting cases. Analytical depth is more important than statistical representativeness.

Scenario analysis: A method of examining how various possible future sate of the world could affect the company's strategy and financial performance. In climate impact reporting, the scenarios typically refer to different GHG paths (the path to 1.5 degree Celsius vs. 2 degrees Celsius or the path based on regulatory transition).

Scope 1 emissions: Greenhouse gas emissions that come directly from a company's operations (such as burning fuel for heat, or powering fleet vehicles).

Scope 2 emissions: Greenhouse gas emissions that are indirect in that they occur because of the production of purchased, consumed goods or services including the production of purchased electricity, heat, steam and cooling.

Scope 3 emissions: Any greenhouse gas emissions that are associated with the provision of goods or services to the reporting organisation in relation to its entire value chain (upstream from suppliers or downstream from customers) and constitute the majority of their climate impacts.

Stakeholder theory: A framework for assessing organisational responsibilities to a broader group than simply shareholders, which are: employees, customers, regulators, the local community and broader civil society. This framework provides a basis for how organisations act in relation to various stakeholders and defines what it means for an organisation to be "accountable to" its various stakeholders beyond simply maximising return on investment.

Stranded assets: The impairment of assets that may occur due to regulatory, technological or market developments that result in a transition towards a lower carbon economy (premature asset write downs, early asset decommissioning and/or conversion of assets to liability).

Transition risk: The financial risk related to adjustments required in order for businesses to operate in a lower-carbon economy including policy and regulatory changes (greenhouse gas emissions pricing), technology and market preference changes which affect the profitability of energy and carbon-based business models.

Value chain: The entire series of activities and organisations required when producing or delivering a good or service, from extraction and refining raw materials to transportation, to production and distribution of the finished goods to disposal. Scope 3 emissions are representative of all greenhouse gas emissions that occur in all stages of the reporting entity's value chain.

Introduction

In a decade, climate change has transitioned from being regarded as an issue on the periphery of environmental policy, to now being established as a global source of systemic financial risk to the operation of institutions who provide capital within the world economy. Previously, climate change had only been treated as an ecological issue (Sabauri et al., 2023), but now banks and insurance firms and investment funds are increasingly susceptible to the transition risks associated with moving toward a low carbon economy and the physical risks associated with increasingly volatile weather patterns (Cardenas, 2024). This evolving view about climate change has resulted in investors and regulators posing a very simple but difficult question for companies: how do climate change issues specifically affect the corporate strategy, financial performance and long-term value of the company? As a consequence of the increased focus on Climate-Related risk, corporate reporting is evolving and Environmental, Social and Governance (ESG) data is being integrated into ESG based reporting in the preparation of financial data for external users.

A new challenge has arisen as a result of this evolution. While companies are now required to report on the risks associated with climate change, the way they are required to report this information, the scope of the information reported and the credibility of the information reported can vary significantly from company to company (Conic et al., 2023; Hakansson et al., 2025). These variations reflect deeper structural divergences in how different industries and jurisdictions conceptualise and measure Climate-Related exposure, making cross sector comparability a persistent methodological challenge (Liu et al., 2024). Consequently, the creation of the International Sustainability Standards Board (ISSB) and the publication of IFRS S1 and S2, effective 2023, represent the most significant steps toward establishing a global baseline for sustainability related financial disclosures (Chonco and Mvunabandi, 2024).

These standards were part of a larger initiative to improve corporate disclosure of climate change issues. The Task Force on Climate-Related Financial Disclosures (TCFD), developed in 2015, is designed to encourage companies to disclose their risks associated with climate change by improving how they describe their risk management processes, governance policies and responses to climate change. Organizations all over the world are now using TCFD compliant forms of reporting, representing a major shift toward greater accountability in corporate reports and more predictable climate risk disclosures (Ngo et al., 2022). Notwithstanding this progress, empirical assessments of TCFD adoption indicate that significant heterogeneity persists in the depth and consistency of reported information, particularly with respect to quantitative scenario analysis (Auzepy et al., 2023).

The transformation to uniform corporate reporting for climate change risks is still developing, even with the above improvements. Companies face continued difficulty in converting complex climate risk issues into useful financial statements with some corporations providing elaborate but non comparable sustainability reports. Conversely, some companies will simply provide brief, qualitative descriptions and empirical evidence shows that companies' disclosures typically do not meet the comprehensive requirements of current sustainability programs (Conic et al., 2023). The concept of materiality creates a further obstacle: management has significant discretion in determining what constitutes financially material information (Matsumura et al., 2022), and the resulting discrepancies reduce the usefulness, reliability and comparability of climate disclosures, creating a significant information gap.

With this in mind, the introduction of IFRS S1 and S2 represents a major effort to improve the quality and comparability of financial reporting related to sustainability (Du Toit, 2024). Nonetheless, there is still a significant lack of empirical data regarding the real-world impact of the ISSB standards, despite the growth in academic work about ESG reporting (Okoye et al., 2025; Pratama et al., 2024). The actual effects of IFRS based climate disclosure standards have largely gone unexamined, as most of the existing literature focuses on voluntary reporting systems and prior frameworks for sustainability reporting.

Research gap: Even though TCFD has been adopted more frequently and IFRS S1 and S2 have been introduced, there is a continued lack of empirical evidence regarding their influence on the quality and utility of Climate-Related disclosures. Studies focus on if an entity has disclosed an item, rather than properly measuring quality or comparability among entities and industries. Also, currently there are few studies that compare two or more entities in different sectors and under one set of regulations in the post 2023 literature (Di Chiacchio et al. (2025). Therefore, we have very little understanding of how the implementation of standardized reporting frameworks will lead to an improvement in the quality of Climate-Related disclosures.

Research question: Do IFRS S1 and IFRS S2 improve the quality of climate-related disclosures, and if so, how? Furthermore, how could that quality be systematically assessed?

Research object: The study of Climate-Related disclosures developed according to both IFRS S1 and IFRS S2.

Research aim: The research aim is to examine the quality of Climate-Related disclosures in corporate financial statements.

To achieve this aim, the following research tasks (**objectives**) are formulated:

1. To identify the challenges associated with the disclosure of Climate-Related information in companies' financial statements.
2. Theoretically ground the concept and assessment of Climate-Related information disclosure quality.
3. Develop a research methodology for assessing the quality of Climate-Related disclosures in corporate financial statements in accordance with IFRS S1 and IFRS S2.
4. Conduct an empirical study of the quality of Climate-Related disclosures in the companies' reporting in the energy and banking sectors, taking into account the requirements of IFRS S1 and S2.

Research method: A systematic review of the scientific literature. Also included are content analysis of organizations' disclosures, a scoring methodology for determining the quality of those disclosures, data distribution, comparison and summary analysis.

1. Disclosure of Climate-Related financial information and key limitations in current reporting practices

1.1. Climate change as a Financial Reporting Issue

According to Lai and Stacchezzini (2021) and Veisi (2025), companies did often mention about efficiency, emissions and sustainability goals but they were always addons and failed to be integrated with the financial aspect of the company. With time this integration is getting difficult to maintain as this concept of climate change now is seen to affect company's operation in terms of asset life span, cost of insurance, long term profitability, financing and supply chain. (Ho et al., 2024). For sectors which are carbon intensive, the consequences are even deeper. The focus of business models will be less on managing risk and increasing efficiency and more on the future success of those models. Therefore, climate change is not only an environmental issue. It is becoming more widely viewed as a financial issue as well.

Climate change no longer functions simply as an aspect of corporate governance but rather is now considered an influential element of a firm's value and determines how a firm will be valued (Aversa, 2023). The impact of lack of clarity and comparability in climate change disclosures can lead to increased financial risk and unstable finances for a firm (Xindole et al.,
2025). Firms and investors looking for opportunities and risks from climate change are expected to connect their policies, financial performance and sustainability through
climate change exposure (Xindole et al., 2025).

Given trends in research, it is becoming clear that the role of climate risk has shifted from being a part of corporate responsibility to having a significant impact on a company's value. As stated by Aversa (2023), lack of clarity in Climate-Related disclosures or lack of ability to compare Climate-Related disclosures can lead to a company's financial instability and thus the company's financial risk is associated with Climate-Related disclosures.

Additionally, according to Xindole et al. (2025), companies are now being held to a greater extent than in the past to explain how their own strategies, financial results and sustainability goals are being affected by both Climate-Related opportunities and risks. The current transition has come into being through numerous converging influences. For example, as reported by Ilhan et al., (2023), investors are increasingly seeking more data to assess their exposure to climate change risks and lenders are looking for precise data before committing capital to a project. Demekas and Grippa (2022) contend that regulators have also begun pushing for a move toward more consistent or structured styles of reporting.

Given the nature and speed of these pressures, the historical narrative of Environmental, Social and Governance (ESG) is now being viewed by many stakeholders as being more than just broadly defined. A general statement about a company's contributions to sustainability may no longer meet the needs of the company's stakeholder. Stakeholders are now looking to identify how climate change issues are having an impact on the company's operations and use in the case of making an investment (see Chua et al., 2022). Page et al. (2025) argue that carbon emissions measurement and reporting is becoming more commonly incorporated into regular financial analysis, with expectations for reporting practices changing at a pace that exceeds the ability of the stakeholders to keep up with that change.

Originally, climate disclosures were meant to be used by stakeholders as a means of better understanding a firm's risk profile, as well as how risks are managed. In practice, however, users continue to have difficulty in accessing the information they require to decide smartly about their investments. Companies that have begun implementing climate disclosures have found that while

there has been an increase in stakeholder awareness of these disclosures, there is still a disconnect between decision making reporting and how companies use climate disclosures in their financial reporting. For example, many companies have adopted climate disclosures, but they do not provide sufficient information linking the companies' climate policies to how their climate goals will impact their overall financial performance (Smith et al., 2024). In many cases, even though companies provide information on their greenhouse gas emissions, that information is not used in conjunction with key financial decision making (capital expenditures, asset impairments and capital allocations) (Digericksen et al., 2023). The result of these findings continues to follow a pattern of increased disclosure but not necessarily improved disclosure.

In different sectors, the issue of climate risk disclosure presents differently. Energy companies are under increasing regulatory pressure to disclose climate risk and are facing innovations in technology to comply with investor expectations. Financial firms have indirectly been faced with climate risk through credit portfolios, investments and the way they assess risk before issuing policies. However, despite these differences, the expectation is that both sectors will disclose how climate risk will impact their risk profiles, strategic initiatives and generation of long-term value. The key question is whether companies should disclose information related to climate risk, but instead whether they are providing clear and comparable information that will allow for better decision making.

The international nature of this research adds an additional dimension to the problem of climate risk disclosure. The current literature focuses on larger economies like Australia, Italy, Spain, Germany and Brazil. Studies of climate risk disclosure in smaller economies, including Lithuania, have not yet started to be reported as there are current limitations related to the regulatory environment for companies operating in the European Union and how companies operate under this large umbrella. However, companies operating in Lithuania currently provide Climate-Related disclosures but at this time there is limited empirical evidence of the utility of those disclosures (Lapinskiene et al., 2025) and to date no studies have been completed documenting how companies in Lithuania are using Climate-Related disclosures (Bernini and Rosa, 2023).

Thus, we find academic and practical gaps with companies being pushed to improve their disclosures. On the other hand, there is still limited clarity on what "better" disclosure really looks like in practice, especially in the context of new standards such as International Financial Reporting Standards (IFRS) S1 and S2. Thus, the problem is to find out if the present reporting practices can meet the expectations.

1.2. Disclosure Quality versus Disclosure Quantity in Climate Reporting

The increase in available information from corporate reporting is supposed to explain and trustworthiness, however, with so much more data available for stakeholders to navigate through, it has created a situation where there is not a clear determination of the usefulness of the information.

Having more information does not necessarily give you a better understanding of that information. Although there may be more financial report disclosures, determining the quality of those disclosures is often more difficult than judging the quality of the information to which the disclosures pertain. Additionally, in some situations, the quantity of available data has increased at a faster rate than its ability to provide meaningful information.

Figure 1 below shows the relationship between disclosure quantity and disclosure quality.

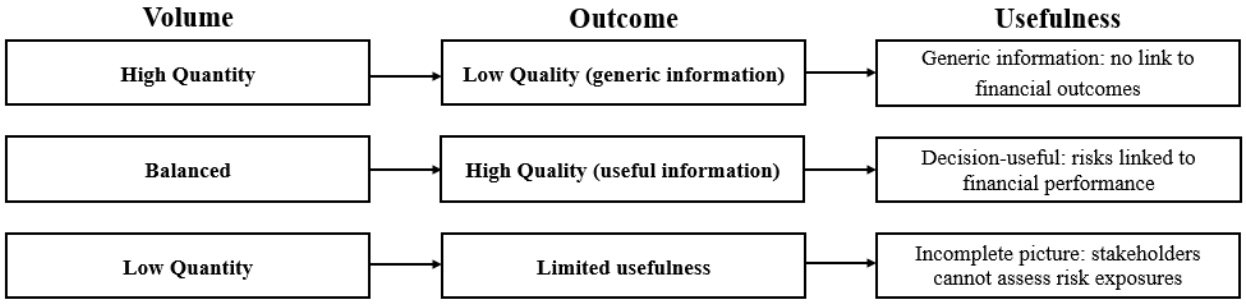

Fig. 1. Disclosure Quantity versus Disclosure Quality: Three Scenarios (prepared by the author)

In figure 1, it is revealed that a high volume does not correspond to a high level of quality. Companies may generate numerous reports that contain large amounts of generalised statements, boilerplate commitments and descriptions of how their businesses operate yet do not provide specific, quantified or decision-making useful information, thus enabling them to simultaneously produce both high volume and low-quality disclosure. This is a major occurrence and represents what Di Chiacchio et al. (2024) referred to as 'symbolic disclosures', whereby the main objective of the disclosures is to create an image of reliability rather than to reduce the level of asymmetry of information.

Furthermore, the usefulness of information is also relative to the ability to compare information. Because stakeholders are concerned not only with the performance of a particular business but also with the relative performance of that business in comparison to its peers (Brunelli et al., 2021; Di Chiacchio et al., 2024), comparability is a key component with respect to determining the reliability of comparisons. Therefore, even when an entity provides full disclosure about its performance, it is still difficult for stakeholders to determine how well that entity is performing.

There have been examples of this problem in various sectors of the economy as well. Dye et al. (2021) for instance, document very little comparability of Environmental, Social and Governance (ESG) reports from oil and gas companies. It's not just oil and gas, Lukacs et al. (2025) note that companies in every sector differ significantly in their amount of publicly available information, the issues they address and whether those issues receive a lot of attention or only cursory treatment. Furthermore, in a lot of instances the information that companies publish is in narrative form, which makes it even more difficult to make straightforward comparisons with disclosures of other companies.

Thus, companies face issues not only regarding how much information they disclose but also regarding the actual content of that information. The expectation is that companies will provide more public information to assist investors and other stakeholders in understanding their exposure to Climate-Related risks. To be useful, however, that information needs to be clear and relevant. For example, a general statement like "we are aware of climate risks" is not very informative. In contrast, when a company provides specific information such as explaining the governance structure applied to make decisions regarding Climate-Related risks, the methodologies used in performing scenario analysis and how decisions regarding Climate-Related issues were made, it would provide stakeholders with a much better understanding of how its governance structure manages such risks.

In addition, it's important to remember that not all disclosures are designed for the same purposes. Companies can benefit from producing disclosures that are incomplete or vague, even though this type of disclosure can give a less favorable impression than fully detailed and accurate disclosures. This type of disclosure is frequently referred to as symbolic disclosure (Di Chiacchio et al., 2024). In those situations, the company's intention may not be to deliberately mislead stakeholders, rather it may simply be to create a certain impression of the company itself.

There are practice based examples of how observations can be derived. For example, Wedari et al. (2021) examined greenwashing in Australia's high emissions businesses that performed poorly environmentally. Therefore, while some disclosures and/or data may not contain trustworthy data, not every disclosure and data set should be judged as containing trustworthy data. This implies that, along with the existence of the purpose of both the reporting for stakeholders being given useful information and in changing the perceptions of stakeholders about a company, there are many more purposes for reporting.

To determine the quality of disclosures, different approaches have been used as proposed in various literatures which are different based on methodological assumptions and focus.

Table 1. Approaches to Measuring Disclosure Quality (prepared by author, based on scientific literature)

Method	Description	Limitations
Qualitative characteristics	Based on qualitative characteristics such as relevance, reliability, comparability	Subjective interpretation
Value relevance	Links disclosures to market-based valuation	Ignores narrative disclosures
Earnings management	Identifies earnings manipulation practices	Not suitable for Climate-Related data
Content analysis	Evaluates disclosure depth and details	Requires a structured scoring model

As such, the increasing complexity of evaluating disclosures is driven in large part by multiple reporting purposes. As a part of evaluating a disclosure's accuracy, it is critical to assess the way it was disclosed, as well as evaluate the precision of the disclosure's information at a very detailed level (Yao et al., 2024).

Time shortening deadlines for analysis from companies does not help matters. These companies do not consistently report the same set of data from year to year. For example, an organization may report on target emissions behaviours in the current year, yet, as a result of evolving policies, but in a subsequent year, it may not have reported on policy engagement behaviours, but it may report on scope of sustainability related to environmental items. Companies have traditionally provided different levels of interim disclosures. However, companies that frequently modify their metrics, assumptions or boundaries also create certain elements of difficulty in attempting to track their progress. The frequent change of disclosure characteristics between fiscal periods often presents barriers for financial analysts attempting to compare companies based upon their historical reporting. Additionally, there is likely to be an inconsistency between a company's disclosed narrative versus actual performance.

Variations in disclosure quality are apparent across the various companies that constitute the market. Gebhardt et al. (2024) demonstrate that there is considerable variation in the quality of disclosure by German publicly listed companies with respect to the various attributes of an organisation. Although there are generally more detailed disclosures regarding governance, frequently less detail is provided for quantitative measures. Lukacs et al. (2025) indicate that there is also significant confusion with respect to how companies label and describe similar concepts, making interpretation of the report more difficult, despite the volume of information provided on a subject.

Sector issues contribute to the overall problem. In the energy sector, Dominguez-Quinones et al. (2025) discuss improvements in The Task Force on Climate-Related Financial Disclosures (TCFD)

alignment by companies, but identify areas where emissions reporting continues to lag. Xhindole et al. (2025) find similar situations in Spain and Italy. Companies report using the same set of disclosures, however, the details contained in the reports can differ significantly. Therefore, while reporting can appear to have been completed according to a particular standard, meaningful information can still be missing.

Thus, these points reinforce that the quality of disclosure cannot be confused with the quantity of information disclosed. Simply because a report is long does not mean it is a good report. The organization of the sections is not guaranteed to aid in decision making. Despite the use of a reporting framework, there may still be material elements of the information that are not disclosed.

Ultimately, format does not matter, but rather, the purpose of the disclosure. Climate-Related disclosures should help facilitate informed decision making for both investors and regulators. The value of Climate-Related disclosures, if not clearly defined, consistently represented and compared, is greatly diminished. The challenge for the institution is not merely to produce additional reports, rather, they must produce a report that provides a minimum amount of assistance to the users of the report.

1.3. Fragmentation and Lack of Consistency in Climate Reporting Practices

The second problem often observed in sustainability reporting is fragmentation. Companies have been using many different sustainability frameworks (The Task Force on Climate-Related Financial Disclosures (TCFD), Sustainability Accounting Standards Board (SASB), Carbon Disclosure Project (CDP) and Global Reporting Initiatives (GRI)) to report their progress on an ongoing basis instead of using one common framework. More recently, the implementation of European Sustainability Reporting Standards (ESRSs) has furthered the fragmentation of sustainability reporting for companies with regional obligations.

The benefit of having multiple frameworks has been to allow flexibility in what and how companies choose to provide sustainability disclosures. However, in practice, the flexibility created by these multiple frameworks has led to a lack of consistency amongst disclosures provided from company to company. Specifically, while companies may be disclosing information on the same issue, they often use different formats, metrics and terminology, which makes it difficult to compare reporting results. Additionally, it is not always clear whether two different disclosures relate to the same issue and there is a level of subjectivity in what companies choose to highlight and omit from their disclosures. Lukacs et al. (2025) referred to this as “label creativity,” whereby companies have a wide variety of possibilities for presenting similar information in different formats, which further impedes the ability to identify what is truly material.

Consequently, there are now numerous sustainability reporting frameworks that do not align with one another and this has been supported in numerous studies pointing out that sustainability reporting may become increasingly inconsistent and difficult to compare over time (Okoye et al., 2025).

The key challenges related to Climate-Related disclosure can be summarized as follows.

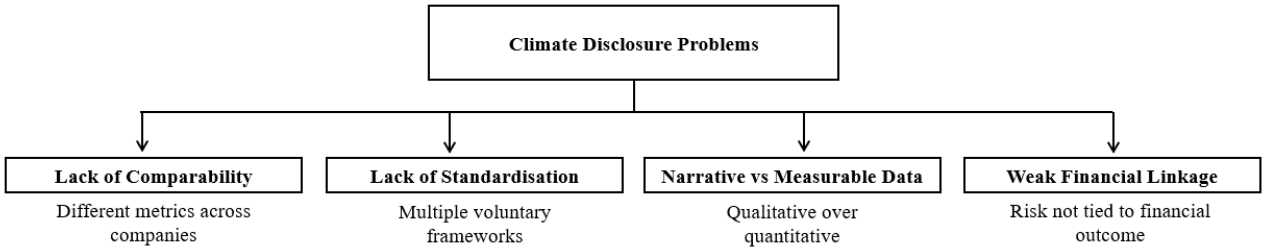

Fig. 2. Core Problems in Climate-Related Disclosure (prepared by the author)

Figure 2 shows that no uniformity in disclosure creates no way for someone outside to compare reported data. Therefore, all data will be in a narrative format rather than being produced by an objective third party. Moreover, there is usually little to no connection between a company's climate disclosure and its financial performance. Thus, because of these actions of the market, there are four separate problems that all interact. Fragmentation will produce inconsistency and inconsistency will produce a lack of comparability. Thus, it cannot be determined whether a given company's disclosures have value to outsiders from either a monetary performance standpoint or an environmental impact perspective.

Further, earlier reviews of the literature indicate that there are no single generally accepted standards for disclosing sustainability information, therefore, a wide variety of practices exist at different points in time related to sustainability disclosures (Sabauri et al., 2023).

For report users this gives a useful challenge. Report users must interpret overlapping but non comparable frameworks as they can receive inconsistent, imprecise, inconsistent or contradictory information, they may receive information from multiple sources and must then make sense of the disparate disclosures presented to them.

Fragmentation directly leaves its mark as well. Companies who are relatively large may need to comply with multiple reporting requirements at once, for instance they may need to develop a TCFD report to satisfy investor expectations but may also be required to provide voluntary disclosure for GRI or Environmental, Social and Governance (ESG) ratings and be subject to local or regional laws, therefore reporting becomes significantly more complex. An example of this issue in Canada can be found in the oil and gas sector, where voluntary and mandatory reporting requirements exist simultaneously (Gilliland et al., 2023). Observations of similar developments exist in Europe as well with regulatory pressure on companies increasing the volume of disclosures, they are required to provide (Yebenes, 2024).

Another challenge associated with the ongoing progress multiple, independent, sets of standards is that the International Sustainability Standards Board (ISSB) framework and the European governed frameworks do not create full alignment, therefore creating greater difficulty in attaining global comparability (Munch et al., 2025; Yoon et al., 2025).

Taken together, the proliferation of parallel reporting frameworks, combined with inconsistent adoption and divergent definitions of materiality, has produced a landscape in which meaningful comparison between companies remains difficult. Until a more unified approach is established, fragmentation will continue to undermine the overall usefulness of Climate-Related disclosures for external stakeholders.

Because of this fragmentation between sustainability reporting and financial reporting there is no obvious relationship. The rules that apply to each form of report are therefore divergent, making the

connection difficult. An example of this can be seen when a business describes transition risks in a narrative form, but the financial impact of those risks does not usually appear clearly within the financial statements. Therefore, the users must establish the connection between the two types of reports themselves.

This gap in the connection between sustainability and financial reporting has been historically highlighted by literature as a broader issue that transcends the national boundaries. For instance, Van Wyk and Els (2023) presented findings of how fragmentation has affected alignment of sustainability and financial reporting at international level. In response to this situation, there have been initiatives to improve the connection between climate reporting and investment decision making using new information frameworks in both sustainability and financial reporting areas (Gao et al., 2024).

While new frameworks to facilitate this alignment have been introduced, current frameworks also have limitations. An example of this is TCFD. The TCFD is founded on sound principles based upon the reporting needs of users. However, these principles are somewhat voluntary which means companies adopt them in varying degrees or not at all (Gupta, 2025; Principale and Pizzi, 2023). Another example of this is that many elements of TCFD have now been absorbed into more formalized standards such as International Financial Reporting Standards (IFRS) S2 and ESRS E1 (Xhindole et al., 2025).

1.4. Difference Between of Sustainability Reporting with Financial Reporting Logic

While reporting may improve, a more serious issue is still present. Climate-Related information is evidenced to be hard to quantify and measure accurately. It's not just how much information is disclosed by companies that needs to be verified. It's also the way in which they can accurately quantify it and connect that number to an economic outcome. To this end, reporting for climate is far different than conventional financial reporting.

There are rules to follow about how companies should recognize and measure information when completing their financial statements. Conversely, when companies are issuing climate reports much of the information is not quantified. Instead, companies provide estimates and create assumptions and scenarios to support their decisions. As a result, there is a lot of variability in how each company defines their boundaries, collects data and presents the information contained in their climate reports, making comparisons from company to company difficult. Add to this challenge the issue of transition risk poses a significant challenge, as transition risks are very hard to model using historical data (Baer et al., 2023).

This challenge is particularly prevalent in emissions reporting. Scope 1 and Scope 2 emissions are generally relatively easy to quantify due to the fact they relate to direct operations, while Scope 3 emissions are much broader, cover the entire value chain and are based on estimates and third-party data. Companies often do not have control over many of these emission inputs (or in some cases, even know they exist). Scope 3 emissions typically represent the largest portion of a company's total emissions, in some cases 75% or more (Page et al., 2025), therefore any reliable measurement of these emissions is critical.

The challenges presented go beyond technical measures, they impact the interpretation of Climate-Related information in a financial sense. Companies that have emissions disclosures or transition plans may have little to no connection with their financial sustainability. Therefore, companies may have descriptive, but no quantitative, disclosures, resulting in a lack of consistency around the benefits associated with disclosures.

Empirical literature confirms these discrepancies. In areas where disclosures have increased, many inconsistencies continue to exist. Risks are frequently described with a high level of detail, while

issues related to opportunities are generally described less quantitatively, in part because it is normally much easier to estimate future benefits (Gebhardt et al., submitted). More broadly, although there is increasing climate risk disclosures available, they do not always enhance the usefulness of the data provided for the purposes of both decision making and management (Gonzalez Cortes et al. 2025).

The time frame creates additional issues, the time frames for financial reporting are typically shorter time frames, while Climate-Related risk and impacts unfold over longer time frames, making it challenging to line Climate-Related information up with metrics that are used in relation to financial reporting. The concepts of materiality and time frames are also defined differently between companies making comparative analyses difficult (Millar and Slack; 2024).

Therefore, the quality of disclosures is the key question. There needs to be a focus placed on whether Climate-Related disclosures are concise and useful for purposes of financial decision making, rather than just an increase in the number of Climate-Related disclosures. Sucheworks such as International Financial Reporting Standards (IFRS) S1 and S2 are intended to address these issues and improve the quality of the disclosures. However, the overarching question remains whether the frameworks improve the quality of the disclosures overall versus adding structure to the existing disclosure process (Okoye et al. 2025).

The key difference between the TCFD framework and IFRS S2 can be summarized in the table below.

Table 2. Comparison of TCFD Framework and IFRS S2 Standard (prepared by author, based on scientific literature)

Aspect	TCFD	IFRS S2
Nature	Voluntary framework	Mandatory standard (in applicable jurisdictions)
Focus	Risk identification and disclosure structure	Financial impact of Climate-Related risks and opportunities
Structure	Four qualitative pillars	Standardised quantitative metrics with cross reference to TCFD
Comparability	Limited as company discretion remains high	Higher as clearer metrics support cross company comparison
Enforcement	Self regulatory and no mandatory compliance mechanism	Subject to IFRS adoption in each jurisdiction

According to Table 2, IFRS S2 builds significantly upon The Task Force on Climate-Related Financial Disclosures (TCFD) but provides a more prescriptive approach with a financial bias in its disclosure requirements. The distinction between a voluntary framework and a mandated set of standards may impact both how reporting companies behave as well as how users rely on the consistency of reported information.

The Climate-Related reporting framework has improved overtime and can be summarized in the figure below.

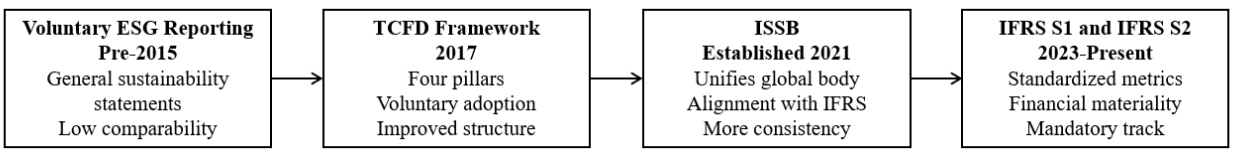

Fig. 3. Evolution of Climate Reporting Framework (prepared by the author)

Environmental disclosure is becoming more factual over time. Previously, organisations would disclose environmental facts mainly on a voluntary basis and primarily in narrative forms (in Figure 3). The level of structure has increased in environmental disclosures with time. Current trends indicate that they will continue to evolve into a higher level of formality with full financial integration as illustrated by IFRS S1 and IFRS S2.

The combination of regulatory requirements, investor expectations and an increasing agreement that traditional methods of disclosing environmentally conscious behaviours have been lacking has driven this move towards improved environmental reporting. Consequently, there has been a gradual shift from narrative form to more formally established standards in terms of methods of environmental disclosure.

Even though progress has been made in this area, the quality aspect of sustainability reporting and the quantitative aspect of financial reporting still do not align. It is still possible to create an operationally disjointed disclosure that is structurally compliant with a financial disclosure. This remains a key problem that the research in this article will investigate.

1.5. Limitations in IFRS S1 and IFRS S2 in Practice

International Financial Reporting Standards (IFRS) S1 and S2 were introduced in 2023, providing a much-needed foundation for sustainability reporting. For many years, companies utilized different reporting frameworks making it very hard to compare companies to each other. The introduction of both standards is intended to provide some structure in the way that companies disclose sustainability information, in the hope that this information can be more comparable and therefore more useful to investors whilst also creating a closer connection between sustainability and financial reporting. While there is some degree of newness in terms of how these standards take shape, most of the guidelines are built upon existing frameworks such as the The Task Force on Climate-Related Financial Disclosures (TCFD) as a basis for how companies consider Climate-Related risks.

Researchers have largely reacted positively to the introduction of these standards, but there is a cautionary tone. According to Kusuma and Gani (2024), with the introduction of IFRS S1 and S2, it is expected that there will be reduced inconsistencies in sustainability reporting due to many companies' use of these frameworks. Similarly, Boakye and Boafo (2025) refers to the introduction of IFRS S1 and S2 as moving us towards harmonization of sustainability reporting but identified that there has been uneven progress in the implementation of these standards. There has also been evidence in some specific sectors that companies continue to struggle regarding availability of data and technological capacity, which has created delays in progress on sustainability reports. For example, Kocis et al. (2025) state that in their work with the Turkish energy sector, there has been a trend toward increasing amounts of detail in disclosures, however they indicate that disclosures are still lacking fully developed. Conversely, Afolabi et al. (2023) argue that in underdeveloped countries, these frameworks might not function as they are currently intended (due to a lack of relevant indicators) and therefore would result in a lack of comparable sustainability reporting.

The direction seems clear for change however the actual direction of where things are going is much less clear. Simply introducing standards does not necessarily improve the reporting. For example, a company requires a comprehensive system, good data and a knowledgeable workforce to be able to comply. Often the company must fit the new standards into an existing regulatory framework, which is different for all countries.

Examples of this gap between what the standards will accomplish and what the companies are doing have already occurred. Both Sabauri and Katashi (2023), report that disclosure levels will increase,

but may not improve in quality, at least in the short run. Okoye et al (2025), report similar findings, indicating that any improvement in comparability and clarity will be largely driven by factors such as enforcement and industry context. That is, while the standards do provide some underpinning for the standard to be applied, the effectiveness of application will vary based upon how well that standard is applied. Delgado S et al (2025), provide a more critical assessment of the situation suggesting companies may still have their own motivation to disclose based upon their own priorities, especially if they are being pressured to focus on financial performance.

There are several broad themes that emerge from literature. Previous research has indicated that disclosures related to climate change were often inconsistent and difficult to compare. Additionally, an increasing number of studies have examined how companies are aligning their reporting practices with frameworks such as the TCFD. Recently, more attention has been focused on both IFRS S1 and S2 and the changes they will bring.

However, whether these standards produce improved quality of disclosure in practice is not yet fully understood. This is where the gap in research becomes apparent. Xhindole et al. (2025) stress that there is a need for more research on how quality of disclosures may be impacted under the new standards. Okoye et al. (2025) also point out that there is still very little empirical evidence on this issue. Compounding the problem even further is the fact that the differences in regulatory environments make things much more complicated. For example, companies report differently depending on how materiality is defined in that region (Yoon et al., 2025).

To address the issue more specifically, we need to have a greater number of clearly defined and useful disclosures, specifically with respect to how robust, complete and reliable the Environmental, Social and Governance (ESG) information is to make effective decisions (Okoye et al., 2025). Comparability relates directly to the feasibility of comparing firms' ESG data across organizations or to assessing firms' ESG performance in a consistent manner. By establishing global standards for sustainability related reporting through IFRS S1 and S2, we would be reducing the fragmentation of reporting that has occurred to date. These ideas are closely tied together as they will help provide clarity about what this research is attempting to accomplish.

The problem with research, then, becomes clearer. Climate-Related disclosures are on the rise. However, there continues to be inconsistencies and disparities in comparison (Millar and Slack, 2024; Yoon et al., 2025). While the structure of reporting has improved through TCFD, there still have not been resolutions to some of the challenges faced by firms since this were released. Concepts of IFRS S1 and S2 are designed to advance reporting relative to those previously mentioned expectations from TCFD, as well as to establish more clearly defined disclosure requirements (Okoye et al., 2025; Du Toit, 2024). The ultimate result of this will depend on whether IFRS S1 and S2 lead to higher quality disclosures or merely a movement toward more standardized methods of reporting.

This is the context of the current research project. In addition to examining the standards themselves, this study will focus on how organizations' actual disclosures are being presented in practice and whether evidence exists of the anticipated improvements or gaps from prior disclosures.

This chapter highlighted the key challenges present in today's corporate Climate-Related reporting practices and established the problem context motivating this research. Five interrelated challenges have been examined: 1. Increasingly climate change is being viewed as an important financial reporting issue, 2. There continues to be a significant gap between the quantity and quality of climate-related disclosures, 3. Reporting frameworks are often fragmented and inconsistent, 4. The logic of sustainability reporting differs structurally from that of traditional financial reporting and 5. When viewed in their current forms, IFRS S1 and IFRS S2 have numerous practical limitations. Together,

these challenges indicate that just because there is more Climate-Related disclosure does not mean that this disclosure is necessarily useful for investors, regulators or any other stakeholders. The real question is not whether companies report on climate, but whether the information provided in their reports is clear enough, specific enough, comparable enough, and useful enough to aid in reducing information asymmetry. This question will provide the intellectual basis for the theoretical framework presented in Chapter 2, the methodological approach outlined in Chapter 3, and the empirical analysis conducted in Chapter 4.

2. Theoretical Framework for Assessing the Quality of Climate-Related Information Disclosure

2.1. Climate risk and Corporate Financial Disclosure

Climate change has long been considered primarily an environmental concern or social issue in the context of businesses but is now increasingly recognised as a financially relevant issue. Information on climate change is mentioned in the sustainability reports or social responsibility sections of their annual reports. Climate-Related issues were seldom addressed in the main body of financial reports. Frequently, companies would provide emissions reduction targets or environmental goals, but these were seldom included in the financial reporting of the company. With this separation of information, the financial performance of the company was often seen to be unaffected by climate change. However, as stakeholders have demanded better transparency and a clearer relationship between climate risk and financial performance, this has begun to change (Yebenes, 2024).

The separation that previously existed between climate change and financial reporting is becoming increasingly difficult to maintain. Climate change is now affecting the business operations of many companies in ways that are difficult or hard to miss. For example, when physical risks such as flooding due to extreme weather events cause damage to business facilities, interrupt production and increase operating costs, one of the many examples of how the effects of climate change will affect businesses is through the increased cost of insurance coverage. In addition to increased insurance costs, there are other business disruptions that will affect businesses, such as supply chain interruptions and production interruptions. In addition to increased disruption of operations due to physical risks, the increased visibility of transition risks, which stem from regulatory changes, carbon pricing, new technologies and different consumer preferences, will create disruptions to the operation and profitability of many companies (Agliardi and Agliardi, 2021). These risks do not operate in isolation from one another. Both transition and physical risks affect the profitability and value of a company's assets, as well as the long-term plans of a company.

Table 3 summarizes the main types or categories of Climate-Related risk and their associated financial impacts.

Table 3. Climate-Related Risks and their Financial Implications (prepared by author, based on scientific literature)

Risk Type	Description	Financial Impact Example
Physical Risk	Floods, extreme weather events, sea level rise, prolonged drought	Asset damage, increased insurance costs, supply chain disruption
Transition Risk	Regulatory changes, carbon pricing, technology disruption	Increased compliance costs, stranded asset exposure
Market Risk	Shifting consumer preferences toward low carbon products	Revenue decline for carbon intensive business lines
Liability Risk	Legal exposure from inadequate climate risk management	Increased provisions, reputational damage, litigation costs

According to Table 3, the various categories of Climate-Related risk have distinct financial impacts that will be considered when a company is evaluated for its value, viability and future success. Each type of climate risk directly impacts the company's expenses (physical risk), revenue (transitional risk) and value (market risk). The different types of climate risk also change the company’s competitive position in the marketplace (market risk) and create possible liability or other legal or reputational expenses (liability risk). The reasons why these risks are materially important to the financial future of an organization are driving the demand for formalized, comparable reporting related to climate risk.

Physical and transition related risks have a direct influence on the financial performance of an organisation as they will affect both the costs and revenues of an organisation as well as its asset valuations.

When the effects of climate change are incorporated into the company's expected future cash flows, climate change can no longer be considered an environmental issue only, but rather, it will be a part of the financial reporting of each company. Figure 4 shows how climate risks become financial impacts and disclosure obligations for businesses.

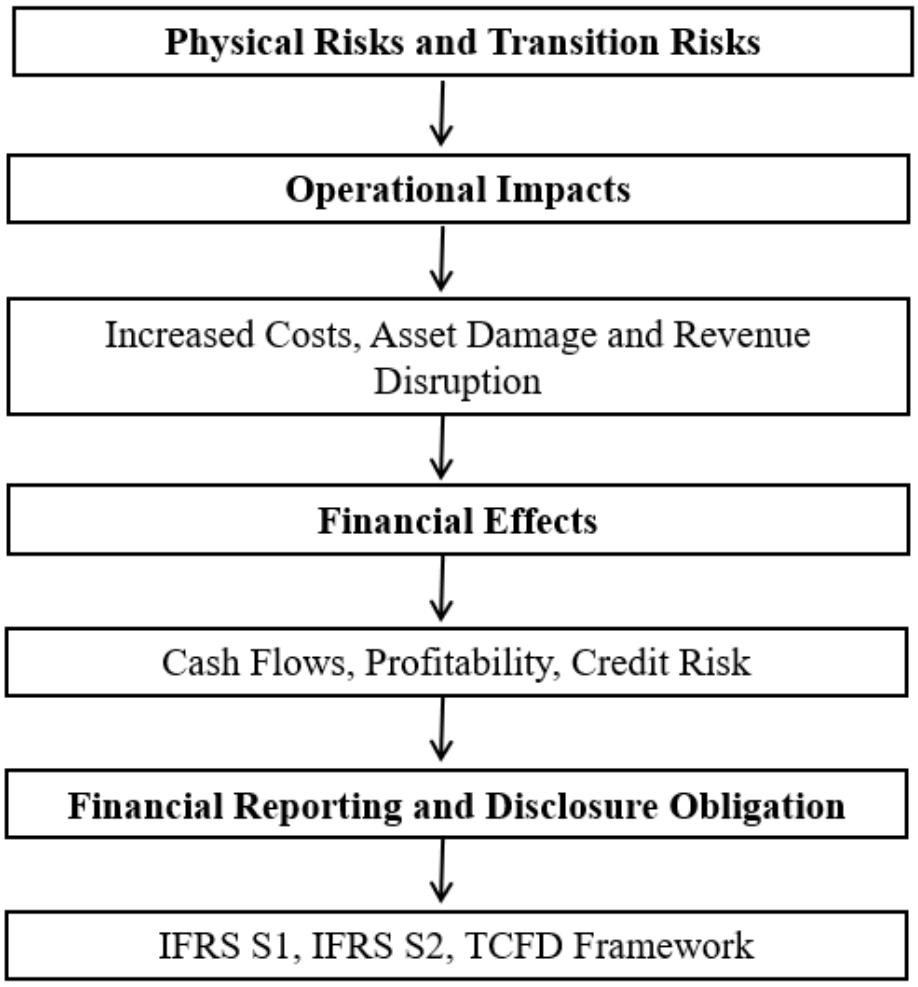

Fig. 4. From Climate Risks to Financial Reporting: The Disclosure Chain (prepared by the author, based on Agliardi and Agliardi 2021; Gebhardt et al. 2024)

Figure 4 shows physical or transitioning climate risks impact the operation of a business via costs, disruption, or asset impacts. Then these operational impacts have a financial impact creating cash flow, profitability and risk exposure, leading to disclosure requirements such as International Financial Reporting Standards (IFRS) S1, IFRS S2 and The Task Force on Climate-Related Financial Disclosures (TCFD). Knowing how to connect these different points in this chain will help us understand how a company's quality of Climate-Related disclosures is critical for making financial decisions.

Climate-Related risks initially affect a company's operations either physically or through transition. This affects the cost, revenue and asset value, leading to companies disclosing items in financial statements under frameworks like IFRS S2.

The financial sector has demonstrated the trend toward increasing exposure of banks, insurance companies and institutional investors to climate change related risks because of their lending and investment actions (Agliardi and Agliardi, 2021). For instance, banks that have a high level of exposure to carbon intensive industries could experience an increase in credit risk if credit risk regulations become more stringent or that the market moves away from carbon intensive companies. Likewise, as Climate-Related events become progressively more consistent and severe, insurance companies are under increased pressure to provide coverage for growing amounts of claims (Yang et al., 2025). In situations such as these, traditional financial metrics do not allow for a valid assessment of the associated risks. A greater understanding of risk is required through the addition of supplementary information, particularly with respect to long term resilience and the way the corresponding companies have dealt with Climate-Related challenges.

Similarly, other sectors, including energy, manufacturing and transportation, face challenges like those faced by the financial sector. Many the assets that currently appear to be profitable will ultimately lose profitability because of changes in policy or because of the increased competitiveness of non fossil fuel-based technologies. Infrastructure based on fossil fuels is a classic example. If there is a change in policy that restricts the development of fossil fuel-based technologies, the value of the infrastructure will decrease significantly and could ultimately be rendered stranded. Compounding the problem is the inherent difficulty associated with accurately reflecting the related uncertainty in standard financial statements. Therefore, investors and lenders need to receive additional information for valuation purposes, not only regarding the present performance of a company but also with respect to its future expectations and strategic direction.

Recent developments have explained why Climate-Related disclosures are more important than ever, because investors are now examining the potential impact of climate risk on decision making related to capital allocation and portfolio management. As a result of this shift in investor preferences, the nature of their information requests has also changed. Disclosures are not just requested by nonprofits and environmental organizations anymore. Financial entities such as asset managers, credit rating agencies and regulatory authorities now expect companies to disclose how Climate-Related risks and opportunities will impact their corporate strategies and anticipated future financial performance.

There's also an increase in regulatory implications for this issue. The impacts of climate change on the global economy are being increasingly recognized as a source of systemic risk within financial markets (Reghezza et al., 2022). When large numbers of companies in the market experience losses or disruptions because of Climate-Related factors, the impacts could ripple outwards in a way that would be detrimental to the financial system. Regulators have begun to see this and they are advocating for companies to provide clearer and more structured disclosures of Climate-Related risks (Agliardi and Agliardi, 2021). Consequently, the divide between sustainability reporting and financial reporting has been lessened over time and this process continues to be in developing.

However, there are challenges in integrating climate matters into financial reporting. Financial reporting typically operates within a framework of established accounting standards and stable measurement methodologies (Millar and Slack, 2024). Most Climate-Related financial reporting uses forecasts and estimates for our assumptions about future conditions. Companies must assess how existing regulatory policies will change in the future, how technology will evolve and how markets will develop. Scenario analyses are frequently used to evaluate how Climate-Related risks may affect future results of operations, but these analyses create a lot of uncertainty when translating Climate-Related risks into financial statements.

The difference between industries creates another complication. Environmental risks differ for every company depending on the sector in which it operates. In agriculture and real estate, for instance, many physical risks may outweigh many transitional risks. However, for companies in energy intensive sectors, transitional risk tends to outweigh physical risks (Gebhardt et al. 2024; Wiklund 2021). A different case can be observed for financial institutions, whose exposure to climate events is usually through indirect means (i.e. via loans and investments) rather than through their own operations (Carattini et al. 2024). The result of these different types of exposure may be that the way a company discloses information varies based on the type of risk exposure. Due to a general lack of standardisation, comparisons among companies have become increasingly difficult.

This is one of the driving forces behind the calls for the need for more structured or formalised reporting frameworks. Regulatory bodies and investors want to know how environmental issues will affect a company's bottom line. The information they seek includes disclosures regarding governance, strategy, risk management and quantitative measures (emissions levels, scenario analysis, etc.) (Gebhardt et al. 2024; Yoon et al. 2025). Without the availability of this type of information, it is extremely difficult to assess the level of preparedness that any company possesses to deal with Climate-Related events.

The TCFD was created to address these issues. TCFD provides companies with a formalised framework to report on their governance, strategy, risk management and targets. Its goal is to create a clearer picture of how companies are considering Climate-Related risks in their business decisionmaking (Auzepy et al. 2023). Although this has improved the level of structure within reporting, there are still challenges that remain to be resolved.

One challenge of voluntary frameworks is the number of different varieties. Some organizations provide highly detailed quantitative statements whereas others provide only very generalized (Gebhardt et al., 2024; Yoon et al., 2025). This creates differing quality of information which complicates comparison between organizations (Bingler et al. 2024; Ilhan et al. 2023). In many cases, organizations appear to be more focused on presenting the good aspects of their disclosures versus providing substantive detail on risks and uncertainties.

The introduction of IFRS S1 and IFRS S2 is intended to address this situation by moving towards a consistent approach for presenting sustainability related financial disclosures. Both standards include information relevant to financial materiality and have the goal of making sustainability reporting more aligned with the financial reports of an organization (Millar and Slack, 2024; Du Toit, 2024).

IFRS S1 and S2 focus on how organizations communicate how climate change issues affect their organizational structure, governance policies and financial results. As described in Du Toit (2024), this means organizations will be required to present Climate-Related issues in a way that supports the analysis of their financial position rather than relying on only narrative-based forms of disclosure. Whether this results in meaningful improvement remains to be determined.

This transition will be informative for assessing the quality of Climate-Related disclosures. Given that the relevance of Climate-Related information grows as it pertains to decision making purposes, the expectation for this information to be reliable and clearly presented likewise grows. If there are no established standards for presenting Climate-Related disclosures, then we may continue to see an absence of consistency in the presentation of Climate-Related disclosures or challenges in interpreting these disclosures (Yoon et al., 2025). This indicates that establishing standards for Climate-Related disclosures has the dual role of enhancing how structured climate disclosures are and improving the usefulness of the information contained in the disclosures (Sun et al., 2022).

The subsequent section will expand upon this theme by analyzing what constitutes the theoretical foundation for climate disclosure and how standardization may impact the quality of this disclosure.

2.2. Financial materiality and Double Materiality in Climate Reporting

An issue that often presents a challenge for climate reporters is the identification of materiality in their report. Financial statements have included elements that have an impact upon how the investors, lenders, or other users of these statements are able to evaluate information that may influence their decisions as to whether to do business with the company in question (Afolabi et al., 2024). Therefore, if a firm were to determine that its financial position relates to climate issues in any material way, there is sufficient evidence to suggest that those are the critical elements upon which they will focus.

Despite being reported in a controlled and systematic manner according to GAAP (US Generally Accepted Accounting Principles), Environmental, Social and Governance (ESG) factors may not always fit neatly into that paradigm. There are instances in which the impact will take time to manifest in the company's financial statements even though those will impact the company's financial position and performance in the long term. For example, there may not be a financial loss from a given company or occurrence this year, yet there will be exposure to future regulation, altered market conditions, or reputational pressure from climate change activity. Hence, the concept of materiality has expanded over what is traditionally considered materiality with regards to climate change.

Consequently, identifying the difference between financial materiality and double materiality is of great significance currently. A company's consideration of financial materiality is primarily based upon the way environmental and climate matters will economically affect the company (Bingler and et al., 2024), whereas double materiality will address both how the company will be affected by climate and environmental matters and how the company, in and of itself, will affect the environment and society (Yebenes, 2024). When considering both types of materiality, the discussions will differ depending upon whether an external or internal perspective is used, therefore, the search for climate materiality is a two-way street.

A distinction exists between the concept of financial materiality and that of double materiality when viewing climate change through both lenses of Climate-Related reporting.

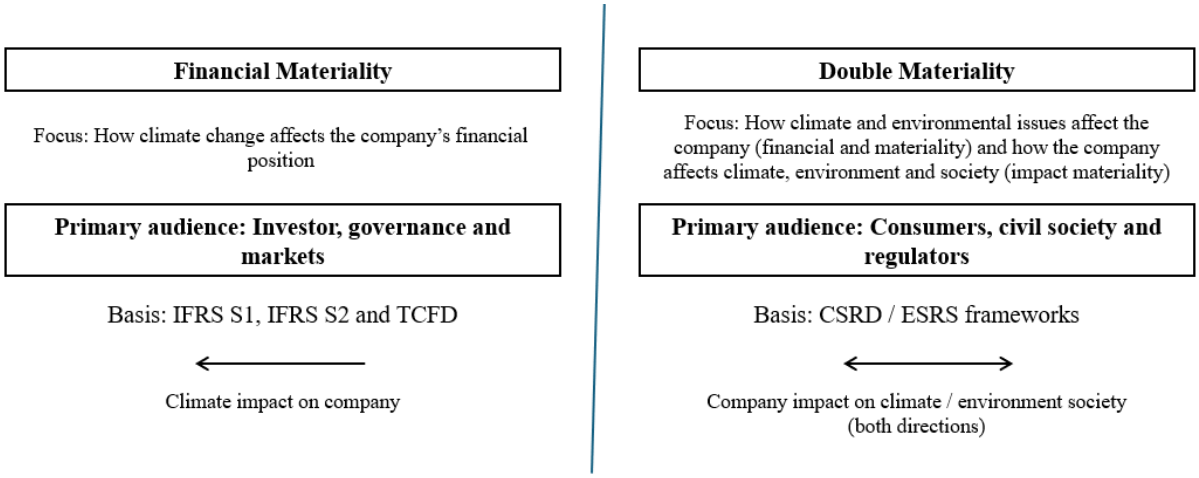

Fig. 5. Financial Materiality versus Double Materiality in Climate Reporting (prepared by the author, based on Yebenes, 2024)

Figure 5 shows the two types of materiality, financial and double as separate concepts that answer different questions for different audiences. The The Task Force on Climate-Related Financial Disclosures (TCFD) and International Financial Reporting Standards (IFRS) S2 disclosures are based

on financial materiality, which will therefore be the main method to evaluate disclosure quality in this review. Many European companies must comply with both the TCFD standards, as well as fulfill their requirements under double materiality as defined by CSRD. Thus, adding a layer of complexity to the way they report each individual item and potentially decreasing the level of detail and completeness of the reporting.

There is a focus on financial materiality with the two new IFRS S1 and IFRS S2 standards (Afolabi et al., 2023). These new standards will provide investors with the necessary information to assess the potential effect of sustainability related opportunities and risks on the value of an enterprise (Afolabi et al., 2023). Companies primarily within Europe also have reporting systems that will require them to consider double materiality. As a result, companies have two separate and distinct reporting processes that require them to respond concurrently to multiple reporting frameworks, both of which contain conflicting materiality concepts.

In evaluating the quality of disclosures related to climate change, there is a crucial difference in whether a company will report only on the direct financial impacts of Climate-Related issues. If a company only evaluates Climate-Related issues that have a direct financial impact, there is a risk that some significant Climate-Related impacts will not be reported. However, if reporting on Climate-Related issues becomes too broad, then the length and complexity of the disclosures will make it difficult to identify which Climate-Related issues are financially material. Thus, the concept of materiality should be viewed as more than simply a technical detail, it determines what a company reports, how it reports and therefore, the overall usefulness of the disclosures.

Consequently, in order to assess the quality of each company's disclosure, it is imperative to understand how companies in this study can make sense of and then apply 'materiality' (single or double) and how these definitions affect their reported disclosures as well as the degree to which the reports will meet the needs of external users making a decision.

2.3. Theoretical perspectives on Corporate Climate Disclosure

To comprehend the differences in the way companies, provide information about their climate impact, and the variances in the quality of such information, one must engage with multiple theoretical frameworks that have been used to analyze the accounting and sustainability reporting literature. The frameworks do not simply allow one to determine that Climate-Related corporate reporting exists. They also provide insight into how the quality of Climate-Related reporting is developed, constrained by and assessed against a given set of criteria. Through the use legitimacy theory, agency theory, institutional theory and stakeholder theory, there are four different ways of viewing, assessing, and evaluating corporate disclosure behaviour, collectively. These four theories form the basis for creating an understanding of the quality of Climate-Related disclosures made by corporations under IFRS S1 and IFRS S2.

Companies have an incentive to demonstrate their compliance with societal values and expectations using disclosure which can lead to the creation of selective reports oriented toward achieving good outcomes rather than providing complete and verifiable information. Alternatively, agency theory posits that accountability is based on the level of information asymmetry for investors relative to management and proposes that governance structures provide an opportunity to reduce these asymmetries and create a more reliable and comparable source of data due to the use of standardised accounting rules such as the IFRS S1 and S2 frameworks (Principale and Pizzi 2023). Institutional theory expands upon agency theory by stating that organisations within similar regulatory regimes will typically have very similar disclosure practices in an effort to gain legitimacy as opposed to having a structural change within their organisation, allowing for an understanding as to why the quality of the disclosed data of companies that are in compliance with the same regulations is often

inconsistent (Afolabi et al. 2023). Stakeholder theory provides further insight into this relationship by examining the different levels of stakeholder pressures faced by organisations in various sectors and of different sizes and how these pressures drive observable differences in disclosure depth as documented through empirical studies conducted in both the energy and financial sectors (Principale; Pizzi 2023).
These perspectives all point to an important finding concerning the current research: having a reporting framework does not guarantee the quality of disclosures. The quality of climate-related disclosures will reflect the interaction of institutional pressures, governance structures, stakeholders' demands and management's incentives, all of which can determine if disclosures are specific, comparable, decision useful, consistent and verifiable. This is especially important in terms of the International Financial Reporting Standards S1 and S2 because they are claiming to transition Climate-Related disclosures from uncoordinated and voluntary reporting to a single, consistent and investor-oriented baseline. However, their actual empirical impact on the quality of Climate-Related disclosures has yet to be determined.

2.3.1. Information Asymmetry Theory

Current corporate disclosure theory highlights that there is an information gap between corporate managers who are expected to disclose information and external stakeholders (such as investors, lenders and analysts) who do not have the same number of insights on the risks, strategies and future outlooks of a company (Sun et al., 2022). Due to this information imbalance, investors may have issues assessing the long-term risk exposure or financial viability of a company.

The presence of large asymmetries in information levels leads to less efficient market functioning (Sun et al., 2022). Investors tend to overestimate profitability, underestimate risk or require higher rates of return to compensate for the uncertainty of an investment. In extreme cases, insufficient corporate disclosure could lead to capital misallocation when investors invest in companies or projects without having a complete understanding of the risks involved (Millar and Slack, 2024).

The absence of specific risk guidance on climate change related to long term corporate value creates a further gap in information. If an investor wants to determine if they will invest in company based upon exposure to emissions, energy dependence, technology adaptability and risk from regulation, the company must disclose this information so that the investor can evaluate future performance.

If Climate-Related disclosures are intended to eliminate the knowledge asymmetry, investors with an appropriate governance system, a risk management system, scenario analysis and indicators for greenhouse gas emissions will provide information to the investor that they otherwise would not have.

Disclosure incentives are not always clear cut. Unless there is evidence that Climate-Related risks will negatively impact financial futures, there will be no incentive for managers to be transparent about these risks. For example, companies with large amounts of income from fossil fuel operations may not wish to disclose transition risks or any potential for stranded assets. Consequently, in these circumstances, there will often be incomplete or selective voluntary disclosures.

In these circumstances, standardized reporting systems will offer a solution. Corporations can provide incomplete disclosures or emphasize favorable narratives without indicating the material risks associated with the company when the disclosures are voluntary and not structured properly (Gebhardt et al., 2024). By creating standardized reporting formats and clearly defined disclosure requirements, standardized reporting frameworks attempt to address this issue.

Thus, information asymmetry theory can be applied to explain the implementation of International Financial Reporting Standards (IFRS) S1 and S2 (Du Toit, 2024). These standards were developed to provide investors with consistent and relevant information regarding climate risks and

opportunities, resulting in a more predictable investment environment and greater efficiency in the capital markets (Du Toit, 2024).

Therefore, the foundation of the present thesis is information asymmetry theory. The working assumption that improved disclosure will reduce the gaps in information possessed by the companies from their stakeholders represents the basis of the subsequent analysis of the quality of disclosures in subsequent chapters.

2.3.2. Stakeholder Theory

Stakeholder theory helps in expanding the research by covering a wider range of stakeholders who impact company behavior, whereas information asymmetry largely concentrates on the interaction between companies and investors. Stakeholder theory states that companies function within networks of relationships involving different groups whose interests must be taken into consideration when making company decisions (Lapinskiene et al., 2025). Investors, regulators, workers, clients, suppliers and civil society organizations are a few examples of these groups (Gupta, 2025).

Over the past 20 years, stakeholder expectations on climate change have changed significantly. Once mostly brought up by advocacy groups, environmental issues are now gradually being discussed in mainstream political and economic contexts. While regulators and policymakers place a strong emphasis on corporate responsibility for environmental impacts, institutional investors are increasingly including environmental risks into portfolio analysis.

As a result of these changes, there is likely to be greater pressure on companies to disclose more details about their exposure to climate risk and their environmental performance (Gebhardt et al., 2024). For instance, investors may look for information on the amount of carbon emitted, transition plans to a lower carbon future and climate resilience when assessing long term investment risks (Gebhardt et al., 2024). To improve transparency in financial markets, regulators may require companies to provide structured climate disclosures (Gebhardt et al., 2024). Consumers and civil society organizations may also call for more accountability regarding a company's impact on the environment (Gupta, 2025).

The growth of sustainability reporting by companies, even where there are no stringent legal requirements, can be explained using stakeholder theory (Gebhardt et al., 2024). To meet the needs of stakeholders, companies report information about their commitment to responsible management and their understanding of the risks to the environment (Gebhardt et al., 2024). By providing meaningful disclosures, companies can use climate disclosures as a way of responding to external forces and supporting their relationships with key stakeholders (Gupta, 2025).

However, stakeholder driven disclosures can vary significantly among organizations or industry sectors. While there may be organizations with comprehensive sustainability reports that include scenario analyses and extensive environmental data, there are also organizations that limit their disclosures to general climate target statements and behaviors warranting responsible sustainability. This may be an increased level of diversity in the format, breadth and comparability of climate disclosures that will eventually exist in the absence of formalized reporting frameworks.

Because of the diversity in the field, it is also critical for there to be uniform disclosure standards. Therefore, frameworks like IFRS S1 and S2 are needed. By specifying the types of sustainability related financial data that must be disclosed, these standards will allow stakeholders to receive comparable and relevant information for making informed decisions from multiple companies within and across different industries (Du Toit, 2024). Stakeholder theory assists in improving the theory of

information asymmetry by explaining the institutional context and drivers that lead organizations to disclose Climate-Related information (Okoye et al., 2025).

2.3.3. Legitimacy Thoery

The legitimacy theory serves as the third theoretical perspective concerning Climate-Related disclosures (Bernini and Rosa, 2023). The premise of this idea is that companies will attempt to maintain legitimacy in the countries or societies where they operate (Bernini and Rosa, 2023) through ensuring that their actions are consistent with the prevailing social norms, social values and social expectations (Sun et al., 2022). If companies' actions violate society's or the environment's expectations, they may suffer reputational damage, face increased regulatory scrutiny, or have a decline in trust from their stakeholders. To mitigate the risks associated with these types of consequences, companies will often use communication tools to demonstrate that their actions are consistent with the prevailing social standards.

One common way to do this is through sustainability reporting. By taking this approach, companies demonstrate their awareness of and the actions they are undertaking to address environmental issues, such as by issuing an environmental report, implementing a climate strategy, or making a commitment to achieving net zero emissions. Such disclosures assist with the legitimacy of companies within the economy, especially among industries or business sectors associated with significant environmental impacts.

The adoption of standardized disclosure frameworks is considered beneficial in helping to resolve this issue by encouraging more comprehensive reporting (Xhindole et al., 2025). Companies face increasing difficulty relying solely on symbolic communication due to governance structure requirements, risk management processes and measurement of quantitative emissions. Standards such as International Financial Reporting Standards (IFRS) S1 and S2 are designed to enhance the reputation of climate disclosures by providing evidence for the legitimacy and financial significance of sustainability related information (Okoye et al., 2025).

Legitimacy theory also provides an explanation for the current explosive growth in climate reporting (Veisi, 2025). Companies are increasingly being pressed into demonstrating sound environmental management practices as they become more widely known for their use and knowledge of climate change (Xhindole et al., 2025). Disclosures are starting to function as a method for companies to maintain a relationship of credibility and trust with both their stakeholders and society (Veisi, 2025).

This study will be guided by a conceptual model that describes the different theoretical perspectives that shape the development of reporting disclosures regarding Climate-Related risks and the impact of reporting standards on the quality of disclosures. This is presented visually in figure 4 attached to this study.

Companies respond to this information imbalance, along with increasing shareholder pressure, by providing Climate-Related information in corporate reports. The quality and comparability of voluntary and unstructured disclosures may differ widely between companies. To address this issue, IFRS S1 and S2 have established uniform disclosure standards to ensure standardized sustainability reporting frameworks. Therefore, it is anticipated that the use of IFRS S1 and S2 will enhance the decision usefulness, comparability and transparency of Climate-Related disclosures.

In this study, legitimacy theory provides insights into why energy firms and financial institutions make Climate-Related disclosures, as well as how the extent of Climate-Related disclosures made by

these organisations vary based upon the differing regulatory pressures and social expectations that each face.

2.3.4. Institutional Theory

While understanding information asymmetries, the relevance of stakeholder groups and theories of legitimacy do provide valuable insight into disclosure behaviour, further insight can be gained by looking at institutional theory, which helps to understand how external pressures will affect the organisational practices adopted.

According to institutional theory, organisations are inclined to adopt similar practices through time due to three types of pressure: coercive, normative and mimetic. Coercive pressures arise from regulatory authorities or through legal obligations, normative pressures arise from professional associations or through norms of practice developed by the industry at large and mimetic pressures arise when organisations are uncertain about a course of action and therefore tend to follow others that have established a precedent.

When looking at Climate-Related disclosures, all three pressures are evident. The recent regulatory developments from International Financial Reporting Standards (IFRS) S1 and S2 (Du Toit, 2024) represent coercive forces to move businesses toward more structured reporting. On the other hand, industry leaders adopting The Task Force on Climate-Related Financial Disclosures (TCFD) as their framework create mimetic pressure for other businesses to follow suit to be competitive and have legitimacy in the industry (Yoon et al., 2025).

Studies indicates that numerous variables including company size, governance structures and integration of ESG considerations influence company decisions to adopt TCFD aligned reporting (Principale and Pizzi, 2023). For example, larger companies are typically more inclined toward structured disclosures. This occurs for two reasons, they tend to be better resourced and their internal capabilities are usually of a higher quality, but due to their size larger companies face external stakeholder expectations regarding the extent to which they should be transparent and accountable.

Another theory that may help interpret the differences in the quality of disclosures is institutional theory. In other words, just because there is a framework in place, this does not guarantee that a company will use that framework in a consistent fashion. Some companies respond to external stakeholder expectations by implementing disclosures merely because they want to be seen as “doing the right thing” rather than because of their genuine desire to increase the quality of their disclosed data. Because of this, it is not sufficient to determine whether a disclosure is made, one must also assess the depth and usefulness of the disclosed information.

From this perspective, external pressure plays a key role in compelling companies to disclose. However, internally, the quality of developed disclosures will depend upon a company’s strategic plan, number of available resources and operational readiness. This explains why disclosure may vary between companies and between the way risks and opportunities are reported (Gupta, 2025).

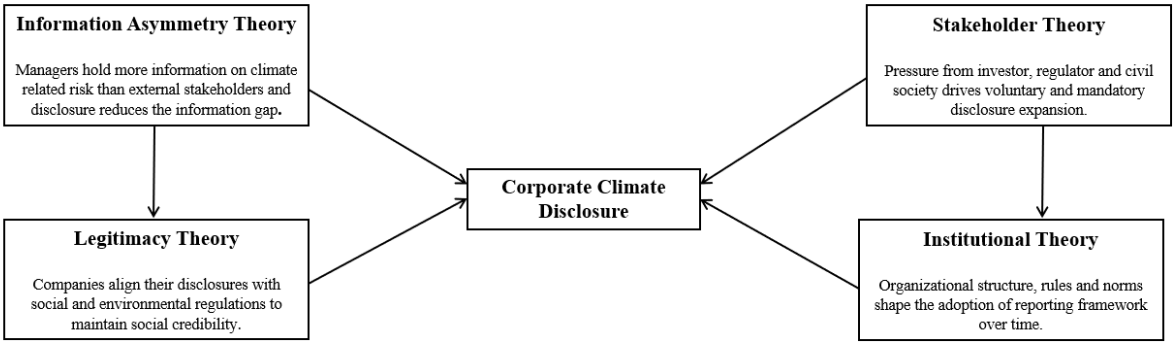

Fig. 6. Four Theoretical Perspectives on Corporate Climate Disclosure (prepared by the author)

Figure 6 illustrates how all four theories address different aspects of the disclosure problem; they are not mutually exclusive. Rather, the actual behaviour of each company regarding disclosure will reflect a combination of all four theories (informational, stakeholder, legitimacy and institutional) at once.

The next section will further develop the theoretical framework associated with Climate-Related disclosure and its connection with standardization and how this will affect the quality of demonstrated disclosures.

2.4. Understanding Disclosure Quality in Climate Reporting

2.4.1. The concept of Climate-Related information disclosure quality

The goal of this research project is to examine the quality of the disclosure. Over the past 10 years, there has been an increase in Climate-Related reporting, as described in previous sections of the report. These days, many companies are writing detailed sustainability reports, including emissions data and describing their climate strategies. However, more disclosure does not always equate to better disclosure. For example, if a company drafts a lengthy report but fails to explain how climate risks are going to impact the company's financial position or future, then that report has little value as there is no useful information in it, despite having many pieces of information.

There are therefore separate studies being conducted that are attempting to distinguish between the quantity and quality of disclosures. The quantity of disclosures can be easily identified using several different ways in relation to how much information a company discloses, including several different indicators (Lukacs et al., 2025). However, determining the quality of disclosures is more difficult. **Quality** of disclosures refers to the clarity, reliability and usefulness of the information given for making decisions (Di Chiacchio et al., 2024). High quality disclosures are of significant use to both investors and regulators in determining the impacts of Climate-Related risks on the performance of a company. Conversely, low quality disclosures can provide general statements about climate risks, ambiguity in the explanation of climate risks and selective disclosure of climate risks, all of which prevent the proper evaluation of risks.

Consequently, the **quality of disclosures** is usually seen as a function of several characteristics rather than just one. There are differing opinions in the literature regarding the elements that contribute to the quality of disclosures. However, several common characteristics that can be seen throughout the literature include the completeness, consistency, comparability, specificity and relevance of financial data, all of which provide a more complete understanding of the use of Climate-Related information.

Completeness refers to whether companies are providing sufficient information regarding Climate-Related risk and opportunity. Complete disclosure would include the governance structure, risk

management processes, strategy and performance indicators (Principale and Pizzi, 2023; Xhindole et al., 2025). The absence of these elements makes it harder to understand the full picture, for instance, reporting emissions data without describing how risks are managed gives little indication on how the company manages its Climate-Related issues.

Consistency involves the degree of stability of reporting over time (Okoye et al., 2025). When companies frequently alter their metrics, reporting boundaries, or format, it becomes increasingly difficult for investors to evaluate progress. Changes in the reported data may reflect actual improvements in performance or may simply be due to different methodologies. Consistent reporting (although imperfect) allows for easier trend analysis and performance comparison over time.

Comparability is also a key factor (Gilliland et al., 2023; Yoon et al., 2025). Investors often evaluate companies within the same industry when making investment decisions, when companies are utilizing different definitions, metrics or reporting formats, the reliability of comparing those companies is diminished. This is one major reason that standardized frameworks are important without a level of alignment between reporting, it is impossible to ascertain which company is superior at managing their climate risks.

A disclosure's quality can be determined by assessing how much the disclosure helps with transparency for the user, comparison of disclosures from multiple companies (to identify best practices), or the ability of the user to make an informed decision based on said disclosure. This assessment does not exist in quantitative terms (the number of indicators or the number of pages of disclosure in an individual report), but through an assessment of the degree to which the disclosure meets transparency, comparability and decision making. Transparency (and thus quality) is achieved when the disclosure contains sufficient detail to allow for analysis and comparison between companies. While general statements typically provide a positive impression of a company's commitment to sustainability, these types of disclosures will not provide users with sufficient detail to analyse or compare company sustainability reports. (For example, does the company have a measurable target for reducing its carbon footprint, or does it provide an explanation of the impact of its carbon footprint on operations?) The additional disclosures provide a more complete picture of how companies are addressing climate risk, versus what the company states it will do to address climate risk.

Comparability helps provide users with the opportunity to make informed investment or direction decisions when looking at companies and comparing and analysing sustainability information when making their evaluations of investment opportunities. A good example of this is when a company explains how climate risk could affect its future revenue, expenses, or asset values, as opposed to only describing the impact of the environment on the company's operations or business.

In summary, these elements demonstrate how difficult it may be to measure the quality of disclosures and thus, the quality of the disclosure is more related to the usefulness of the information and not just the number of indicators or page count. Quality can only be measured by assessing the degree to which the information is transparent, comparable and supports the user's decision-making process.

Reporting frameworks were an integral part of the conversation surrounding Climate-Related disclosures. Currently, there are different frameworks available (for example TCFD) that develop a structure for companies to disclose their Climate-Related information with a focus on governance, strategy, risk management and metrics (Xhindole et al. 2025; Principale and Pizzi 2023). The intent of the framework is to promote companies that present Climate-Related information in an organized manner which is relevant to decision making.

However, having a framework does not necessarily guarantee that the information disclosed by companies is of high quality. Companies may utilize the same reporting framework but report to a different extent or provide distinct levels of clarity. For example, some companies will report climate governance in detail with supporting data and scenarios whereas other companies will only meet the minimum level of reporting as outlined by the reporting framework.

As a result, many researchers use more structured techniques to determine if the disclosures of companies are of high quality. One of the most common research techniques that is used to evaluate the quality of disclosures is content analysis (Du Toit, 2024). In doing a content analysis a researcher will review company reports and review if specific items of disclosure are present in the report and if they are clear. Researchers will typically create disclosure scoring systems or reporting indexes to evaluate the reporting quality of the company (Du Toit, 2024). For instance, if a company discloses detailed climate governance processes, risk management processes, or emissions data then the company would score higher than a company that disclosed little information.

Many times, the scoring systems that researchers develop to evaluate reporting quality are based on established frameworks (e.g., The Task Force on Climate-Related Financial Disclosures (TCFD), International Sustainability Standards Board (ISSB)) (Veisi 2025). Researchers may verify that Climate-Related disclosures contain essential items such as governance structure, climate risk integration in strategy and quantitative metrics. Following this check each item will be evaluated concerning completeness of disclosures and clarity of disclosures.

Qualitative data can be converted into numeric scores (Vijaya et al., 2025), thus, providing a means to compare companies, or changes in main performance components over time. For example, researchers can investigate if companies' disclosure quality improves following the adoption of new reporting standards (Yoon et al., 2025).

International Financial Reporting Standards (IFRS) S1 and S2 add an additional element to the previous approach to improve measurement of disclosure quality. These standards outline what types of information, specifically related to sustainability factors and their impacts on companies' bottom lines, should be disclosed (Kocamıs et al., 2025; Du Toit, 2024). As a result, it will now be possible for researchers to assess whether companies not just report complete information, but whether that information is also relevant and useful from a financial perspective.

Under this definition of disclosure quality, the extent to which companies provide information relevant to climate change risk and opportunity by disclosing clear, comparable, or financially relevant information will have to be assessed. When evaluating disclosure quality, consideration will have to be given to the way companies disclose their information, consistency in their disclosures and the way they link climate risk and financial performance.

The following section defines standards of structured reporting that facilitate the assessment of climate change related disclosures and enables researchers to evaluate Climate-Related disclosures in a structured manner using predefined report categories.

2.4.2. Challenges in Measuring Disclosure Quality

While there is much debate regarding the quality of disclosures, actual measurement is much more complex than measuring the financial result because of the ambiguous nature of defining disclosure quality, it is not as defined and standardised as measuring a financial result for a company, as it is often measured and interpreted differently, depending on the researcher (Millar and Slack 2024). This is further complicated by the fact that it is frequently interpreted differently by an individual

depending on their view of ESG and the difficulty associated with verifying those subjective views (Yebenes 2024).

One of the most challenging issues with determining the quality of disclosure is the determination of which disclosures are meaningful and which are merely symbolic in nature (Bingler et al 2024). Companies may provide long descriptions of their climate strategy, but they often do not create measurable indicators or verifiable baselines from which to operationalise their commitments, therefore, their commitments are vague or lack sufficient detail to allow the user to assess what has been accomplished or not (Veisi, 2025). Disclosures of this type may appear thorough, but they often do not assist the user to assess the exposure to Climate-Related risk.

Another challenge regarding evaluating how good disclosures is in the academic literature is that many studies use scoring methodologies that assess various aspects of disclosure including whether particular information is present and the level of detail provided (Di Chiacchio et al., 2024). Although there has been a platform created by utilizing frameworks to develop commonality, guidelines have been used inconsistently between different entities and because assessing whether something is "detailed" or "clear" may not have an objective perspective, this inconsistency has created subjective ways to interpret results.

Another challenge relates to time. Climate change reporting has developed rapidly and what was determined to be sufficient former years may no longer be considered sufficient today. The general focus for previous disclosures has been on Greenhouse Gas (GHG) emissions or general sustainability objectives (Gilliland et al., 2023). More recent disclosures have added additional components of requested disclosure such as financial impacts, conducted scenario analyses and expressed relationship between strategies versus more generally providing GHG emissions and based on the combined nature of these three recent disclosure requests for companies incorporate more breadth into their disclosures concerning economic and financial risks (Yoon et al., 2025). Therefore, measuring quality needs to encompass more than what is disclosed, but also needs to account for currently available standards.

Overall, the previously mentioned challenges indicate that no single measure can capture disclosure quality, which is a multi dimensional concept (Yebenes, 2024).

The following table provides an overview of the primary difficulties related to assessing the quality of the disclosed information by summarising the literature on this topic (Table 4) below.

Table 4. Key Challenges in Measuring Disclosure Quality (prepared by the author, based on scientific literature)

Challenge	**Description**	**Impact on Measurement**
Subjectivity	"Quality" is interpreted differently by different researchers and users	Inconsistent evaluation across studies
Lack of standardisation	No uniform criteria exist for measuring disclosure quality across firms	Poor comparability between companies and sectors
Symbolic disclosures	Narrative commitments without measurable indicators or verifiable baselines	Low decision usefulness; hard to distinguish substance from signalling
Time dynamics	Reporting expectations change rapidly; metrics and boundaries shift between periods	Longitudinal comparisons become unreliable

The main methodological difficulties involved in formally assessing disclosure quality can be found in Table 4, which presents descriptions of all major challenges associated with the investigative process. Although these challenges are a normal aspect of undertaking this type of research, they can be minimized by using an established, organized and well-defined scoring methodology, like this study's approach in Chapter 3. A structured approach allows one to consistently apply the same set of criteria for each company throughout the entire sample.

Consequently, it should be assessed using a more systematic approach, while acknowledging that some portion of interpretation will always be required. As such, this research considers both the existence of disclosed information and the degree of detail, to facilitate the comparison of disclosure among entities in a more consistent manner.

2.4.3. The Link Between Disclosure Quality and Decision Usefulness

A key concern in reporting Climate-Related information is not only similar to the question of whether a company has actually made any disclosures but rather if the information provided through those disclosures will be useful to users of this data in making their decisions. In many circumstances, disclosures exist, however, they do not clearly show financial consequences (Ilhan et al., 2023; Millar and Slack, 2024). The result is that there is a disconnect between what has been reported and how those disclosures will be used practically.

For investors and lenders, the key consideration is whether the risks and opportunities associated with climate change impact potential future cash flows, economic value of assets, or overall business strategy (Ilhan et al., 2023; Millar and Slack, 2024). While general statements regarding commitment to sustainability are useful, they lack the level of detail needed for a user to complete that type of analysis. What is needed instead are disclosures demonstrating how Climate-Related factors impact a company's financial performance.

This is where the concept of decision usefulness becomes relevant. Disclosures should provide sufficient information for users to evaluate both the existence and the level of risk associated with any risks identified. For example, if an entity discloses information about its greenhouse gas emissions, it should also describe whether these emissions will expose it to any future regulatory costs or costs associated with transitioning away from these emissions. If the entity presents scenario analysis, the sources of the assumptions used, as well as the money effects related to them, should be clearly stated as well.

The relationship between financial reporting, Climate-Related risks and opportunities is sometimes weak in real world disclosures. Climate-Related information is often presented in a separate section of the financial report and does not necessarily integrate with the related financial analysis or vice versa. Consequently, it is often difficult for users to understand how Climate-Related issues may affect the company’s overall financial position.

The increasing difficulty that users are experiencing related to establishing connections between the information disclosed by companies about Climate-Related risks or opportunities is an important reason for the development of standards such as International Financial Reporting Standards (IFRS) S1 and S2 that emphasize financial relevance (Okoye et al., 2025; Du Toit, 2024). By requiring the linkage between Climate-Related risks and opportunities with strategy and financial performance, these standards are aimed at improving the usefulness of the disclosures that companies use to report the nature, extent and potential financial impact of Climate-Related risks or opportunities. However, the achievement of this goal will depend on the companies' actual practices of applying the requirements.

In this context, the quality of the disclosures is both a measure of their completeness or level of detail, as well as a measure of the extent to which they can support sound economic decision making. This finding supports the need to evaluate the presence of disclosures, as well as their linkage to financial performance.

2.4.4. Difficulties in Connecting Climate Disclosures to Financial Statements

According to Dye et al. (2021), one of the recurring problems with climate reporting is that the sustainability information presented does not always tie clearly back to the financial statements. Many companies provide detail surrounding various components associated with risk, emissions and transition, but companies do not necessarily make it obvious how those details connect back to actual financial results.

This often has to do with the way climate reports are structured. Most of the time, any potential Climate-Related information goes into its own section and sometimes it is even in separate reports altogether (Kusuma and Gani, 2024). This is logical from a presentation perspective, as both reports would have different expectations concerning how issues are presented and what types of rules, formats and accounting methods are used. This creates a disjointed appearance, in terms of how reports are created, which results in lack of connection between the two reports.

The uncertainty associated with Climate-Related risks also contributes to the disjointedness of the reports. Various assumptions are required in relation to Climate-Related risk regulation assumptions, technology assumptions and market changes (Baer et al., 2023). Since each of those assumptions can change and can vary from company to company, there is not a single formula that can be used to convert a Climate-Related risk into a financial figure. Even if you can see the connection, it may be general in nature.

Another issue is timing, with financial reports, the time periods covered are generally shorter than those over which climate risk increases and changes. For instance, a risk that will be important in ten years may not yet appear in current reports (Millar and Slack, 2024). This does not render the risk irrelevant, rather, it makes it much more difficult to quantify.

In an attempt to deal with such issues, recent standards require forward looking information regarding a company's strategy and performance that would be impacted by its exposure to the effects of climate change (Du Toit, 2024). In practice, however, there is still considerable variation in how different companies disclose this information, some are very detailed, while others only make limited disclosures.

As a result, it is insufficient to only look at whether Climate-Related disclosures exist. The relationship between the Climate-Related information being disclosed and the company's financial results is what is important, if the relationship is not clearly articulated, then the utility of the information being disclosed will be diminished, even if the actual disclosure is extensive.

2.4.5. Decision usefulness as a Basis for Evaluation

Decision usefulness has frequently been mentioned in the financial reporting environmentand it is also relevant in the Climate-Related disclosure space. Much of the literature is based on what is disclosed by the companies. However, it can also be argued that decision usefulness should include, among other factors, how useful the reported information will be to users when making investment decisions.

In the case of financial reports, the definition of decision usefulness is straightforward, the information disclosed in the reports should be used by the reporting entities to assess their performance, position and future performance capability (Sabauri et al.,2023). Climate-Related disclosures often contain forward looking information, assumptions and qualitative information and these characteristics will make it difficult to assess their usefulness.

Consideration also needs to be made when assessing the decision usefulness of disclosures, since the report users are not just concerned with the nature of the disclosures, they will also consider how the disclosures will assist them with their decision making, for example, an investor may wish to determine how Climate-Related risk will affect the expected cash flow, the value of the assets being reported and the overall long term strategy of the entity (Ilhan et al.,2023) to provide examples. Generalised statements about sustainability related commitments will not provide useful information that would meet this purpose. What will be more useful in the assessment of decision usefulness is whether the disclosures describe the monetary impact of Climate-Related factors.

Decision usefulness and disclosure usability do not always go together. An entity may qualify for a large amount of disclosure but if that disclosure is not directly related to future financial results, the practical value of the information will be limited. This has highlighted that the quality of disclosure should go beyond simply completeness to include decision usefulness as an additional dimension.

International Financial Reporting Standards (IFRS) S1 and S2 represent the change of focus to financial materiality (Kocamıs et al., 2025). Financial materiality provides a basis for decision making by investors (Okoye et al., 2025), but whether companies implement this appropriately affects the effectiveness of these standards in practice. Merely adhering to a reporting structure does not ensure the usefulness of information.

On a theoretical level, decision usefulness and information asymmetry are closely linked (Okoye et al., 2025) because clear and relevant disclosures reduce uncertainty for external users. Decision usefulness and stakeholder theory are also linked in that different groups will require different information based on their particular interest (Sanchez et al., 2025). This relationship explains variance in the quality of disclosures. Information will still be deemed useful, irrespective of companies following similar frameworks, based on the level of explanation about the information and its relationship to financial outcomes. Some companies provide detailed and structured disclosures, while others only provide less structured and descriptive disclosures.

Ultimately, the concept of decision usefulness gives a useful measure for Climate-Related reporting. It provides a shift from focusing on quantity of disclosures to focusing on whether disclosures provide information that allows for understanding and comparison. Given the growing number of disclosures in climate reporting, it is important to evaluate the potential usefulness of disclosures as there is still significant divergence in usefulness among companies.

2.4.6. Balancing Comparability and Flexibility in Reporting

In climate reporting, adhering to certain standards (for example, having a similar structure) creates the possibility for comparing companies. By reporting on a consistent basis, users can read and compare information between one company and another, therefore, if one company reports an accident but did not disclose information on other issues, users may not be able to make effective comparisons between them.

However, not all businesses are susceptible to similar climate risks. The challenges that an energy company faces are not necessarily comparable to those that a bank or a manufacturing company

encounter. As a result, businesses need the ability to provide background explaining their individual circumstances. They cannot always rely on a single, rigid structure for reporting on climate risk.

This creates a tension when developing reports. On the one hand, if the rules surrounding reporting are too strict, the company's report may not provide an accurate assessment of its climate risk. Conversely, if the company has too much flexibility when creating its report, the report may not resemble another company's report. There are examples of both occurrences.

Companies use flexible approaches to decide how much detail to include and what metrics to use and to adapt their disclosures to fit their specific context, however, this leads to differences in their disclosures, as companies may use different words or make different assumptions about similar subject matter (Baer et al., 2023; Millar and Slack, 2024).

More structured approaches attempt to minimize this issue by identifying clearer expectations. However, they do not eliminate the possibility of differences (Lukacs et al., 2025; Yoon et al., 2025). There is still a need for companies to interpret the requirements and exercise judgement, which means that even when a company is using the same framework, there may still be differences in their disclosures.

The differences matter when one considers the quality of the disclosures, as a report that is highly comparable may not have as much information in it and a report with a lot of detail may be difficult to compared alongside other reports, therefore, the question is not simply choosing one or the other.

Because of this, the quality of disclosures must be reviewed from both perspectives, as they must not only be comparable, but also reflect the true state of the company, therefore, this study has implemented a common structure for delivering information but still provides room for variability in presentation.

2.4.7. Limits of Standardisation in Improving Disclosure Quality

Standardised reporting frameworks are widely thought to resolve inconsistencies and comparability issues. However, because standardisation by itself does not ensure excellent quality disclosures.

The reason for this is that most standards focus on what is to be disclosed and not necessarily on the level of detail or usefulness of the disclosure. Thus, some companies may satisfy the standard but still provide little useful information.

There are plenty of examples where two companies issue similar types of reports in compliance with the same set of standards. Some disclose detailed verbal and/or quantitative information and clearly link their disclosures to the financial performance of the company. Other companies present limited detail or explanation and provide only general disclosures. While both companies are compliant, the quality of their disclosures is different.

The second limitation relates to how each company interprets the standards. Even if standards are very well-defined companies will still have to exercise judgement in preparing their reports. Areas where judgement is required include scenario analysis, risk identification and picking out the right metrics for disclosure. Different interpretations of the standard may produce different reporting outcomes.

Another important issue to consider is incentives behind an organisation's disclosures. Companies have many reasons why they would choose to report information a specific way. For instance, they might highlight their success while not providing full disclosure on the uncertainties or risks that they

might face. While this type of reporting behaviour would not violate any regulatory requirements, it would certainly impact the usefulness of those disclosures to an external user.

Furthermore, there is a time lag in the implementation of standards. Each Company is at a different stage of adopting standards and their internal capabilities vary greatly. For example, some companies have a very sophisticated system in place for collecting and analysing their data while others are still in the process of developing these capabilities. These differences impact the consistency of disclosures.

Thus, the existence of a standard does not ensure an improvement in the quality of disclosures, while it provides a framework, it is up to each company to determine how that framework will be applied.

This is particularly relevant in the case of International Financial Reporting Standards (IFRS) S1 and S2. Although both standards were developed with the intent of enhancing the quality and comparability of climate change disclosures (Du Toit 2024), the effectiveness of the standards needs to be evaluated once companies start using them. In evaluating how companies use established (structured) reporting frameworks, this study will contribute toward assessing whether these companies present useful disclosures.

High quality disclosures are susceptible to change. With evolving reporting frameworks and changing expectations, how we define 'high quality' will also be subject to change. Therefore, evaluations of disclosure quality need to be understood within their respective context or as to when they were made.

2.4.8. The Role of Consistency Over Time in Climate Disclosures

Companies' changing reporting practices over time have a great deal to do with determining if there has been true progress. When a company changes the way, it reports things from one year to the next, it makes it difficult to tell whether there has been any real progress.

Lukacs et al. (2025), Du Toit (2024) report that changes in how companies report things from year to year is a fairly standard practice. For example, a company may change how they determine their reported metrics or they may change the boundaries they are using when calculating something. However, because they are using updated methods or data, it is not indicative of a shift in performance but instead due to a change in how they are reporting their performance. For someone who is reading the report, it can lead to confusion, because there is not always a straightforward way to tell whether the difference in two years is due to actual improvement or just a change in format.

In climate reporting, this has become apparent as the methods for reporting continue to develop. For example, companies' emission calculations can be modified, or they may change how they use or do scenario analysis due to latest information becoming available. These types of changes can certainly improve the accuracy of what is being reported. However, they make comparing reports over time much less straightforward.

The uniformity of the information being reported is important in determining how well the audience will be able to follow what is happening related to that information. For example, frequent minor changes to current information can reduce the perceived dependability of the information and therefore reduce the audience's ability to use it in their day-to-day activities.

So, when evaluating the quality of a firm's disclosures, it is important to not only look at the total amount of information provided but also to determine if that same total has been reported on a consistent basis over time, which will create another dimension for evaluating Climate-Related disclosures.

In Section 2.4, the authors discuss the seven dimensions of disclosure quality in relation to climate reporting. The authors define quality as something that includes more than the number of disclosures or how often they are made. Rather, quality is determined by whether the information disclosed is complete, consistent, comparable, specific, relevant and useful for decision making. They then identify some of the challenges associated with measuring the quality of disclosures, including the subjective nature of quality assessments. The absence of universal criteria, the presence of vague or symbolic disclosures and varying expectations for disclosures over time. In addition, the authors explain that determining how useful the disclosed information is to investors or lenders when making investment and funding decisions is the primary basis for evaluating Climate-Related disclosure quality, particularly in relation to the IFRS standard focus on financial materiality in S1 and S2. The authors note, however, that it is often challenging to make links between Climate-Related and financial disclosures, due in part to timeliness and consistency when these reports are being prepared (sustainability reports and financial statements being prepared on different bases), thereby impacting the potential usefulness of many disclosed items. Meanwhile, while standards provide increased comparability across organisations (by creating standardised frameworks), standardised frameworks do not ensure that disclosures of high quality will result. The extent to which depth and consistency will occur is dependent upon the company concerned. When these two observations are considered together, it is apparent that disclosure quality is comprised of several dimensions; these factors will be used to develop a scoring methodology, which can be found in Chapter 3.

2.5. The Role of Reporting Frameworks in Improving Disclosure Quality

Earlier we discussed how a company's disclosure quality is based not just on the total quantity of information, but also how easily it can be interpreted, compared and used. In practice, getting to this point can be difficult. Companies who voluntarily disclose climaterelated information do not have strict reporting standards to which they must comply, so the quality of that disclosed information varies widely (Veisi, 2025). Some companies provide only very short, general disclosures, while others will provide detailed disclosures with both supporting analysis and data. This makes it impossible for stakeholders to effectively compare companies and determine the reliability of the disclosed information (Vijaya et al., 2025).

In order to address this issue, many different reporting frameworks have been created (Dye et al., 2021). The basic premise of these frameworks is straightforward. they are designed to provide companies with a more structured method of reporting sustainability information relating primarily to environmental risks and opportunities (Sabauri et al., 2023). By using consistent categories and guidance to report sustainability information, reporting frameworks attempt to reduce fragmentation in sustainability reporting and increase overall transparency (Yoon et al., 2025).

Table 5 summarises the main contributions and limitations regarding how reporting frameworks improve disclosure quality so that we can all appreciate their importance.

Table 5. Key Contributions and Limitations of Reporting Frameworks (prepared by the author, based on scientific literature)

Framework	Key Contributions	Limitations
Voluntary ESG Reporting	Flexibility; raised awareness of environmental and social issues	Lack of standardisation; wide variation in depth and format
TCFD Framework	Structured pillars (governance, strategy, risk, metrics); improved consistency	Voluntary; significant variation in how pillars are applied in practice
IFRS S1 and IFRS S2	Standardised, investor focused disclosures and emphasis on financial materiality	Implementation is still evolving and companies interpret requirements differently

Table 5 demonstrates that the successive frameworks have created increasing amounts of structure and specificity in terms of what is required to be included in climate disclosures. The Limitation column shows a consistent indication that there is too much leeway for voluntary frameworks and there is still room for differences in interpretation and implementation of even mandatory standards. The challenge facing International Financial Reporting Standards (IFRS) S1 and S2 is to reduce such variations sufficiently so that the intended improvements in comparability, as well as quality, will materialise in practice.

Most of the earlier reporting efforts, however, did not provide sufficient emphasis on the financial aspects of climate change. While sustainability reports typically contain general environmental or social information, they do not always explain how climate change will affect a company's value or performance (Sabauri et al., 2023). Many disclosures were descriptive rather than analytical. Over time, this caused problems for investors who seek decision directed information (Baer et al., 2023; Ilhan et al., 2019).

The Task Force on Climate-Related Financial Disclosure's (TCFD) development has been a key step in addressing climate risk with respect to the company's governance, strategic and financial risk management. The TCFD organizes climate change disclosure into four categories: governance, strategy, risk management and metrics and targets. The TCFD framework encourages companies to treat the climate risk as an integral part of their core business decision making processes and not as a separate sustainability issue.

The advantages of the TCFD framework are clear. It requires companies to move beyond general assertions and disclose specific and detailed descriptions of how they manage climate risk (Gebhardt et al., 2024). For example, in requiring disclosure about the governance and risk processes involved with managing climate risk, the TCFD encourages companies to describe how climate risk is managed at various levels of the company (Gilliland et al., 2023). The TCFD also encourages companies to use quantitative indicators (e.g., emissions related metrics and performance targets), which will enable easier tracking of progress over time (Ilhan et al., 2019).

The other advantage is improved comparability. When companies report their climate risk (and related) disclosures in accordance with similar reporting categories, the disclosures become more easily comparable across companies, even when they do not provide similar levels of detail (Du Toit, 2024; Lukacs et al., 2025). In the absence of such categories, companies may not report the same metrics (or omit valuable information) from climate risk disclosure, making comparison across companies difficult (Yebenes 2024). Through standardization, the TCFD is encouraging companies to adopt consistent climate risk disclosure practices (Xhindole et al., 2025; Yoon et al., 2025).

Despite many companies reporting ESG (environmental, social and governance) plans and performance voluntarily, there remains no consistent procedure for disclosing this information across all companies. Companies report similar information at varying depths based on the framework they adopt (Xhindole et al., 2025; Moses et al., 2025). For example, some companies use detailed scenario analyses to assess Climate-Related risk, while others use limited information. Even when companies do use the framework's structure, the content reported is still general (Gebhardt et al., 2024).

These inconsistencies highlight the need for an accurate set of formal standards (Kusuma and Gani, 2024). Voluntary frameworks serve as a guide to encourage companies to report more consistently, however, companies are still left to interpret how to meet the reporting requirements differently (Yoon et al., 2025). Due to these differences, companies continue to provide various levels of quality in their reporting regardless of any framework used (Gilliland et al., 2023).

Global sustainability standards serve as a solution to this issue. Policymakers and international organizations are putting greater emphasis on creating more consistent reporting requirements for sustainability related financial information (Sabauri et al., 2023). The establishment of the International Sustainability Standards Board (ISSB) represents an effort to supply a unified global reporting framework for all companies.

The issuance of IFRS S1 and S2 standards continues this effort (Du Toit, 2024). The IFRS standards build on earlier frameworks, particularly TCFD. However, these new standards provide clearer and more detailed reporting requirements than those previously developed (Okoye et al., 2025). Similarly to previous frameworks, these standards will require companies to incorporate Climate-Related risks into their governance and strategy as well as their financial decisions rather than treating these risks as separate disclosures (Yoon et al., 2025).

In this way, standardized frameworks can play a key role in enhancing the quality of disclosure. By providing clearer expectations, they reduce ambiguity around what to report, thus encouraging greater consistency in disclosure (Du Toit, 2024). This means that investors will have a better ability to assess Climate-Related risks and compare companies.

However, the success of these standards remains dependent upon how they are utilized in practice. No amount of design will produce high quality disclosure if the only goal of the company is to comply with minimum requirements. Thus, it is critical to examine how these standards are being applied in practice to determine their value.

Although structured reporting frameworks like TCFD and IFRS S2 are becoming more popular, the academic literature shows a lack of consistency in the quality of disclosures among firms and industries. Structured reporting frameworks improve the comparability of disclosures and increase the transparency of disclosure. However, companies still have discretion in how they interpret and implement the frameworks, resulting in disclosures that are not comparable due to differences in their depth and consistency as well as their usefulness for making business decisions.
Disclosures can also remain narrative oriented instead of quantitatively strong, which leads to lower usefulness for investors (Xhindole et al., 2024)

Additionally, the quality of disclosures is not only determined by the design of the structured reporting framework, but also the way companies implement their framework. In particular, the degree of difference in regulations, institutions and industry characteristics will also contribute to differences in the quality of disclosure among different companies.

This study will take that approach. It will provide evidence as to whether structured reporting frameworks do, in fact, result in better quality Climate-Related disclosures. By analysing the way companies use these reporting frameworks, we can evaluate the extent to which standardization creates improved transparency, comparability and usefulness for decision making.

2.6. IFRS S1 and S2 as a Basis for Standardising Climate Disclosure

2.6.1. The Case for Standardisation: Origins and Objectives of IFRS S1 and S2

The earlier discussion identified two principal problems with Climate-Related reporting. The first was inconsistency and lack of comparability among disclosures, caused by the fact that companies use different frameworks and voluntary practices to disclose information about climate change. As a result, disclosures between different companies are often quite distinct (Millar and Slack 2024). The second problem is the inconsistency in quality of disclosures. Even when companies disclose Climate-Related information, the quality of that information is not always clear or useful for decision making (Millar and Slack 2024; Yebenes 2024). These two problems have resulted in a considerable

number of calls for greater consistency and standardisation in Climate-Related reporting, especially in sectors where Climate-Related risks may affect a company's financial results and investment decisions (Millar and Slack 2024).

The formation of the International Sustainability Standards Board (ISSB) represents a response to these problems. The goal of this new organization is to create a more consistent global framework for sustainability related financial disclosures. Previous attempts at creating a consistent framework for sustainability disclosure have used a self reporting approach, which continues to create significant inconsistency between companies in the way they disclose this information. Conversely, the ISSB has tried to align sustainability disclosure more closely with financial reporting than previous voluntary self reporting frameworks. The introduction of International Financial Reporting Standards (IFRS) S1 and S2 standards are examples of this change in thinking. Both IFRS S1 and S2 were developed, in part, as a way of integrating Climate-Related information within the definition of financial reporting rather than as creating a separate "sustainability" reporting system from financial reporting.

IFRS S1 establishes the framework for companies to report material information on their sustainability performance and is intended to provide users with an understanding of the risks and opportunities that might affect the company’s overall value. The intent of S1 is not to provide users with a comprehensive narrative regarding a company’s sustainability, instead, companies should provide users with the information required to assess how environmental and social conditions shape a company’s strategic decisions as well as its performance and prospects. Therefore, users will be able to assess the relevance of environmental and social factors to a company’s business.

IFRS S2 builds on IFRS S1 by focusing on Climate-Related risks and opportunities. IFRS S2 adopts the disclosure requirements and structure set out in some of the previous Climate-Related reporting frameworks (notably, the The Task Force on Climate-Related Financial Disclosures (TCFD)), with the key difference being that IFRS S2 provides more detailed guidance on Climate-Related disclosures. IFRS S2 requires companies to provide governance, strategy, risk management and metrics and targets related to the effects of climate on their business. This means that the treatment of Climate-Related risks and opportunities will not be considered isolated environmental issues, rather, they will be factored into the entirety of a company’s business decisions.

IFRS S2 shifts from the practice of prior reporting practices with respect to Climate-Related risks and opportunities, whereby the disclosure of general sustainability commitments and sustainability or environmentally related performance measures were made without discussing or linking Climate-Related risks to the company’s financial results. In contrast, IFRS S2 has placed a much greater emphasis on the integration of Climate-Related risks and opportunities into a company’s business. That is, companies will be required to discuss how Climate-Related risks will impact their business planning, operations and financial results, thereby making the climate disclosures much better Integrated into the corporate reporting framework.

Theoretical perspective, these standards will contribute to eliminating the Information Asymmetry Problem between Companies and Investors. It is common for the Manager to have a better understanding of a company's internal risks, future and areas of potential exposure than could be communicated to someone External to the Company. Without a set of clearly defined disclosure requirements, much of this information could remain undisclosed and therefore Hidden. Climate-Related risks can also create special difficulty in assessing from an outsider perspective due to the lengthy period during which they may realise or become evident. The purpose of Standardized reporting is to enable Users to gain access to Climate-Related risk Factors More easily and to interpret this type of information More clearly (Gao et al., 2024).

In addition to assisting with information asymmetric reduction, IFRS S1 and S2 have a primary objective of enhancing Comparability. Before IFRS S1 and S2, when reporting on Climate-Related Risk Factors, various companies reported differently (Gilliland et al., 2023). The Aggregation of Data reported through various companies, regions and areas made it difficult for Users to evaluate comparing across companies or Geographic Regions. To avoid this fragmentation of Reporting Data, IFRS S1 and S2 established One set of criteria for measurement, definition and Scope of Reporting. Therefore, reducing the differences in Reported Climate-Related Risk Factors across the globe (Okoye et al., 2025).

This important to Investors Who Operate in More than One Market. When companies report Climate-Related Risk Factors in related categories and same metrics, then, there are better able to assess their risk and compare the strategies They (Use to) Mitigate Risks (Millar and Slack, 2024; Yoon et al., 2025). The use of Standardized Reporting Will Result in More Efficient Capital Allocation Improved Functionality of the Global Financial System (Okoye et al., 2025).

The introduction of standards does not guarantee that all reporting issues will be resolved. In practice, the implementation of IFRS S1 and S2 differs between businesses. While some businesses will provide a high volume of meaningful and detailed disclosures, others will provide only enough to fulfil the minimum requirements. Although this is likely to improve the structure of the reports, the quality of information reported may still vary.

For this reason, it is essential to assess the practical implementation of the IFRS S1 and S2 standards. The results of empirical studies on the implementation of IFRS S1 and S2, as well as any improvements in the usefulness and consistency of disclosures resulting from these standards, will establish whether companies provide clear descriptions of Governance Systems, Risk Management Processes, Strategic Direction and Quantitative Climate-Related Indicators through their disclosures.

The study is aligned with this empirical approach and will analyse how sustainability reporting standards influence the quality of disclosures. By analysing the disclosures of organisations against a structured framework, it will be possible to assess the extent to which the implementation of IFRS S1 and S2 leads to increased levels of transparency, comparability and financial relevance.

Overall, IFRS S1 and S2 provide an opportunity for sustainability reporting to be more aligned to financial reporting principles while decreasing fragmentation in reporting practices and provide organisations with more structured and decision useful information. The remaining chapters of this thesis will explore the efficacy of these standards in practice.

2.6.2. Behavioural Aspects of Climate Disclosure

Furthermore, how decisions are made within organisations for Climate-Related disclosures also come into play when discussing regulations and reporting frameworks. Not only does reporting occur because of rule based and external pressures, but it also occurs because of how managers interpret risk, prioritize risks and respond to uncertain situations.

Rational decision making becomes difficult when dealing with long term, uncertain Climate-Related risks because they are not typically top of mind for most managers (Baer et al., 2023). Additionally, due to their performance evaluations based on quarterly and annual results, managers will often prioritize short term performance over long term concerns (Yebenes, 2024). As such, risks that do not become visible until a later time may not receive as much attention (Yebenes, 2024). This is often referred to as the "tragedy of the horizon," whereby the future risk is acknowledged, but it does not factor into current decision making (Domínguez-Quinones et al., 2025).

In addition to these biases, there are also behavioural tendencies that affect how Climate-Related information is reported. For example, some organizations may provide information on the positive aspects of their climate strategy, including progress or commitments, while omitting details related to negative aspects such as challenges or uncertainties (Bingler et al., 2024). Firms may tend to highlight actions that are easy to communicate rather than actions that require more effort to measure or describe (Bingler et al., 2024).

It is suggested by the behaviour patterns exhibited that compliance with structural reporting requirements, are not adequate for producing high quality disclosures. Other equally important determinants of the quality of a given disclosure are the willingness and internal capacity of management to engage with truly challenging, long-term and uncertain Climate-Related information in order to create as much depth and utility in their company's disclosures as possible.

2.6.3. Industry Differences in Climate Reporting Practices

Depending on the industry where a company works, Climate-Related disclosures may be quite different. This is mainly due to varying types and amounts of Climate-Related risk faced by different industries (Yoon et al 2025).

To better illustrate these differences across industries, Table 6 presents a structured comparison of Climate-Related risks and disclosure practices.

Table 6. Industry Differences in Climate-Related Disclosure Practices (prepared by the author, based on Yebenes, 2024; Yoon et al., 2025)

Industry	Type of Climate Risk	Nature of Exposure	Disclosure Characteristics	Key Challenges
Energy	High transition risk	Direct (operations, emissions)	Quantitative, detailed (emissions, targets, scenarios)	Measurement complexity, regulatory pressure
Banking / Financial Services	Indirect transition risk	Portfolio based via clients and investments	More narrative, less granular	Difficulty linking risk to financial outcomes
Manufacturing	Physical and transition risks	Asset and supply chain exposure	Mixed (qualitative and quantitative)	Data availability, supply chain complexity

According to Table 6, the energy sector (the focus of this research) has the highest intensity of transition risk and the greatest expectation to provide detailed quantitative disclosures of all aspects of emissions, including targets and climate scenarios. The banking and financial services sector is impacted by climate risk through the lending and investment portfolios it maintains. This creates a fundamental difference in how climate risk is measured and reported, which will influence both the design of the empirical assessment in Chapter 3 as well as the way the results are interpreted in Chapter 4.

Transition risk is more widely perceived in energy consuming industries such as crude oil or natural gas and electric utilities (Dye et al 2021).

Institutions such as banks and other financial services experience climate risks primarily indirectly versus directly. Their exposure to climate risks is a result of the activities associated with providing credit and making investments (Alsagr and Apergis 2025; Auzepy et al 2023). This creates increased complexity in their disclosures as risks are tied to client and portfolio outcomes rather than related to the operations of the institution itself (Auzepy et al 2023; Campiglio et al 2022). Financial service firms may therefore provide less granular details and rely more on narrative descriptions.

In contrast, physical risks exist primarily for supply chains, operations and assets in industries such as agriculture, real estate and manufacturing sectors. For these sectors, the emphasis is on the impact of climate events on their assets and supply chains (Wiklund, 2021; Yebenes, 2024).

These differences between industries also complicate comparisons among companies across various sectors. Industries may have the same type of reporting framework; However, they may have quite several types of disclosures using that framework. Thus, it is critical to consider industry specific characteristics when conducting evaluations regarding the quality of disclosures made by companies (Yebenes, 2024; Yoon et al., 2025).

Though the intent of the reporting frameworks is to create uniformity, those uniformities have not produced a change in the practice of reporting. The level of compliance with the structure provided by the frameworks does not guarantee a significant improvement in the actual reports. This suggests that simply standardizing report formats may not correct some of the more fundamental problems associated with climate change reporting. Therefore, to adequately evaluate the quality of disclosures, it is important to consider the discrepancies across different industries, as each company's efforts to report will be weighted against a scoring model, based on their own reporting performance and their industry's overall structural characteristics.

2.6.4. Practical Challenges in Applying Reporting Standards

Climate-Related reporting standards can be difficult to enforce effectively because although many businesses use the same framework, each company interprets the information they collect and present it differently. This can be attributed to the amount of judgment used in reporting on climate (Millar and Slack, 2024).

As an example, companies must determine what system boundaries to apply, which assumptions will be made in scenario modelling and how to predict the future of impacts. Since the standards do not provide clear guidelines for making every decision related to climate scenario models and assumptions, these differences contribute to complications when reporting (Auzepy et al., 2023; Millar and Slack, 2024). Therefore, two companies could report similar information but come to widely differing conclusions.

Further complicating matters is the availability of data. In many cases, particularly regarding Scope 3 emissions or supply chain risks, companies are often forced to rely on estimates rather than specific data and encounter issues with proprietary data, digital infrastructure and supplier engagement. As such, data reliability for disclosure may suffer and companies may not be able to compare reports due to inconsistent methodologies or differing assumptions (Millar and Slack, 2024; Yoon et al., 2025).

Issues relating to the integration of financial reporting and disclosure of Climate-Related risks and opportunities are also highlighted with the introduction of Financial Reporting Standards (FRS) such as International Financial Reporting Standards (IFRS) S2 which link Climate-Related risks and opportunities to financial performance by integrating sustainability reporting into financial reporting. There is a current gap between the descriptive nature of narrative reporting completed and the analytical nature of financial analysis because there is fragmentation in ESG reporting (Okoye et al., 2025; Du Toit, 2024).

These issues require an evaluation of FRS efficacy from development and use in practices as factors in assessing the quality of disclosures as determinants of whether a specific disclosure meets the criteria for disclosure, rather than simply evaluating the existence of disclosures (Bingler et al., 2024; Gebhardt et al., 2024).

2.6.5. The Evolution of Climate Reporting Over Time

Reporting related to climate change has not been consistent in terms of its structure or how it has developed, it has gone through periods of gradual evolution with changes associated with new government regulations, new stakeholder expectations and new frameworks available for businesses to use in their reporting (Du Toit, 2024).

Initially, sustainability reporting was quite basic, many companies referred to being environmentally responsible in generalities, rather than specific ways or means of accomplishing that goal (Du Toit, 2024). For example, many times companies did provide limited quantitative data relative to their efforts to reduce emissions or improve efficiency, however, they did not always tie these efforts back to how they would financially benefit from them by providing comparable quantitative data to demonstrate improved financial performance (Veisi, 2025). Often the companies reported this type of information in a section of their reports that was separate from and additional to their main financial discussions.

As climate issues began to receive increasing attention, reporting began to change. Companies reported more detailed information that allowed for better identification of emissions and other environmental goals or targets (Yebenes, 2024), therefore, allowing for a more reliable means for measuring performance in relation to these disclosures and sustainability reports (Yoon et al., 2025). However, even after these improvements, it was still not clear how companies could tie their reporting information back to their expected financial results, or at most their reporting only included a brief explanation of how they would affect financial results (Gupta, 2025).

The development of Climate-Related disclosure has occurred in multiple phases that have moved from a voluntary, narrative form of report to a more systematic and structured method of reporting for corporations.

Table 7 illustrates how reporting methods evolved through their stages.

Table 7. Stages in the Evolution of Climate-Related Disclosure (prepared by the author, based on scientific literature)

Stage	Key Characteristics	Type of Disclosure	Limitations
Early Stage (Voluntary)	General sustainability statements and limited quantitative data	Qualitative, narrative based	Low comparability and weak link to financial performance
Intermediate Stage (Structured)	Emissions data, targets and efficiency metrics; TCFD alignment begins	Mixed qualitative and quantitative	Partial financial integration: inconsistent methodologies
Advanced Stage (Framework Based)	Governance, strategy, risk and metrics disclosed and scenario analysis introduced	Structured and partly standardised	Variation in depth across companies; limited enforcement
Current Stage (IFRS Aligned)	Climate risk integrated into strategic and financial planning with adoption of IFRS S1 and S2	Integrated financial and non-financial reporting	Uneven implementation: disclosure quality still developing

Table 7 shows that the evolution of climate disclosure consists of progressive development from completely voluntary narrative reporting to more organised, standardised reporting systems, linking Climate-Related information to financial outcomes. Currently, reporting is the most developed stage on this evolutionary path, as it aligns with International Financial Reporting Standards (IFRS) S1 and

S2. However, it demonstrates through evidence presented in this chapter that companies are still at earlier stages of implementation.

Recently, there have been growing efforts to incorporate Climate-Related issues into core business strategic planning (Dye et al., 2021). In addition to increasing use of scenario analyses, transition risks and longer-term planning have become part of the dialogue for many companies. Some companies are using scenario analysis, transition risk and long-term planning to establish their expected performance expectations (Aversa, 2023; Gilliland et al., 2023). The TCFD has contributed to these efforts by providing a more structured way for companies to conduct these initiatives (Xhindole et al., 2025).

However, progress towards these goals has not been uniform across all organizations. Companies have varied in their pace of implementation, resulting in some offering more comprehensive disclosures while others retain very high-level disclosure (Gebhardt et al., 2024; Yoon et al., 2025). This is evident across sectors and within a sector and is one explanation for why the quality of disclosure is still inconsistent.

Over time, the nature of climate disclosures has changed, shifting away from purely voluntary disclosure. Historical methods allowed for much greater company discretion in measuring and valuing these disclosures and therefore made them often not comparable to one another (Bingler et al., 2024; Gilliland et al., 2023). The most recent standards such as IFRS S1 and S2 seek to reduce the variability in reporting by providing more consistent expectations (Kocamıs et al., 2025). Companies are changing with these evolving standards.

Due to these changes, climate disclosures should be considered as still developing, rather than as being fully developed. Thus, what is viewed as acceptable today can shift as expectations continue to develop (Sabauri et al., 2023; Yoon et al., 2025). Therefore, differences in reporting from one company to another may not only be influenced by company specific factors, but also how far along in this development phase the various companies are (Gebhardt et al., 2024; Yoon et al., 2025).

Sections 2.6.1 to 2.6.5 show that while IFRS S1 and S2 will result in more uniformity and usefulness (of climate disclosures). The practical implications of IFRS climate disclosures will be influenced by finical, behavioural, sectoral, implementation and timing issues of management and manager's maturity for reporting practices. These issues will provide a backdrop for understanding empirically examined issues discussed in Chapter 4.

2.7. Conceptual Framework and Research Propositions

The discussion in the previous sections focused on both why organisations provide climate change related disclosures and how the different reporting frameworks may impact the quality and usefulness of these disclosures. As climate change related risks exert an increasing influence on long term company value, as well as their financial performance, the demand for such decision useful information has also increased in intensity (Liu et al., 2024). Conversely, previous research has shown that disclosure practices have not yet developed to be uniform. Rather, organisations and jurisdictions undertake a variety of different disclosure obligations, creating an inherently fragmented picture of climate change related risk across the jurisdictions (Lukacs et al., 2025).

There are several theoretical lenses that provide explanations for this situation. Information asymmetry is one of the primary theoretical perspectives. Managers typically have access to more detailed climate change risk related and internal strategy information relative to external stakeholders. By contrast, investors and regulators primarily rely upon the information made available to them in public documents (Okoye et al., 2025). Therefore, in the absence of appropriate transparency, external

parties cannot accurately assess how climate change related risks might influence the future performance or financial viability of an organisation (Ilhan et al., 2019). As a **Carbon intensity** result, structured disclosures promote the reliability and usefulness of financial statements related to climate change by providing additional clarity and transparency in this area.

The Stakeholder Theory provides insight into how companies have responded to pressures to increase the number of Climate-Related disclosures they have issued over time. As environmental issues have become more apparent, many companies are being pressured by investors, regulatory bodies, or the public to demonstrate that they are effectively managing climate and environmental risks (Dye et al., 2021; Auzepy et al., 2023). One way for corporations to show that they are meeting the expectations of these various stakeholders is through increasing the level of disclosure. Legitimacy Theory suggests that another motivation for disclosures may be to keep a positive public image by being aligned with the social expectations of the public (Veisi, 2025). However, such disclosures do not always yield meaningful reporting and in some cases may remain too broad and purely symbolic, especially when voluntary reporting occurs (Okoye et al., 2025).

These theories and how they interact with each other, provide a useful perspective for understanding the increase in the amount of Climate-Related reporting, as well as the inconsistent quality of that reporting (Afolabi et al., 2023; Brunelli et al., 2021). Corporations may selectively disclose information, use narrative versus descriptive disclosures and provide little detail about the risks and strategies associated with sustainability (Lukacs et al., 2025). In addition, even where disclosures exist, they may not provide the information necessary to enable comparison or support for decision making (Bernini and Rosa, 2023).

To address the above issues, structured reporting frameworks have been developed. An example of this is the Task Force on Climate-Related Financial Disclosures (TCFD) which recommends companies structure their disclosures around four key areas: governance, strategy, risk management and metrics (Xhindole et al., 2025; Sabauri et al., 2023). Doing so will allow interested parties to better understand how Climate-Related risks are being addressed in business processes. Building on this foundation, the International Financial Reporting Standards (IFRS) S1 and S2 are designed to establish a more consistent global standard for sustainability related disclosures (Kusuma and Gani, 2024; Okoye et al., 2025). These standards will also emphasize the materiality of environmentally related financial information, thereby moving sustainability reporting closer to financial reporting.

From this perspective, IFRS standards can be viewed as a response to the previously discussed issues around information. By creating categories and presenting clear requirements for companies' reporting, IFRS provides them an avenue to lessen the fragmentation of financial information and improve comparability between reporting entities (Du Toit, 2024). The premise is that if companies report according to a similar framework, it will be easier for the stakeholders who read those reports to understand and compare them.

These concepts serve as a foundation for the conceptual framework in this study. The conceptual framework of this study is presented in the figure below.

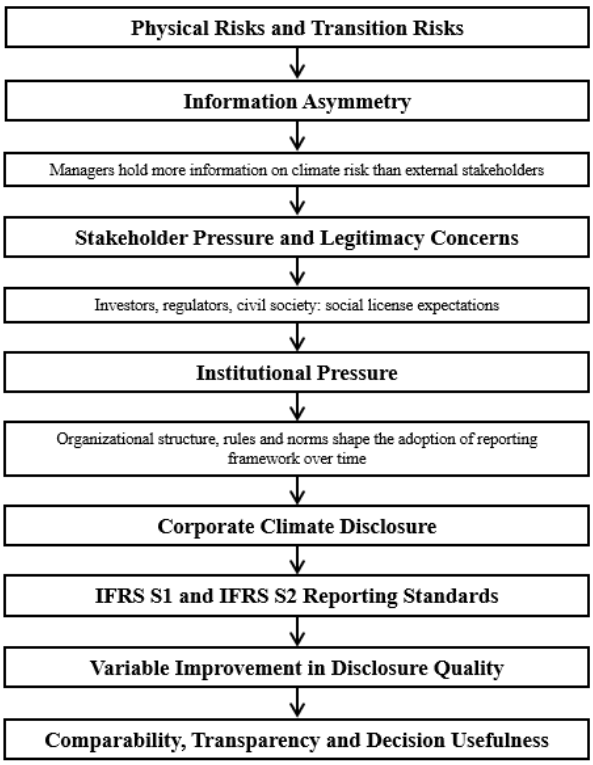

Fig. 7. Conceptual Framework for Climate-Related Disclosure Quality (prepared by the author)

The framework presented in Figure 7 illustrates how Climate-Related risks (both physical and transitional) create an asymmetry of information between company management (who have access to detailed knowledge of these risks) and external stakeholders (who rely on public disclosures to assess risk). The creation of this asymmetry creates an interaction between three theoretical drivers of disclosure behavior. These include: the stakeholder pressure created by investors, regulators and civil society, legitimacy concerns that motivate companies to show congruence with environmental norms and institutional isomorphism, which shapes reporting behavior through coercive, normative and mimetic forces.

Climate-Related risks create an information gap between a company and its external stakeholders since they are typically unaware of how a company is managing Climate-Related risks (Gebhardt et al., 2024). Disclosures by a company will typically be affected by regulatory expectations and stakeholders' demands (Yoon et al., 2025), but if companies are given too much latitude (e.g., voluntary reporting or loosely defined) there will be wide variability in the quality of information disclosed by each company. Standardized frameworks such as IFRS S1 and S2 are designed to reduce this variability by promoting the consistent and relevant disclosure of Climate-Related information.

The framework also discusses how different variables interact with each other. First, the existence of information asymmetry creates a need to report. Second, market pressures to satisfy both legitimacy and stakeholder expectations influence the way companies report. Lastly, reporting frameworks determine the format in which information will be disclosed. Together, these three elements should promote both more transparent and comparable disclosures.

The content of this research provides the theoretical foundation for the three areas of concern (see Appendix 6). Each of the three areas of concern is addressed through the establishment of universal theoretical propositions that are tied together through the use of institutional theory and the theory of information asymmetry. In addition, for each proposition there are specific relationships made to the Table of Empirical Findings from Chapter 4.

The first major area of concern is comparability. The disparity between the disclosures of companies based on their use of different reporting frameworks for their sustainability reporting leads to difficulties in comparing the disclosures made by different companies. Based on institutional theory and information asymmetry theory, the use of different methodologies for reporting by companies operating under different voluntary reporting frameworks results in differences in the scope, structure, and content of the information disclosed by these companies. The proposed adoption of a standardized sustainability reporting framework will facilitate greater consistency and allow for the development of common criteria and thereby decrease the extent to which these differences may exist between the disclosures of different companies.

Proposition 1: The use of standardized frameworks for sustainability reporting enhances the ability to compare Climate-Related disclosures in corporate reports.

According to Section 2.3.1, the information asymmetry theory forms the basis of the second proposition, which contends that by providing a consistent and organized way for disclosing their risks related to climate change, organisations can provide more accurate information to their stakeholders and thereby alleviate the uncertainty which comes from not being able to observe a company's actual level of risk from publicly available information.

Proposition 2: Consistent regulations for Climate-Related disclosures reduce the level of information asymmetry between a company and its stakeholders.

The third proposition is about the total quality of all levels of climate risk disclosure. The four perspectives discussed in section 2.3 are used to inform the third proposition. Information asymmetry indicates that standardisation of guidelines will help to remove the opacity associated with climate risk information. Legitimacy theory shows that mandatory frameworks limit the extent to which organisations provide only symbolic reporting. Institutional theory demonstrates that coercive pressures lead to structural compliance. Stakeholder theory illustrates that the variety of requirements for Climate-Related disclosures will help to meet various groups of users' information needs. Collectively, these perspectives provide evidence that well defined guidelines for Climate-Related disclosures will increase the amount of information provided by organisations, improve the quality and structure of the information and increase its usefulness for decision making.

Proposition 3: The quality of the climaterelated disclosures in corporate reporting has been positively impacted by the introduction of IFRS S1 and S2.

Section 4 combines both Stakeholder and Institutional Theory from sections 2.3.2 and 2.3.3, respectively, to address why companies with greater external scrutiny will be more likely to produce more disclosures than companies with less external scrutiny. Institutional Theory outlines how regulatory frameworks and expectations within an industry create pressures on firms to report in specific ways: coercive, normative and mimetic. Stakeholder Theory demonstrates that these pressures can have an influence on the degree of detail in reporting by firms operating in an environment where there exist higher levels of external scrutiny. Thus, both fundamental lenses demonstrate that the institutional context of the company as opposed to the type of reporting framework used by the company will greatly affect the depth and style of each company’s Climate-Related reporting.

Proposition 4: By way of regulations and other external pressures, the institutional context has a substantial bearing on how the disclosures for climate change are made.

Fifth and finally, legitimacy theory and stakeholder theory will serve as a basis for the fith proposition. These two theories have been defined earlier in Sections 2.3.3 and 2.3.2. According to legitimacy theory, managers will tailor their disclosures to protect their organization's social licence to operate, which will lead to variability in the specificity and level of depth of their disclosures even though all companies appear to comply with the same standard. With respect to stakeholder theory, managers will also have different levels of dedication to the reporting process based upon the different attributes and number of their stakeholders. As such, these two perspectives provide evidence of the existence of observable differences in the quality of disclosures attributable to managerial and behavioural factors rather than the existence of a reporting framework.

Proposition 5: Factors related to human behavior and management have a discernible impact upon the amount and clarity of information relating to climate change in the disclosures of an organization, whether they report under a universal standard.

The findings of this study illustrate how Climate-Related disclosure is determined by both external pressures as well as internal organizational considerations and by the type of structure that is presented through reporting frameworks. Although there have been recent developments made in improving disclosure consistency, there continues to be a large amount of variation amongst such disclosures because of not only the different frameworks due to their various interpretations, but also due to how organizations apply the respective framework(s) to their own financial statements.

Consequently, to make a quality assessment of Climate-Related disclosures, one must use a systematic and uniform approach that considers both the presence of disclosure and the level of detail disclosed by the organization. With this, the empirical analysis of this study's disclosure practices will utilize a robust and consistent methodology for evaluating disclosure practices and measuring their level of quality, all of which are discussed and analyzed further in Chapter 3.

3. Methodology for Assessing the Quality of Climate-Related Disclosures in Corporate Reports

3.1. Research aim and Objectives

In the last decade, there has been an increase in Climate-Related disclosure data disclosed through the reporting of corporations. Across all sectors of the economy, there are now large volumes of reporting through sustainability reports including emissions reductions targets, strategies to combat climate change. Nevertheless, a larger volume of information disclosed does not equate to a higher quality of disclosure, too often, the disclosures are still vague or inconsistent and not usable for financial decisions (Bingler et al., 2024; Yoon et al., 2025).

With the recent regulatory changes, however, this problem is becoming more pronounced in terms of reporting standards, with International Financial Reporting Standards (IFRS) S1 and S2 creating global standards for sustainability related financial disclosures that are focused heavily on Climate Risk and Climate Opportunities. These standards will create more structured reporting requirements to reduce the fragmentation and enhance comparability and transparency within Sustainability Reporting (Du Toit, 2024). However, the introduction of a standard does not immediately change how an organization reports their Climate-Related disclosures. An organization needs to interpret the standards, incorporate new practices into their operations and express those practices in an actual disclosure that is useful to stakeholders (Du Toit, 2024). It is this gap between what the standards require and what an organization discloses that the present study attempts to assess.

Chapters prior provided an overview of the theories underpinning this research, as well as developments in how Climate-Related disclosures have evolved over time and how there is increased regulatory and academic interest in the quality of these disclosures. The current chapter will describe the empirical methodology used to examine the quality of disclosures as they are presented.

The aim of this empirical research is to determine the quality of Climate-Related disclosures in corporate reports of companies in the energy and bank sectors and evaluate the extent to which the use of structured reporting frameworks, like IFRS S1 and S2, has an impact on the level of quality achieved.

The aim is followed by the objectives below:

1. Development of a structured scoring instrument capable of assessing the quality of climate disclosures across a range of dimensions based upon established reporting frameworks, like International Financial Reporting Standards (IFRS) S1 and S2.
2. Application of that instrument to a sample of 2024 corporate reporting from European based companies in the energy and banking sector and providing an assessment of the quality of climate disclosures by analytical dimension.
3. Comparison of climate disclosure quality across both sectors as well as identifying any similarities or differences in how energy and banking companies disclose climate disclosures.

The above objectives are sequentially ordered in terms of instrument design (objectives 1), empirical testing (objectives 2) and comparison analysis of the results (objectives 3). Together, the three objectives constitute a structure for answering the overarching research question identified in the introduction.

The main parameters of the research design are summarised in Table 8 below.

Table 8. Main Parameters (prepared by the author)

Component	Description
Research aim	The aim of this empirical research is to determine the quality of Climate-Related disclosures in corporate reports of companies in the energy and bank sectors and evaluate the extent to which the use of structured reporting frameworks, like IFRS S1 and S2, has an impact on the level of quality achieved.
Research problem	Despite the adoption of IFRS S1 and IFRS S2, the quality of Climate-Related disclosures varies significantly across sectors, with governance more consistently developed than strategy and metrics, indicating that framework adoption alone does not guarantee comparability or decision-useful reporting.
Research approach	The research is qualitative and deductive: it uses a theoretical framework to measure how good quality corporate reports are compared against each other by processing observation-based evidence obtained in Chapter 4 with theories examined in Chapter 2.
Research method	A content analysis has been conducted on corporate reports, using an established scoring scheme applied to four distinct dimensions to evaluate and compare the quality of disclosures.
Analytical framework	The structured content analysis of corporate reports will consist of qualitative research findings and an associated structured scoring system that measures corporate reporting of Climate-Related disclosures on several dimensions: (1) Governance, (2) Strategy, (3) Risk management and (4) Metrics and targets
Data sources	The research will be based on publicly available corporate reports published in the year 2024 (annual accounts, sustainability reports, integrated reports).
Sample	Six publicly listed European companies operating in climate sensitive sectors: energy (Enel, Iberdrola, Ignitis) and banking (Swedbank, Santander, FinecoBank).
Unit of analysis	Climate-Related disclosure sections within corporate 2024 reports.
Measurement approach	Structured scoring of disclosure quality using predefined evaluation criteria across four dimensions.
Evaluation scale	Each disclosure dimension is scored on a 0–3 scale: 0 = absent, 1 = minimal, 2 = moderate, 3 = comprehensive.
Data analysis technique	The scores for each of the four dimensions will be aggregated and averaged across the participating companies and industry types to identify disclosure quality patterns.
Expected outcome	A comprehensive analysis of the relationship between structured reporting frameworks and Climate-Related disclosure quality will provide insight into whether structured reporting frameworks have improved corporate Climate-Related reporting practices.

Both the objectives and aim of the Chapter will establish a framework for conducting empirical investigations in Chapter 4. As such, they will allow the analyses conducted there to systematically link back to the theoretical basis established in Chapter 2 and scoring model outlined later in this chapter.

The empirical component of the study was conducted in six sequential stages, as set out in Table 9 below.

Table 9. Stages of the Research Procedure

Stage	Activity	Description
Stage 1	**Literature review and framework development**	Existing climate disclosure frameworks (TCFD, IFRS S1 and IFRS S2) and academic literature were reviewed to establish the four analytical dimensions and the four dimensions of the quality assessment tool.
Stage 2	**Sample selection and report collection**	Six European publicly listed companies were selected from the energy and banking sectors. Their 2024 annual, integrated andsustainability reports were sourced from official company websites and investor relations pages.
Stage 3	**Identification of Climate-Related disclosures**	Each report was read in full to locate all sections containing Climate-Related content, including governance, strategy, risk management, metrics and targets and emissions.
Stage 4	**Application of the scoring system**	Each identified disclosure was evaluated against the predefined criteria for all four dimensions. Scores from 0 to 3 were assigned based on the depth, specificity andusefulness of the disclosed information.
Stage 5	**Aggregation and comparison**	Total scores were calculated per company and per sector. Averages were compared across companies and between the energy and banking groups to identify patterns in disclosure quality.
Stage 6	**Interpretation of results**	Findings were interpreted in relation to the research objectives, the relevant reporting frameworks andthe academic literature to draw conclusions about the state and drivers of climate disclosure quality.

In order to create an adequate assessment of the quality of disclosures, it was important to have a systematic and replicable process that was created based on both the theoretical framework and accepted reporting standards. All companies and sectors have been assessed using this process sequentially to ensure that they have been compared uniformly by all steps of the six-stage assessment process.

3.2. Research approach and Analytical method

Combining a qualitative and a structural scoring method was used because Climate-Related disclosures are generally presented in either narrative format that describes their governance arrangements, strategic goals, approach to risk management, or future targets. A quantitative only approach would have only captured a small fraction of the information and would not have adequately captured the nuances or context of how corporations communicate about climate issues.

Examining how companies disclose Climate-Related information through qualitative content analysis provides the ability to associate the disclosed information with the categories established in existing sustainability reporting frameworks. By introducing a scoring system, this provides the ability to measure the disclosures in a structured manner, making it possible to make comparisons among companies and across different reporting periods when applicable.

Four dimensions govern the analytical framework: governance, strategy, risk management and metrics and targets. These four dimensions are broadly aligned with International Financial Reporting Standards (IFRS) S2 disclosures. In addition to Scenario Analyses (as part of Strategy), the completeness of reporting emissions will be assessed (as part of the Metrics and Targets Dimension). The scoring criteria pertaining to each dimension can be found in Section 3.5.

3.3. Research Sample and Data Sources

A sample of six publicly traded European companies across two sectors, specifically energy and banking, are used. The year of focus for this review is 2024 and all reports that were publicly available as of 2024 or the first part of 2025 related to the same calendar year constituted the primary source documents for this study.

The sample was selected through purposive sampling as opposed to random sampling, as purposive sampling is appropriate for qualitative and mixed methodology research designs when the primary goal is to select cases that will provide the most informative data relevant to the research topic versus achieving statistical validity of the results obtained from the selected sample. Within this study, the research library used three criteria to identify the companies selected for inclusion in the sample. Criteria were based on:

1) Whether the company is publicly traded on a recognised stock exchange within Europe, such as Borsa Italiana, Bolsa de Madrid, or Nasdaq Nordic.
2) Whether the company operates in a sector that has material exposure to climate risk and
3) Whether the company publicly discloses its sustainability and Climate-Related disclosures.

The energy sector has been selected for this study mainly due to the direct exposure energy companies experience relative to Climate-Related transition risks. Changes in carbon regulatory policies, carbon pricing schemes and the advent of renewable energy will have a substantial impact on the way in which energy companies operate, how much effort they spend on capital expenditures and how they strategically position themselves (Agliardi and Agliardi, 2021). Therefore, energy companies must provide adequately detailed disclosures regarding their current emissions reduction strategies, ongoing capital expenditures and responses to regulatory changes.

The financial sector has been included in this study because the way banks as financial institutions are impacted by climate change is very different than how other industries are impacted. Financial institutions are indirectly impacted by climate change through their lending and investing activities. Banks that finance carbon intensive industries are at risk of transition related risks when assessing the credit quality and asset values of their clients (Campiglio et al., 2022; Reghezza et al., 2022). As a result, banks are increasingly expected to disclose how they assess Climate-Related risks and incorporate these assessments into their overall risk management practices, portfolio composition and credit risk assessments. Additionally, comparing these two sectors provides insight into how different types of climate exposure impact the quality and level of disclosures made within each sector.

The data utilized in this study were obtained solely from publicly available sources: annual reports, integrated reports, sustainability reports and dedicated Climate-Related disclosures. These sources provide researchers with access to the same type of information that is typically available to external stakeholders (investors, regulators and analysts) and therefore are suitable for conducting a research study focused on the quality and value of public disclosures made by companies. A listing of the specific reports used in this data collection for each company is included in Table 10. Further details on each company's reporting standards, audit status and size are provided in Table 12.

Table 10. Data Sources by Company

Company	Reports Analysed (2024)
Enel S.p.A.	Integrated Annual Report 2024
Iberdrola S.A.	Annual Report 2024, Sustainability Report 2024

Ignitis Group	Integrated Annual Report 2024
Swedbank AB	Annual and Sustainability Report 2024
Banco Santander S.A.	Consolidated Annual Report 2024
FinecoBank S.p.A.	Annual Report 2024, Consolidated Sustainability Reporting 2024

The sample consists of two different sectors within the energy and finance industries with the following companies: Enel, Iberdrola and Ignitis are three energy companies operating in Italy, Spain and Lithuania respectively, while Swedbank (Sweden), Banco Santander and Finecobank are three banks operating in Lithuania, Spain and Italy respectively. This sample allows for comparisons of both sector and company levels, while also providing a general degree of geographical diversity within the European region. Including Ignitis, as a smaller utility operating in a less developed reporting environment in the Baltic, along with larger companies like Enel and Santander provides a wide spectrum of company sizes and levels of maturity in terms of their reporting environment's maturity level.

Because the companies were selected based on their experience and knowledge of climate change reporting, we are assured that the data obtained from the study represents a variety of reporting environments, creating a firm foundation for drawing conclusions about climatic disclosure quality across the sectors studied.

3.4. Measurement of Disclosure Quality

As described in Section 2.4, literature on the quality of Climate-Related disclosures describes disclosure quality as being represented by many characteristics such as completeness or consistency or comparability. (Di Chiacchio et al., 2024). The operationalisation of disclosure quality for this study has been restricted to three of the many characteristics (completeness, specificity, and relevance) because they are easily identifiable through the content analysis of publicly available corporate reports, and they are also most congruent with the principle of decision usefulness on which IFRS S2 is based. While consistency and comparability are both essential to function as qualities of the disclosed information, they are not measured separately within this study as an element of the scoring system. Given that the analysis of the company is based on only one year of reporting, inter temporal consistency cannot be evaluated. However, consistency across the companies is ethically supported by the same criteria being used for all six companies but is treated as a function of the method used rather than as a unique category. Completeness measures whether the themes of governance, strategy, risk management and metrics and targets required by IFRS S2 are included in that company’s disclosure. Specificity measures how specific the disclosure is for those themes. Finally, relevance measures whether the information provided in the disclosure is material for evaluating the company’s Climate-Related risk and response. Below are the four level scoring frameworks outlined above which encompasses the completeness, specificity, and relevance of a company’s Climate-Related disclosures.

In the scoring framework, relevance encompasses two more quality attributes, that are identified in Section 2.4 of this report, which will not be reflected as separate scoring dimensions: decision usefulness and connection of Climate-Related disclosures to financial statements. A disclosure will be considered relevant for purposes of this scoring framework if it provides an investor or lender with information that assists them in figuring out the possible impacts of a company's exposure to climate risk on its financial performance. This is consistent with the principle of decision usefulness outlined in Section 2.4.4 and IFRS S2’s emphasis on financial materiality. Relevance scoring will be decreased for disclosures that do not demonstrate this connection, even if the disclosure is nominally complete and specific.

The measurement of quality of disclosure in this research is structured around four dimensions, where each dimension corresponds to one of the specific areas of Climate-Related disclosures that are required per IFRS S2 and by frameworks that reference the TCFD. In addition, each of these areas is evaluated against the three operationalised quality attributes (completeness, specificity, and relevance) discussed earlier in this chapter. The four dimensions broadly correspond to the disclosure requirements found in IFRS S2 and the analytical framework developed in the literature review (Yoon et al., 2025).

The four scoring dimensions correspond to the quality features stated in section 2.4 in the following ways: the governance dimension assesses primarily the completeness of the required elements of climate oversight, because the most important question is if all the structural elements of climate oversight are included and adequately described. The strategy dimension assesses both completeness and specificity in that the high quality of a strategy disclosure includes all required components and includes a demonstration of how climate factors are specifically incorporated into investment decisions and financial planning, which is a measure of relevance for this dimension. The risk management dimension also has a criterion of specificity and relevance in evaluating whether there are adequate detail and connection to the enterprise-wide financial risk management methodology for identifying and managing climate risk. The final metrics and targets dimension is where all three quality characteristics have the most relevance: completeness requires that all three scopes of emissions data (scope 1, 2 and 3) are provided. Specificity requires that time bound quantified targets are included and relevance requires that the emissions data and quantified targets are presented in a manner that enables the comparison of the company's actual emissions level against their stated commitment.

Governance is the first dimension analysed. Completeness refers to a company having both a board level and a management level responsibility for Climate-Related issues to be adequately disclosed. Specificity looks at whether a company identifies individuals by name who will have responsibility for Climate-Related risk oversight, describes the processes by which each party will be kept informed of the oversight responsibilities and explains how each party integrates climate risk into their decision-making processes. The relevance of governance is measured by the potential usefulness of the governance information disclosed to an investor evaluating the company's accountability structure. Generally, the more robustly disclosed Climate-Related governance will provide the investor sufficient information to understand the roles and responsibilities of individuals or management teams for Climate-Related responsibility, the process by which the board and management are kept informed of their respective responsibilities, how the board and management receive information about Climate-Related risks and how Climate-Related risks are integrated into the boards and management's decision making processes (Gebhardt et al., 2024).

The second dimension of assessment is Strategy which is composed of Completeness, Specificity, and Relevance. Completeness means ensuring that there are disclosures which address how climate-related risks and opportunities will affect the "long term" goals and planning for the organization. Assessment of Specificity looks to see if the disclosures will provide specific information regarding the actual investment decisions made or a change to their business model, for example adoption of technology because of the Climate-Related risk, and whether each company uses scenario analysis to assess future impacts. Lastly, Relevance assesses whether the strategic information contained in the disclosures allows stakeholders to determine how a company is positioning itself for the impact of physical and transitional risks associated with climate change. Companies which disclose in detail typically provide information on how Climate-Related factors will affect either their investment decisions, business model, or technology (Yoon et al., 2025).

The third dimension of assessment is Risk Management, which has the same three levels of assessment as Strategy. Completeness, Specificity, and Relevance. Completeness of the disclosures must demonstrate how the company identifies, assesses and manages Climate-Related risks. Assessment of Specificity examines the company and whether they use a structured and consistent methodology and how the company integrates climate risk management into the enterprise-wide risk management framework. Relevance considers whether the disclosures provide information to allow the reader to evaluate the credibility and thoroughness of the company's risk management processes. Companies with strong disclosure practices typically will demonstrate a structure to their risk identification and assessment processes and explain how they integrate climate risk management into their overall enterprise risk management processes (Baer et al., 2023).

Metrics and targets are the fourth dimension measured. Completeness entails that a corporation present quantifiable objectives and numerical data for the emissions securely fall within any one of the three scopes of GHG emissions calculated at the corporate and segmental level. Specificity will be based on creating quantitative goals that have a timeframe and can be measured against an established historical set of metrics and that satisfactory computed GHG emissions with appropriate statistical notes and a comparison to previous years are available. Relevance will be based on determining if such metrics and targets as provided by the corporation will enable the interested party to determine if a corporation has progressed toward meeting its commitment to Climate Change. Corporations that disclose quality measures for GHG emissions will typically provide measurable, quantitative, and timeline based measurable and quantifiable goals for example, "25% decrease by the year 2030", which will allow for the measurement of GHG emissions in order to provide all three scopes of GHG emissions (Scope 1, 2 and 3) with unique identifiers and established boundaries and methods to measure. GHG emissions will be used to determine a base for the purpose of establishing and monitoring GHG emission reductions, and therefore an inability to validate targets without GHG data and a lack of targets upon which to measure performance would prevent companies from managing GHG emissions strategically.

The four aspects of the discloser will have scores from 0 to 3. A score of zero means that the disclosure is completely absent, one means that there is a minimum amount, but that it is not useful for decision making because it is too broad, two means that it is partially complete and partially specific, while three means that it is fully complete and specific. Each of the four score levels has its own criteria, as shown in Table 10, meaning that each company receives a total score ranging from zero to twelve. The score boundaries have been explicitly established based on the three operationalized characteristics of quality: score one would generally be awarded because there is a disclosure but the level of specificity is not sufficient for full decision usefulness, score two would be awarded if the level of completeness is only partly complete or the specificity is not sufficient for full decision usefulness, while the score three would only be awarded if the level of disclosure is both complete across all required elements and sufficiently specific for the investors use in assessing the company's exposure to climate risk.

Table 11. Scoring Criteria for Disclosure Quality Assessment

Disclosure Dimension	Score 0 - Absent	Score 1 - Minimal	Score 2 - Moderate	Score 3 - Comprehensive
Governance	No mention of board or management responsibility for Climate-Related matters.	A brief or generic reference to climate oversight with no named roles or processes.	Board and management roles are identified, but the description of oversight processes lacks specific details.	Clearly defined roles, oversight mechanisms and integration of climate considerations into decision making are described in detail.

Strategy	No information on how climate risks or opportunities affect business strategy.	A general statement that climate change is considered in strategy, without specific detail.	Some explanation of how Climate-Related risks and opportunities influence investment decisions or business model planning, with reference to at least one climate scenario.	A detailed account of how physical and transition risks shape long term strategy and business model adaptation, supported by multiple climate scenarios (1.5'C, 2'C pathways) with quantified assumptions and documented business implications.
Risk Management	No description of how climate risks are identified, assessed, or managed.	A brief or vague reference to climate risk management with no described process.	The approach to identifying and assessing climate risks is described, with some mention of the tools or methods used, though without full methodological detail.	A structured risk management process is described with clear methodology, integration into enterprise-wide risk management and explanation of how climate risks are prioritised and monitored.
Metrics and Targets	No quantitative targets or emissions data are disclosed.	Some Climate-Related metrics are mentioned (partial emissions data), but without targets, baselines, or context for measurement.	Quantified targets are set for at least some dimensions, Scope 1 and Scope 2 emissions are disclosed, progress is partially tracked.	Comprehensive metrics and targets are set across all material climate dimensions: full Scope 1, 2 and 3 emissions are disclosed with methodology notes and year on year comparisons, progress against targets is documented with timelines and accountability mechanisms.

Maximum total score for each company is 12 (the four dimensions each have a score of 0-3). Total scores will be used for comparison across companies. Dimension level scores allow for evaluation of the quality of disclosure for all dimensions.

3.5. Limitations of the Method

There were limitations to the structured approach taken throughout the study.

Firstly, the fact that only the information contained in publicly available corporate reports has been utilized creates restrictions upon the analysis. Primarily any information which may have been disclosed through internal communications, management discussions or because of an audit will not be included. As a result, the scores assigned to companies reflect only what has been made publicly available by the company to external stakeholders. As such, it cannot be assumed that companies have provided a complete and accurate picture as to how they are managing climate issues and that the scoring for those companies accurately represents their level of management of climate issues.

Secondly, despite utilizing a structured scoring methodology for the completion of the content analysis, the nature of the content analysis requires that some degree of interpretive judgement is involved in scoring the content. In many cases, the defining line between a score of 1 and a score of 2 (between a "general statement" and a meaningful explanation) depends on the analyst's

interpretation of the content. Every effort was made to mitigate this subjectivity within the assessment using predefined, explicit criteria. However, it is impossible to eliminate the potential for subjectivity in scoring of content.

Regarding the sample size and source of selection, only six companies were sampled. Two sectors were selected from this establishment. There were neither any statistical generalizations made nor were there any sectors chosen based on statistics. The overall purpose for the research is not given to make use of statistical generalizations but focuses on the analytical depth wherein you examine (in depth) a predetermined number of techniques associated to provide insight to determine how they produce reports for Climate-Related information that are well defined based on the predetermined sample.

The last limitation has to do with the time span for this research. It covers the FY 2024 only. Longitudinally you would be able to make comparison by reviewing how there would change with regards to the quality of their disclosures since the implementation of International Financial Reporting Standards (IFRS) S2, but this research did not measure these previous issues, but there will value the future research made into this area.

None of these limitations decrease any value of the findings of this research, however they should be given some consideration when interpreting their results and the overall possibilities of their findings.

4. Assessment of Climate-Related Disclosure Quality in selected European Corporate Reports

4.1. Introduction and Scope of the Empirical Analysis

The previous chapter explained the methodology used in this study and defined four aspects of analysis which are governance, strategy, risk management and metrics and targets with definitions of scoring criteria to evaluate the quality of the disclosures are made on a scale of 0 to 3 for each aspect of analysis for a total possible score of 12 (four aspects of analysis times three points per aspect) and this chapter provides the findings and discusses the interpretation of the findings based on the application of this method to the 2024 corporate reporting of six European companies from the energy sector and banking sector.

This chapter is divided into six sections. In Section 4.2, an overview of each sample company includes general characteristics such as size, type of business and Climate-Related reporting environment. The aggregate scoring of the sample companies based on the total score across all four dimensions of analysis is provided in Section 4.3. In Sections 4.4 and 4.5, findings from the analysis for both the energy and banking sectors, respectively, are examined based on the four dimensions of analysis. An overview of all four dimensions of analysis is given in Section 4.6 for both sectors combined. Section 4.7 includes an analysis of how empirical results from this study relate to three primary concepts of analysis: disclosure quality, comparability and standardisation. As previously noted in Section 2.4, comparability is a characteritics of disclosure quality. For that reason, a separate analysis of comparability is provided in Section 4.7 to ascertain whether disclosures made by companies in the same sector or across sectors can be compared meaningfully. Section 4.8 provides a synthesis of interpretations of all findings from this research. Finally, Section 4.9 provides a summary of the chapter's conclusions.

Only when analysing specific empirical findings in this chapter and referring to reporting frameworks International Financial Reporting Standards (IFRS) S2 as part of the analysis will there be references made to these frameworks.

4.2. Overview of the Sample Companies

An expanded overview of the primary reporting and organizational characteristics of each company in the sample, including sector, country, accounting basis and sustainability basis is shown in Table 12. Information provided includes whether the company's financial and sustainability reports were subject to external auditor review as well as the size of the company.

Table 12. Sample Companies and Reports Analysed

Company	Sector	Country	Financial Accounting Standards	Sustainability Reporting Standards	Financial Report Audited	Company Size
Enel S.p.A.	Energy	Italy	IFRS (EU adopted)	GRI, ESRS (CSRD), TCFD aligned	Yes	Large (96.7bn euro total in assets, ~60,000 employees)
Iberdrola S.A.	Energy	Spain	IFRS (EU adopted)	GRI, ESRS (CSRD), TCFD aligned	Yes	Large (141.5bn euro in total assets, ~41,000 employees)
Ignitis Group	Energy	Lithuania	IFRS (EU adopted)	GRI, TCFD aligned	Yes	Medium (5.5bn euro in total assets, ~3,400 employees)

Swedbank AB (Sweden)	Banking	Lithuania	IFRS (EU adopted)	GRI, ESRS (CSRD), TCFD aligned	Yes	Large (SEK 2.8tn euro in total assets, ~15,000 employees)
Banco Santander S.A.	Banking	Spain	IFRS (EU adopted)	GRI, ESRS (CSRD), TCFD aligned	Yes	Large (1.95tn euro in total assets, ~212,000 employees)
FinecoBank S.p.A.	Banking	Italy	IFRS (EU adopted)	GRI, TCFD aligned	Yes	Medium (33.8bn euro in total assets, ~1,400 employees)

In total, these six companies represent two sectors and three countries, with Ignitis Group being one of the few companies which operates in a small European market (Lithuania). This broad representation makes it possible to evaluate similarities and differences between jurisdictional and sectoral characteristics, as well as by company size, development of market and regulatory systems. All three companies in the energy sector (Enel, Iberdrola and Ignitis Group) are publicly traded utility companies that have direct exposure to the climate transition risks associated with weather events, supply chain disruptions. Enel and Iberdrola are among the world's largest electricity providers, both have global portfolios of renewable energy resources located in Europe and elsewhere. Ignitis Group is a regional utility providing electricity throughout the Baltic region, with a goal of 4-5 GW (gigawatt) of new renewable generation capacity by 2030 (Ignitis Group, 2024). All three of the companies evaluated in this study produce detailed annual (integrated or combined) and sustainability reports, making it possible to collect considerable amounts of information for the purpose of completing this analysis.

In Europe, Banco Santander is one of the largest financial institutions based on total assets, while Swedbank is among the largest Nordic banks and has committed to achieving net zero emissions to align with a pathway of 1.5 degrees Celsius (Swedbank, 2024). FinecoBank operates primarily through digital channels and has limited physical presence, thus, it has a different climate risk profile than other banks. For FinecoBank, emissions produced through operations (scope 1 and 2) are not significant, but they have a very high level of Climate-Related exposure through financed emissions arising from investment portfolios (FinecoBank, 2024).

The variability of our selected sample was intentionally created from multiple sectors, various company sizes, and differing maturity levels so that the analysis could provide a comprehensive look at how different types of companies are disclosing their information, as opposed to giving us only one type of disclosure pattern (one specific type of company).

4.3. Overall Scoring Results

The four point scoring scale shown in Table 13 is applied consistently across all aspects of this assessment.

Table 13. Scoring Scale Reference

Score	**0**	**1**	**2**	**3**
Meaning	Absent	Minimal	Moderate	Comprehensive: detailed, specific, decision useful disclosure

The scores allocated to each of the four dimensions for each company are shown in Table 14, along with total scores and sector averages.

Table 14. Disclosure Quality Scores by Company and Dimension (Maximum Score: 12)

Company	Governance	Strategy	Risk Mgmt.	Metrics and Targets	Total (/12)	Sector
Enel S.p.A.	3	3	3	3	12	Energy
Iberdrola S.A.	3	3	3	3	12	Energy
Ignitis Group	3	3	2	3	11	Energy
Swedbank AB	3	2	2	2	9	Banking
Banco Santander	3	2	2	2	9	Banking
FinecoBank S.p.A.	1	1	1	1	4	Banking
Energy sector avg.	**3.0**	**3.0**	**2.7**	**3.0**	**11.7**	
Banking sector avg.	**2.3**	**1.7**	**1.7**	**1.7**	**7.3**	

The scores show the clear difference between the companies in the two sectors. As the average score for the energy companies is 11.7 out of 12, Enel and Iberdrola scored the maximum of 12 in all four areas, while Ignitis scored 11 owing to the lack of a comprehensive, but still moderate score on the risk management aspect. The banking sector had an average score of 7.3 out of 12, Swedbank and Santander with 9 points and FinecoBank with 4 points.

The difference between the sectors is greatest in the strategy and metrics and targets dimensions, where the energy companies consistently scored 3, whereas the two larger banks scored only 2 and FinecoBank scored 1. The governance dimension showed the least amount of difference, that is, there were 5 out of 6 companies that scored 3. However, FinecoBank received a score of 1 because it did not provide a sufficient level of detail on its climate governance structure.

4.4. Financial Analysis of Selected Companies

This section of the report outlines a summary of the finances of the six companies in the analysis. This analysis provides context for the quality of disclosure that will be outlined in subsequent sections. For example, understanding a company's financial size, capital structure and industry specific business model will assist in determining the company's degree of exposure to Climate-Related risks, and its capacity to produce disclosures that are comprehensive and provide useful information for decision making. As discussed in Chapter 2, large, capital-intensive companies are subject to increased regulatory scrutiny and investor pressure, which gives them stronger incentives to produce high quality disclosure (Gebhardt et al., 2024; Ilhan et al., 2021).

4.4.1. Energy Sector

Enel S.p.A., headquartered in Rome, Italy, is viewed as one of the top ten largest utility companies around the world when measuring total assets and produces, transports, sells and distributes electricity through a diverse range of activities throughout the European Union, Latin America and North America. In 2024, total revenues for Enel were 78,947 million euro, representing a 16,618 million euro decrease (17.4%) from 95,565 million euro in 2023 due to lower energy commodity pricing. However, EBITDA of 22,801 million euro reflects an increase of 844-million-euro (3.8%) year over year and demonstrates how durable Enel's regulated and renewable businesses are. Profits for the owners of the parent increased from 3,438 million euro in 2023 to 7,016 million euro in 2024. Enel's total net financial debt decreased from 60,163 million euro last year to 55,767 million euro this year while investing 13,223 million euro in total capital expenditures primarily related to investments in utility infrastructure and expanding renewable energy capacity (Enel, 2024, p. 23).

The above financial performance is directly correlated with how and what information Enel discloses to the public about Climate-Related issues. Enel's Integrated Annual Report, 2024, links projected EBITDA growth (approximately 7% per annum from now to 2027) to its investment in developing renewables and its exit strategy for coal. Establishing the link between Financial Planning and Climate Commitment is key to understanding how Enel approaches disclosure and thus helps to explain why Enel received the highest marks in each of Strategy and Metrics and Targets in this study. The significant reduction in net debt combined with strong operating cash flows provides Enel with the financial ability to continue to invest in and grow its green infrastructure. This is evident through the quality and comparability of Enel's disclosures.

Iberdrola, a Spanish multinational corporation, operates in regulated and nonregulated energy markets throughout Europe (including the UK) and North America. Its financial and climate performance reports are both part of Iberdrola's 2024 Annual and Sustainability Reports, meaning that they provide an integrated view of Iberdrola's financial and climate performance. In 2024, Iberdrola invested heavily in its electricity grid infrastructure, as well as in developing its offshore wind capacity, with over 47 GW of installed renewable energy capacity by the end of 2024. Iberdrola also has a projected capital expenditure plan of approximately 40 billion euro for the period from 2025 to 2027. The company's target of becoming carbon neutral by 2040 and achieving net zero emissions by 2040 is clearly supported through certification via the Science Based Targets initiative, while Iberdrola has also set interim targets for emissions intensity, which are based on the company's asset development strategy. This close alignment between the capital allocation strategy of Iberdrola and its climate strategy is therefore one of the key reasons why Iberdrola has provided such meaningful and extensive disclosures concerning all four assessment dimensions examined in this analysis.

In 2024, Ignitis Group made approximately 527.9 million euros in adjusted EBITDA, an increase of approximately 8.9% from 2023. The following year's results were positively influenced primarily by the increase in revenues associated with Networks, which amounted to roughly 262.4 million euros or almost half (49.7%) of total Group revenue, as well as through the phase in of new green generation facilities coming into service (Ignitis Group, 2024, p.14). Total Group capital expenditures for 2024 were approximately 812.0 million euro, with 53.5% for new green renewables. The Company had a net debt of approximately 3,815 million euro on its balance sheet, an increase of roughly 22.4%, as it continued its capital-based expansion strategy. The Company also declared a dividend of 1.326 per share for the year ended 31 December 2024, or approximately 96.0 million euro for the year (Ignitis Group, 2024, p. 19). For 2025, the Company expects adjusted EBITDA between 500 and 540 million euro and capital expenditure between 700 and 900 million euro (Ignitis Group, 2024, p.17).

Based on the financial position of Ignitis, there is a correlation between its lower rating in the risk management dimension and the company's continued growth in the capital-intensive phase. Current new capital projects to develop offshore wind, battery projects, and distribution network have driven the company's net debt higher. In terms of climate-related measurements and governance, the company has solid reporting but their risk management amount in reporting the financial impacts of climate scenarios is not as robust as other companies within the region (Enel and Iberdrola) due to a less mature approach to risk systems as well as the smaller entity size and more concentrated geographical exposures. The context of the region and the transition of the electricity system from the Baltic region to the Continental European grid in 2025 adds both a potential opportunity and an element of financial uncertainty for the Ignitis Group that is only partially reported by the company.

Based on the financial analyses conducted across three energy firms, it is confirmed that there is a relationship between strong capital expenditures towards low carbon, a strong investment strategy towards meeting climate targets and strong overall disclosure scores, which supports the

determination that the financial exposure to climate transition will drive disclosure quality for this industry.

4.4.2. Banking Sector

Swedbank AB is one of the largest Nordic banks and primarily does business in the retail and SME markets in Sweden, Estonia, Latvia, and Lithuania. The bank announced total income for 2024 of SEK 74,104 million (around 6.48 billion euro), almost unchanged from SEK 73,057 million (approximately 6.39 billion euro) in 2023. Net profit for 2024 was SEK 34,866 million (approximately 3.05 billion euro), a small increase from the net profit of SEK 34,130 million (approximately 2.98 billion euro) in 2023 (Swedbank, 2024, p. 4). The cost/income ratio remains an impressive level of efficiency relative to other Nordic banks. The return on equity has decreased to 17.1% from 18.3% in 2023. However, the bank continues to maintain a strong capital base with a Common Equity Tier 1 (CET1) capital ratio that increased to 19.8% at year end compared to 19.0% at year end 2023, which is significantly above what is required by regulators. Diluted earnings per share were SEK 30.86 (approximately 2.70 euro) and the board of directors has proposed a dividend of SEK 21.70 per share (approximately 1.90 euro) (Swedbank, 2024, pp. 38-39).

Swedbank has two features of its financial profile that affect its disclosures. First, the continuing strong capital position and stable profit of the bank allow for the development of more advanced methodologies for measuring climate risk. However, since no real quantification of financial losses exists at this time, this remains the only significant deficiency in their overall risk management. Second, Swedbank's heavily mortgaged loan portfolio, consisting of about 20% of all mortgages in Sweden, exposes the bank directly to physical climate risk through the underlying value of the collateral on mortgage loans and through the impact of energy efficiency improvements on future cost savings from these properties as measured against the loan amounts. To mitigate these issues, Swedbank has initiated a partnership with Ramboll to provide sustainability advice for property acquisitions and development. However, at this time there have been no quantifications of the potential impacts of physical climate risk on credit quality within the bank's financial disclosures.

As of December 31, 2024, Banco Santander S.A. was among the top five banks in terms of size, and in terms of total assets and size based on market cap, it was the largest bank operating in the Eurozone. The Group’s revenues increased to 62.2 billion euro by roughly eight percent year over year, attributable profit reached an unprecedented level of €12.6 billion euro, while return on tangible equity (RoTE) was measured at 16.3% (Santander, 2024, p. 10). The efficiency ratio was also significantly improved at 41.8% due to the benefits of large-scale operations and ongoing improvements to operating efficiencies. On December 31, 2024, Banco Santander had total assets of 1,837,081 million euro compared to 1,797,062 million euro on December 31, 2023. Loans and advances to customers were 1,054,069 million euro (Santander, 2024, p. 392), total equity was 107,327 million euro, and the fully loaded CET1 capital ratio was 12.8%, which was above the Group’s target range of 12% - 12.7% (2023: 12.3%). The number of employees worldwide at the Group was approximately 206,753 and the Group had approximately 8,011 branches (Santander, 2024, p. 393).

Santander's scale presents both challenges and advantages in relation to the implementation of their climate disclosure programme. This breadth of their global lending portfolios, for example, retail, consumer, commercial and investment banking is more complex to measure and attribute financed emissions from compared with an entirely domestic focused bank like Swedbank. While using the Partnership for Carbon Accounting Financials (PCAF) methodology provides an element of methodological transparency, current PCAF based reporting covers only parts of their total loans, for example, oil and gas, power, automotive) instead of their entire exposure to credit risk. This is evident in the scores pertaining to strategy and metrics with Santander receiving a 2 versus a 3. Consequently,

while there is a demonstrated link between Santander's commitments related to climate change and their financial performance, they have not yet been fully integrated across all their financial statements.

FinecoBank S.p.A., based in Italy, is an online bank and financial services provider focused primarily on brokering, banking and providing personal finance advice to customers. In place of traditional branches, the bank serves most of its clients via digital means. As of 31 December 2024, FinecoBank's total assets were about 33,352 million euro, which is significantly smaller than the equivalent figures published by either Swedbank or Santander. The majority of the Group's loan portfolio comprises retail mortgage or personal loans, and is spread across relatively small amounts, and almost entirely secured by either real estate or financial collateral. The Group publishes its report on its operations for 2024 within the Consolidated Sustainability Reporting (as defined in FinecoBank's 2024 report).

FinecoBank's Financial Model impacts on the way it discloses Climate-Related information.
FinecoBank does not have direct material exposure to high carbon sectors in its lending book (primarily retail lending), resulting in significantly lower absolute levels of direct physical climate risk and financed emissions than comparable banks such as Santander or Swedbank. This structural limit affects the climate disclosures made by FinecoBank. However, as discussed in the scoring analysis, the disclosures of all four dimensions had relatively low levels of specificity or quantification. FinecoBank's lower overall scores may be attributed to the relatively low level of quality of the institution's climate reporting capabilities and not merely on the basis of its business model. For example, the lack of a complete dataset on financed emissions, the lack of scenario analysis that is beyond the ICAAP stress testing process, and the lack of maturity of FinecoBank's assessment of double materiality support the conclusion that FinecoBank's low scores were primarily due to the immaturity of its climate reporting capabilities.

To conclude, the three banks' differing business models are not solely a result of their financial profiles. Rather they also differ in their business proximity and risk profile, which contributes to differences in the quality of Climate-Related disclosures. In addition, regardless of whether a bank is a large or small institution or an international or national institution, two other factors affect the received outcome are maturity of reporting and commitment from the institution to disclose Climate-Related information.

4.5. Double Materiality Disclosure

Companies are required to report double materiality if they disclose how sustainability and climate change issues impact them (financial materiality or outside-in prespective) as well as how a company impacts the environment and society (inside-out prespective or impact materiality). The concept of double materiality is critical to the European Sustainability Reporting Standards (ESRS) under the Corporate Sustainability Reporting Directive (CSRD), which is a more rigorous standard than single financial materiality, which is the basis for IFRS S2 and TCFD reporting, and only includes an outside-in perspective (financial materiality). The sample of six companies' disclosures varies widely regarding the reporting of two dimensions of materiality, which has implications for assessing overall disclosure quality and completing the research framework developed in Chapter 2.

Two separate analytical definitions are Financial Materiality and Impact Materiality. Financial Materiality is looking for whether Climate Change will create risks or opportunities that are material to the Company's Financial Position, which is directly addressed by both IFRS S2 and TCFD. The other analytical definition of Impact materiality looks for whether the Company is creating material positive impact, or material negative impact on Climate, Communities or Ecosystems. This has been addressed by both ESRS E1 and the broader framework of CSRD. A full double materiality assessment considers both definitions. The way this analysis is laid out reflects the analytical

definition separation. The three companies, Energy companies and Swedbank, are publishing Reports that align with or are compliant with the ESRS standards and are conducting formal double materiality assessments. Santander has completed a double materiality assessment for its CSRD readiness. FinecoBank formally conducted its first double materiality analysis in 2024.

4.5.1. Energy Sector

Each of the three businesses engaged in energy production offers information in line with two-way materials, however the degree of two-way treatment differs from business to business.

Enel's Integrated Annual Report for the 2024 fiscal year contains both forms of materiality defined in the sustainability standards. To define the financial side of the materiality definition, the Group Strategy and Risk Management chapter (pp. 63-92) connects financial projections, earnings before taxes and the capital budget with risk factors related to climate change (both physical and transitional). The impact side of the materiality has been defined via scope 1, 2, and 3 GHGs emissions, the company is on to achieve net zero emissions. In addition, the company's Climate Change Sustainability Statement (developed in accordance with the EU directive) has formally included the double materiality definition and confirmation that climate change is material for both forms of materiality. Enel states that their physical generation and distribution assets will be "adversely affected" by climate change (physical risks), while at the same time there will be a transition risk associated with changing laws regarding carbon and technology evolution. In addition, Enel states that they emit an estimated 70million tCO2e in 2024; and that the renewable energy produced in 2024 was over 130TWh, which is a positive contribution to reducing GHG emissions (Enel, 2024, pp. 23, 94).

Among those reviewed, Iberdrola's is one of the most comprehensive in the context of double materiality disclosure. As can be seen from its Sustainability Report 2024, the company has adhered to the ESRS framework and included an explanation of how they have assessed all material impacts and risks from both financial and impact perspectives, as described in IRO-1 of standard (p. 56). For Iberdrola, climate change is material from both a financial and impact perspective. From a financial perspective (physical risks) and regulatory transition risks from changes in asset values, physical risks are present within both their grid and assets generations. The impact of its carbon and supply chain emissions and the role in helping its customers to reduce theirs are all factors that they have identified from an impact perspective. Additionally, the company indicates that they utilised formal double materiality processes in the assessment process to assess both physical risk scenarios utilising SSP2-4.5 scenario modelling as well as through stakeholder consultation with regards to identifying impact materiality. Finally, the level of alignment with both ESRS and ISSB related reporting, including SASB sector disclosures, also means that the assessment of both financial materiality is consistent with IFRS S2 (Iberdrola, 2024, pp.90-95).

In the Integrated Annual Report 2024, Ignitis Group provides double materiality through the Sustainability Statement (Section 6) prepared in accordance with ESRS (pp. 174-265). Climate change is presented by Ignitis as being material to Ignitis: both how climate change affects Ignitis, and how Ignitis impacts climate change. There are both physical risks associated with the Baltic grid infrastructure operated by Ignitis and transition risks associated with synchronizing Baltic power systems to Continental Europe. Furthermore, Ignitis discloses greenhouse gas emissions produced through generation, as well as the positive effects of investments in renewable energy through its expansion programme. The Sustainability Statement discusses double materiality in the IRO-1 section, and the assessment includes disclosed time horizons. KPMG provided independent assurance of some quantitative risk indicators, including greenhouse gas emissions, adding credibility to the impact materiality aspect of the disclosure (Ignitis Group, 2024, pp. 18-19).

4.5.2. Banking Sectors

The banking sector has a more varied view of double materiality reporting when comparing the completeness of the double materiality assessment with how clearly the two views are separated out in the reports.

Swedbank's 2024 Annual and Sustainability Report consists of ESRS aligned Sustainability Report under the CSRD framework, and the double materiality assessment is reported through the bank's IRO-1 process (pp. 85-91). The IRO-1 process details how the bank identifies and assesses both material impacts (both financial and non-financial), material risks and material opportunities. To address financial materiality for climate change, Swedbank's climate transition plan outlines physical and transition risk exposure related to Swedbank's credit portfolio (pp. 102-107). The E1 Climate Change disclosure addresses calculate financed emissions, as well as the related sector-specific targets established by the bank, as well as Swedbank's operational emissions. The impact materiality dimension is accounted for via Swedbank's reporting of financed emissions (Scope 3, Category 15) where through the lending and investment activities of a retail bank, Swedbank has a significant impact on Climate-Related outcome. Swedbank acknowledges its responsibility for the carbon footprint associated with the lending and investment activities it provides, and as such has established sector-specific financed emissions intensity targets, however Swedbank does not currently have complete portfolio level Scope 3 emission coverage (Swedbank, 2024, pp. 101-103). Swedbank treats the double materiality concept in a structured and coherent manner, reflecting genuine engagement with the subject, rather than solely engagement based on compliance.

The formal double materiality assessment conducted by Santander in 2024, overseen as indicated in the governance section by the RBSCC, determined that climate change is a material theme from both a financial materiality viewpoint (physical and transitional risks that influence credit quality, asset values and the bank's own cost of funds) and from an impact materiality viewpoint (the contribution of Santander to GHG emissions through its financed portfolio). Detailed analysis of the outside-in dimension can be found in the Risk Management and Compliance Section (pp. 601-750) where climate risk has been incorporated into the enterprise-wide risk framework, with PCAF-based financed emissions identified for selected high-emission sectors (Santander, 2024, pp. 59-65). The inside-out dimension of the analysis can be found in Santander's responsible banking commitments, including investment of 100 billion euro in sustainable and responsible investments, and their decarbonisation targets for the oil and gas, power and other carbon intense sectors. Approval of the double materiality assessment can be found in the governance section of the Climate Transition Plan, pages 21-29 of the Consolidated Annual Report 2024. Although Santander's disclosure of double materiality is substantial, there is comparatively less detail available on the inside-out aspect than on the outside-in aspect because the impact-oriented disclosure within banking institutions globally is at an earlier stage of development.

FinecoBank conducted its first formal double materiality assessment in 2024. The Board of Directors adopted a global policy for this assessment in September 2024. Section 1.2.3 of the Consolidated Sustainability Reporting 2024 describes the details of Fineco's double materiality analysis (pp. 108-134). The analysis identifies climate change as a relevant topic. It also identifies two different materiality dimensions of climate change, financial materiality versus impact materiality of climate change. The financial materiality perspective includes physical and transition related risks that impact Fineco's assets and the bank's loan portfolio, and its operating environment, while the impact materiality perspective includes how much greenhouse gas is emitted (materialities). Fineco conducted its first assessment of the opportunities associated with climate change. The depth of disclosure for both the financial materiality dimension and the impact materiality dimension is less than what is expected from the other companies in this sample. The financial materiality perspective is largely described qualitatively and is not supported using quantitative scenario analysis.

Conversely, the impact materiality perspective is limited because Fineco has no complete variation of financed emissions via its entire financing and investment portfolio (FinecoBank, 2024, pp. 170-183). These limitations represent Fineco as a first-year reporter, relative to the other sample companies and reflect the developmental trajectories of the other companies over previous reporting cycles.

4.5.3. Comparative Assessment

The double materiality disclosures of the six companies show varying levels of comprehensiveness and integration: highly comprehensive and integrated (Enel, Iberdrola), structured with some development (Ignitis, Swedbank, Santander) and at an early stage of development (FinecoBank). This trend in double materiality disclosures aligns closely with the overall quality of climate disclosures in these companies (see Table 14) and indicates that companies that successfully respond to multiple perspectives on climate change are also those that have extensive climate disclosure practices and thereby hold the highest quality climate disclosures across all dimensions examined. Companies that do well in both strategy and metrics areas are also among the most successful in integrating climate change into their financial planning and impact measurement processes.

One significant difference between these two industries is how much emphasis there is placed by companies on each direction of materiality. In the case of energy businesses in our sample, they tend to be very detailed in terms of discussing the impact they have on climate (impact materiality) related to their direct greenhouse gas emissions, because their direct GHG emissions are large, quantifiable and verified externally. Similarly, energy companies generally provide good details regarding the financial impact of climate change (financial materiality), with quantification of both physical and transition risk, and the relationship of such risks to financial forecasts. In contrast, banking institutions face a systemic imbalance regarding each aspect of materiality: with respect to the financial aspect, they are typically at least as developed than with respect to the impact aspect; however, banks lack the ability to control for the availability of financed emissions data because that requires their counterparties to disclose that information. This difference between the two industries confirms findings of other research about climate disclosures in the financial services industry (Reghezza et al., 2022; Campiglio et al., 2022). Furthermore, it indicates that the fundamental characteristics of the industries dictate not just how well an industry discloses, but which of the dimensions of materiality are the most developed at each stage of maturity for financial institutions when it comes to climate risk disclosure.

A double materiality lens provides a useful means to evaluate the relevance criterion for assessing the quality of disclosures in this study. Disclosures that are "one-dimensional". Meaning, it only addresses either financial materiality or impact materiality and does not fully meet the needs of those stakeholders who are dependent on corporate climate reporting. For example, outside-in investors and creditors need an outside-in perspective in order to assess their financial risk, whereas regulators, civil society, and supply chains need an inside-out perspective in order to assess environmental accountability. Companies in this sample with the best scoring overall are also those who have made the most advancements toward creating effective disclosures for both target audiences (creating double materiality disclosures). This indicates that the maturation of double materiality disclosures is consistent with the overall quality improvement of disclosures.

4.6. Analysis of Disclosure Quality in the Energy Sector

The energy firms in this analysis exhibit the highest level of Climate-Related disclosure quality among the assessed companies. This conclusion aligns with the theoretical framework outlined in Chapter 3 in which operational exposure to climate transition risks was found to be an important driver of depth of disclosure (Agliardi and Agliardi, 2021). High quality disclosures are not only a

regulatory requirement but also constitute essential commercial communications to investors and creditors of companies whose assets, revenues and competitive positions are directly influenced by carbon regulations, energy prices and the transition to renewable energy Sources.

As per the quality indicators defined in Section 2.4 above, the sample of energy companies exhibited strong performance in all areas of performance. For each company, the energy company provided complete disclosures that met each of the four disclosure categories. Additionally, the energy companies provided specific details indicating governance structure, strategy, and emission data with named positions, quantifiable timeframes, and verifiable baselines. Additionally, the Climate-Related information is directly tied to the company's financial planning, capital allocation, and investor measures of performance. As noted in Section 2.4.4, the companies' performance also met the decision usefulness standard with respect to each company's disclosure providing enough information for an Investor to evaluate how climate relates to expected cash flows, asset values and long-term strategies for the business.

4.6.1. Governance

Each of the three energy companies received a score of 3 in governance, each having defined structures at both the management and board levels to provide oversight over climate issues, specifically, there are committees identified within each company's governance structure to perform these functions. These same companies have also established direct links between climate performance and the compensation of their executive officers as part of their respective corporate governance policies. *(Source: Enel Integrated Annual Report 2024, Section 2 'Governance' (pages 33-62) and Section 4 'Climate Change' (pages 93-150); Iberdrola Annual Report 2024 (pages 34-35) and Iberdrola Sustainability Report 2024 'Governance' chapter (pages 16-30); Ignitis Group Integrated Annual Report 2024, Section 4 'Governance' (pages 91-130) and Section 6 'Sustainability Statement' (pages 266-320). All three disclosures are contained in the companies' financial/integrated annual reports and are subject to external limited assurance.)*

Specifically, Enel has established two standing committees for the Board of Directors to provide governance and oversight into climate issues:

1. The Control and Risk Committee, which identifies and assesses Climate-Related risks.
2. The Corporate Governance and Sustainability Committee, which is responsible for monitoring the company's sustainability strategy as well as for the integration of sustainability into the company's overall business plan.

In December 2024, Enel amended its bylaws to implement the recently adopted Central Securities Depository Regulation (CSRD) requirements. This has resulted in the formal reallocation of committee responsibilities in terms of sustainability reporting (Enel, 2024). Climate-Related impacts must be expressly factored into the approval process of the Business Plan to determine the remuneration policy. Therefore, the governance structure supports the integration of climate considerations into strategic decision making and the overall objectives of the company. *(Source: The 'Governance' chapter of Enel's 2024 Integrated Report (pages 33-62) describes the Corporate Governance and Sustainability Committee's mandate (p. 38), as well as amendments to CSRD bylaws (p. 52). The Sustainability Statement, which was prepared in accordance with CSRD/ESRS, is incorporated into this same report).*

Similarly, the governance framework of Iberdrola has a similar style. The company has a Climate Action Plan which lays out its formal transition plan and provides a clear path for the company to achieve net zero emissions by 2040. The SBTi certification of the company's net zero emissions trajectory is part of its overall public accountability framework and is governed by the Board of Directors and the Executive Team. Climate-Related performance measures account for 10% of long-term incentives and are linked to alignment with 1.5-degree Celsius targets (Iberdrola, 2024). *(Source: The Governance chapter (pages16-30) of Iberdrola's Sustainable Report 2024 discloses information about the Climate Action Plan, SBTi certification approval, and executives' compensation relationships related to Iberdrola's 2024 Annual Report filing that has been prepared under ESRS/CSRD.)*

At Ignitis Group, the Risk Management and Sustainability Committee of the Supervisory Board have primary oversight responsibility for sustainability management and business ethics. Climate-Related targets, including the company's net zero commitment by 2040 to 2050, as well as the company's green capacity expansion programmed, are part of the key executive performance indicators (Ignitis Group, 2024). The robust and detailed governance disclosures of the three companies demonstrate that they all receive the highest rating possible for their Climate-Related practices. *(Source: Ignitis Group Integrated Annual Report 2024, Section 4 'Governance' (pages 91-130), specifically Section 4.2 'Governance framework' (p. 91) and Section 4.7 'Risk management' (p. 125). Climate governance detail also appears in Section 6 'Sustainability statement' (pages 266-320).)*

4.6.2. Strategy

The companies' scores were all 3 for the strategy dimension. The companies all provided additional disclosures that go well beyond simple statements of general sustainability. The disclosures also present structured ways of describing the influence of Climate-Related factors on their allocation of capital, the evolution of their business model and long-term financial planning. (*Source: In the case of Enel, information about strategic objectives can be found in Section 3 ('Group Strategy and Risk Management') of the Integrated Annual Report 2024, pages 63-92, and Chapter 'Climate Change' of the Integrated Annual Report 2024, pages 93-150. The strategic objectives of Iberdrola can be found in Chapter 'Strategy' of the Sustainability Report 2024 (pages 22-90) and in Chapter 'Climate' of the Sustainability Report 2024 (pages 82-112), along with other relevant information found in the Annual Report 2024, while for Ignitis Group, the relevant section is Section 2.2 ('Strategy and Targets') of the Integrated Annual Report 2024 (pages 25-90).)*

For Enel, the strategy disclosures are exceptionally closely integrated with the financial reports. In the Integrated Annual Report for 2024, Enel linked its climate commitments (including leaving the coal business by 2027, achieving net zero emissions across its generation and retail businesses by 2040) to its projected financial performance via the ordinary Group Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) forecast range of 24.1 billion to 24.5 billion euros in 2027, a CAGR of approximately 7%. The report presented the projections for ordinary Group EBITDA alongside the company's forecasts for the renewable investment program and emissions reduction plan (Enel 2024). The report provides an easily understandable and coherent narrative that makes it difficult to separate the climate strategy from the company's core business. *(Source: The Group's strategy, EBITDA forecasts, and renewable resource investment plan can be found in `Group Strategy and Risk Management' (pages 63-92) from Enel's Integrated Annual Report 2024. The climate scenario analysis and the Net Zero transition pathway for the Group will be reported in the Climate Change chapter of the report (pages 93-150), which will include reporting on Consolidated Financial Statements.)*

The strategy section of Iberdrola has very specific interim targets and a broad range of scenario analyses. They have set interim emissions intensity targets for 2025, 2026 and 2030, with a goal of achieving an emissions intensity of less than 10 gCO2/kWh (10 grams of carbon dioxide per kilowatt-hour) by the end of 2030. They are on pace to meet their target of a 65% reduction from their 2020 baseline in absolute emissions by 2030, having reduced their absolute emissions by over 40% from their 2020 baseline by the end of 2024 (Iberdrola, 2024). They utilize multiple climate scenarios in their strategic analysis, including those that are aligned with the Paris Agreement 1.5-degree Celsius pathway, over a range of time frames (short, medium and long term) to 2100. *(Source: The Iberdrola Sustainability Report 2024 includes an analysis of emissions intensity (gCO2/kWh) targets for 2025, 2026, and 2030 along with a multi scenario analysis. These are in the Climate chapter (pages 82-112). As part of the 2024 Annual Report, there is a financial context for all these commitments.)*

As the largest utility provider in the Baltic region, Ignitis Group's strategy is based on its regional context. The company's long term development plan follows both national and EU energy and climate policies to achieve the 2030 goals of reducing greenhouse gas emissions and deploying one and a half gigawatts of battery storage capacity by 2030. The company has linked its infrastructure investments of more than 800 million euro in 2024, a substantial proportion of which will go toward renewable capacity expansion, to achieving net zero emissions (Ignitis Group, 2024). While the geographic scope of Ignitis Group's strategy is smaller than that of Enel or Iberdrola, the quality and specificity of their strategic integration is on par with the other two companies. *(Source: The Ignitis Group Integrated Annual Report for 2024 presents investment amounts and net zero targets in Section 2.2 - Strategy and Targets (pages25-90) and further information in Section 6 - Sustainability Statement (pages 174-265). Financial reports and sustainability reports can be found in the same integrated report.)*

4.6.3. Risk Management

Risk management is a less variable area of concentration in the energy sector. Based on these results, both Enel and Iberdrola received scores of 3, while Ignitis obtained a score of 2. *(Source: In section 3 of the Integrated Annual Report, (pages 77-92) provides Enel's risk governance model while the way in which Enel has assessed the impact of climate change is presented in "Chapter: Climate Change," pages 104-127. In the Sustainability Report of Iberdrola, pp 93-112, there are further details on the methodology for assessing climate risks and how scenarios are constructed to support that assessment. The Ignitis Group's Integrated Annual Report covers risk management in section 4.7 (pp 125-174).)*

Enel and Iberdrola had structured processes in place for determining, evaluating and mitigating physical and transition climate risks. For evaluating physical risks, Iberdrola conducts an analysis (based on the SSP2-4.5 (Shared Socioeconomic Pathway 2 with a radiative forcing of 4.5) scenario related to 2.7 degrees of warming) utilizing CMIP6 (Coupled Model Intercomparison Project Phase 6) climate projections and, when considering transition risks, evaluates these risks over three different time frames: short to medium term (2021-2040), long term (2041-2060) and very long term (2080-2100) (Iberdrola, 2024). The methodology used by Iberdrola and the inclusion of climate risk output into its business plan and investment decisions establishes maximum score credentials.

Ignitis has identified physical and transition risk categories relevant to its strategy and regulatory environment but is less detailed about specifically quantifying the financial impacts of each risk category. While the risk framework has been incorporated within the risk management system and stress testing and monitoring processes are outlined within the report, the methodology utilized to

assess and quantify the risks is not as transparent as it would be if it were to meet the comprehensive benchmarks set forth in the scoring criteria. This resulted in a score of 2.

4.6.4. Metrics and Targets

All three energy companies receive a score of 3 for metrics and targets. Each company discloses full Scope 1, 2 and 3 greenhouse gas emissions with year-on-year comparisons and each has established time bound, quantified reduction targets aligned with external certification frameworks. *(Source: Under 'Enel's metrics in combating climate change' (pages 142-150) of their Integrated Annual Report 2024 you can find data related to GHGs & emissions reduction. Iberdrola reports Scope 1, 2 and 3 emissions plus gCO2/kWh intensity targets throughout the pages in their Sustainability Report 2024 (pages 83-112), whereas information published by Ignitis Group can be found within Section 1.5 'Sustainability highlights' (pages 6-18) and further detailed GHG data is published in Section 6 'Sustainability Statement' (pages 174-265) of their Integrated Annual Report 2024. The selected GHG indicators were independently assured by KPMG.)*

Ignitis Group discloses total Greenhouse gases (GHG) emissions of 4.05 million tCO2-equivalent (tonnes of carbon dioxide equivalent) for 2024, representing a 7.2% reduction compared with 2023. This figure comprises Scope 1 emissions of 0.48 million tCO2-equivalent (up 14.8% due to increased energy production), Scope 2 of 0.12 million tCO2-equivalent (down 35.6%) and Scope 3 of 3.45 million tCO2-equivalent (down 8.3%). Carbon intensity for Scopes 1 and 2 fell by 18.4% year on year to 199 gCO2-equivalent (grams of carbon dioxide equivalent) per kilowatt-hour. Selected sustainability indicators, including GHG data, have been independently assured by KPMG (Ignitis Group, 2024).

Enel reports total direct and indirect GHG emissions across its entire value chain of approximately 70 million tCO2-equivalent, down 26% compared with 2023, in line with the targets certified by the Science Based Targets initiative. Renewable electricity generation exceeded 130 TWh (Terawhatt hour) in 2024 and Scope 1 emissions intensity from power generation is subject to a specific SBTi certified reduction target for 2026 (Enel, 2024).

Iberdrola's emissions disclosure is among the most precise in the sample. The company has set a target to reduce electricity generation emissions intensity to less than 10 gCO2/kWh (10 grams of carbon dioxide per kilowatt-hour) by 2030, with intermediate annual milestones of 60 gCO2/kWh (60 grams of carbon dioxide per kilowatt-hour) in 2025 and 55 gCO2/kWh (55 grams of carbon dioxide per kilowatt-hour) in 2026. The company's net zero ambition for all scopes by 2040 implies a 90% absolute reduction from the 2020 base year, with residual emissions to be neutralized according to defined quality standards (Iberdrola, 2024).

All three energy companies report having verified, time bound emissions reduction targets as part of their respective external certification processes. This demonstrates their progress towards achieving metrics maturity. This metric provides users of their financial statements with information that helps them make economic decisions about these companies.

4.7. Analysis of Disclosure Quality in the Banking Sector

The banking industry displays a more diverse picture. Swedbank Inc. and Santander both demonstrate strong governance related disclosures and their companies also provide meaningful disclosures related to strategy as well as risk management, however, their disclosures may not provide as much detail or quantification in terms of disclosing these risks as compared to other sectors such as energy.

In addition, FinecoBank, which is not as developed across all four categories of Climate-Related disclosure, has less information to provide about its Climate-Related reporting due to its smaller size and the fact that it has only begun to develop its Climate-Related disclosures.

The basis of assessment concerning the disclosures of the banking industry's performance is defined in Section 2.4 of this report. There is evidence to support an overall conclusion of the above analysis. When governance disclosure results are compared to the quality characteristics of the information that banks publicly disclose to their shareholders, there appears to be an identifiable trend. Full governance disclosures contain nearly all the components associated with organizational governance structure; however, the extent to which banks have developed strategy and metrics is significantly less than that of governance. Specifically, banks have not yet fully completed their financed emissions coverage or exhibited thorough scenario analyses of financial impact. Furthermore, specificity is also lacking in strategy and risk management as the information is typically describable and broad relative to quantifiable. Overall, the main area where the governance structure and strategy have weaknesses is with relevance which is decision usefulness. Many banks fail to clearly how climate risks will impact financial returns although it has been demonstrated in Section 2.4.3 that the link between climate risk and financial return is essential to making a useful disclosure.

The lower scores in the banking sector are not due to a lack of commitment from the financial community, rather, they are a result of the structural challenges that arise from providing financial services to individuals and businesses. Most climate risks arise from lending and investing portfolios. This is referred to as financed emissions, rather than from direct greenhouse gas emissions associated with the banks' operations (Campiglio et al., 2022; Reghezza et al., 2022). This structural challenge leads to significant difficulties in determining, attributing and providing credible and comparable disclosures of Climate-Related risks.

4.7.1. Governance

In the case of all three banks considered, governance is the area where they each scored highly (3 for both Swedbank and Santander, 1 for FinecoBank). *(Source: The governance disclosures for each of the three banks were based on the banks' own annual reports. Swedbank included relevant information for the ESRS GOV-1 to GOV-5 disclosures (pages 92-101) in its Sustainability Report, which is part of its 2024 Annual and Sustainability Report. Santander discloses governance material between the Corporate Governance chapter (pages 482-600) and the Our Climate Transition Plan sub-chapter (pages 32-68) of the 2024 Consolidated Annual Report. FinecoBank discloses governance information in Section 1.3 Governance (pages 135-148) and Section 4 Governance Information (pages 253-262) of the 2024 Consolidated Sustainability Reporting.)*

Swedbank's Governance structure includes the Board Remuneration and Sustainability Committee, which is responsible for monitoring and evaluating the sustainability work of the Group as well as verifying that the remuneration systems of the Bank are consistent with the effective management of risk. During 2024, the Committee, in addition to its regular activities, focused on the Bank's emerging sustainability strategy and the alignment of that emerging strategy with the 1.5 degrees Celsius global target (Swedbank, 2024). The governance disclosure relating to the Committee is specific in that the Committee is named, and its mandate is clearly defined, in addition to making clear how the oversight of the bank's sustainability commitments align with the Bank's strategic sustainability commitments. *(Source: The RBSCC's mandate, composition and activities for 2024 are covered on pages 21-29 of the Consolidated Annual. The Governance information sub section "Our Climate Transition Plan", pages 32-68 contain the double materiality assessment approval for 2024. Further composition information can be found in the Corporate Governance section of the report, (pages 482-600).*

Santander has established a governance structure based upon the Responsible Banking, Sustainability and Cultural Committee (RBSCC), which is responsible for proposing and overseeing the development and implementation of the Group's sustainability strategy and policies. In 2024, the RBSCC approved the Bank's double materiality assessment, which included the identification of material impacts, risks and opportunities relating to climate change. Furthermore, other Committees of the Bank's Board (including the audit committee) have Sustainability related responsibilities that are defined in their respective responsibilities (Santander, 2024). Performance indicators relating to Environmental, Social and Governance metrics, including Climate-Related performance indicators, are included in the executive remuneration framework.

Governance disclosures at FinecoBank specify there is a Board of Directors where sustainability related matters are reported to the Board at regular intervals. There are also a Sustainability Committee and a Corporate Governance Committee that includes an Environmental and Social Responsibility committee. For the Board to execute double materiality analysis, they approved it per a global policy developed in September 2024 (Fineco). Unfortunately, there is insufficient detail around the respective responsibilities of each of the aforementioned bodies with respect to climate specific matters or the processes by which Climate-Related information is communicated from the board level and these committees therefore it has given the overall impression that while there appears to be some level of governance structures create to meet Regulatory expectations, they are not yet fully functional for climate specific accountability. *(Source: FinecoBank provides information related to its board of directors and its governance committees in Section 1.3 on pages 135-148 of the Consolidated Sustainability Reporting 2024. In Section 4 of the report, which can be found in the Governance Information section on pages 253 to 262, there are additional metrics related to governance. The approval process for the double materiality assessment of September 2024 is in Section 1.2.3, on pages 108-134, while further financial and operational context regarding governance can be found in the Consolidated Report on Operations section of the Annual Report 2024.)*

4.7.2. Strategy

Swedbank's gaps in strategy compared to energy companies like Santander and FinecoBank are at least noticeable through its ambitious 2050 net zero goal with 1.5-degree Celsius portfolio alignment. *(Source: The complete Sustainability Report for 2024 includes Swedbank's impacts on Climate Change (SBM-1) strategic goal and target statements (pages 77-80), as well as the summaries for Swedbank's Strategic Directions and Targets (pages 80-92). Banco Santander's strategic objectives regarding their climate change policies are found mainly within Chapter 2.0 "Business Model and Strategy" (pages 7-17) and the associated "Our Climate Transition Plan" (pages 32-68). All strategic objectives of FinecoBank regarding Sustainability are detailed within Section 1.2 "Strategy and Material Matters" and Section 3 "Sustainable Development Goals" from their 2024 Consolidated Report (pages 103-135). Please refer to Appendix I (pages 285-300) for a complete summary of FinecoBank's ESG Multi Year Plan covering FY 2024 to FY 2026.)*

For example, Swedbank's climate strategy is structured around three principles:

1. movement of balance sheet related assets towards sustainability,
2. assist customers with their transitions toward sustainability and
3. lower their direct operational carbon footprint.

Swedbank has established sustainable finance targets and has exceeded its 2030 targets already in 2019 (Swedbank, 2024).

The targets themselves are meaningful investments and demonstrate Swedbank's commitment to its strategic vision. However, Swedbank has not explicitly provided a link between Climate Strategy and core financial performance. The strategy reads more like standalone support to the overall financial narrative rather than being embedded into the overall financial performance.

The three-pillar net zero strategy of Santander aims for net zero by 2050, with industry specific portfolio decarbonisation targets set for 2030 for significant sources of emissions like oil and gas and electric power generation. As of the end of 2024, Santander had achieved 89 billion euros under management in socially responsible investment and is on course to meet its target of 100 billion euros (Santander, 2024). As with Swedbank, the commitments made by this institution represent a meaningful commitment to sustainable development but have been disclosed in relatively broad terms so that investors wishing to evaluate Climate-Related financial materiality may find it difficult too. *(Source: The targets for decarbonizing the portfolio and the commitment of EUR 100 billion to sustainable and responsible investment (SRI) are included in the 'Our Climate Transition Plan' ("the Plan"), "Our Climate Transition Plan" (pages 33-40) of the Santander Consolidated Annual Report 2024. The 'Business Model & Strategy' chapter (pages 7-17) and financial review sections of this same report provide the relevant context for financial performance.)*

FinecoBank's strategy and related disclosures are mainly comprised of unqualified expressions of a commitment to sustainable development, along with reference to its Environmental, Social, and Governance (ESG) Multi Year Plan for 2024-2026. The relationship between climate change and the long-term financial planning and business model of the bank is not explicitly articulated. However, the bank does provide evidence that it has begun to identify opportunities related to climate change in its first ever climate change opportunity assessment as part of the 2024 Double Materiality Analysis, which indicates the bank is still in the early stages of integrating its climate change strategy into its broader strategy (FinecoBank, 2024). *(Source: FinecoBank's strategy disclosures are included in Section 1.2 'Strategy and Material Sustainability Matters' (pages 103-135) of the Consolidated Sustainability Reporting 2024, and the ESG Multi-Year Plan 2024-2026 (Appendix I, pages 285-300). The first assessment of climate change opportunity has been made as part of the 2024 Double Materiality Analysis described as part of Section 1.2.3 (pages 108-134).)*

In the bank sector, the strategy scores are similar across banks and show a trend of banks having made commitments. However, the degree to which these commitments have been financially integrated is still incomplete, making them largely unusable for making investment decisions.

4.7.3. Risk Management

Swedbank and Santander both scored 2 (the highest possible) in terms of Risk Management, while FinecoBank scored 1 (the lowest possible). All 3 banks have identified physical and transition risks as categories for identifying and integrating climate risk into a broader risk management framework. The difference in the three banks relates to the amount of detail provided for the methodologies used and how much the identified risks are connected to quantified financial impacts. *(Source: According to Swedbank, the climate risk methodology can be found in the Sustainability Report's 'Climate Transition Plan' (pages 102-107) and the E1 'Climate Change' Disclosure (pages 119-138). Santander's approach to climate risk is found within the Consolidated Annual Report 2024. This can be found in the 'Risk Management & Compliance' section (pages 601-750) and contains information related to PCAF based financed emissions in pages 33-34 and in pages 59-65 of 'Our Climate Transition Plan'. Finally, FinecoBank is disclosing its methodology for assessing Climate-Related risks within the Consolidated Sustainability Reporting 2024 report within the 'Climate Change' (pages 170-183) section.)*

For Swedbank, climate risk is integrated into credit risk assessment and internal risk models using sector specific decarbonisation targets. For example, Swedbank committed to halve the emissions intensity of its shipping portfolio by 2030 relative to a baseline in 2022 pursuant to the International Maritime Organisation's (IMO) net zero emissions strategy. This commitment will be incorporated as part of the bank's overall risk management strategy. The bank has not quantised estimated financial losses to its climate risk exposure. The scenario-based methodology utilized is described as a general rather than technical detailed level.

The integration of climate risk management at Santander Bank uses the Responsible Banking, Sustainability and Cultural Committee (RBSCC) and aligns it with the bank's enterprise-wide risk framework. The Partnership for Carbon Accounting Financials (PCAF) methodology tracks financed emissions, providing a level of methodological transparency for comparisons with other PCAF users. For high climate relevant sectors, such as power and oil and gas, portfolio alignment targets will include specific absolute and intensity-based targets (Santander, 2024). While there is a lack of quantitative estimates of financial exposure from climate scenarios, this is the largest gap compared to the comprehensive benchmark, as it is for Swedbank.
FinecoBank's climate risk management approach has evolved from its digital business model and limited direct physical climate risk exposure. This bank will use supervisory guidelines and conduct stress tests during their Internal Capital Adequacy Assessment Process (ICAAP) process to assess physical climate risk and will not complete standard climate scenario analysis on this topic. Transition risk will be factored into the ICAAP through acceleration of Environmental, Social, and Governance (ESG) market shifts in a scenario impacting FinecoBank's commission income (FinecoBank, 2024). Though this approach makes sense for FinecoBank's business model, the minimal quantification of possible financial impact and lack of standard climate scenarios mean FinecoBank's disclosure categorizes within the minimal, rather than moderate range.

Although all the banks have a common governance framework, differences exist among banks in terms of the depth of climate risk incorporation into quantitative financial exposures. Such differences are one of the primary reasons for the observed overall quality difference between the banking and energy industries.

4.7.4. Metrics and Targets

For Swedbank and Santander the Metrics and Targets rating is 2. The Metrics and Targets rating for FinecoBank is 1. (Source: *According to pages 106-107 of Swedbank's 2024 Annual & Sustainability Report, they report their operational (Scope 1) emissions (which include GHG emissions) via their Annual and Sustainability Report, section E1 - Climate Change (Pages 119-138) (E1 Climate Change) for target emissions by sector financing and climate metrics for each sector. Reporting on financed emissions using the 'PCAF' method by Santander is found on page 59-65 of Our Climate Transition Plan (Consolidated Annual Report 2024 - pages 32-68). FinecoBank's emissions data and target metrics are covered in Section 2.2 (Climate Change) in pages 170-183., and 4.4 (Metrics and Targets) (pages 262-263).)*

Swedbank has operational disclosure of Scope 1 and Scope 2 emissions and provides baseline emission intensity targets for financed emissions in specific sectors, which include oil production, gas production and shipping. Currently, 36% of their originations consist of sustainable bonds. Also, transition related sustainable financing volumes are tracked to a predetermined plan (Swedbank 2024). All these measures represent useful metrics, however, Swedbank did not disclose all financed emissions for the total portfolio (Scope 3) and it did not establish a connection between financed emissions and any performance metric related to their financing activities.

In the case of Santander, they provide both portfolio level financed emissions and financing targets unified with sectoral decarbonisation pathways. As an example, Santander has established a target for financed emissions attributable to oil and gas production to be 16.98 million tCO2 (Total Carbon Dioxide) by 2030. They have established a power sector financed emissions intensity of 0.11 tCO2 per megawatt hour by 2030. The financed emissions are calculated based on the PCAF methodology (Santander 2024). Like Swedbank, Santander has operational coverage of financed emissions for only a portion of their loan book. This reflects difficulties accessing accurate greenhouse gas emissions data for all their counterparties.

FinecoBank has disclosed Scope 1 and Scope 2 operational emissions. However, its significance is minimal given its digital business model. Moreover, it began to disclose financed emissions in 2023. The disclosure of financed emissions is less fulsome than Swedbank and Santander's, however, it does include some performance targets related to the reduction of operational emissions that are outlined in their Environmental, Social, and Governance (ESG) multiyear plan for 2024-2026. These targets, however, do not clearly specify quantities or timeframes to be considered comprehensive for financial performance disclosures (FinecoBank 2024).

Banks will need to assess how well developed and consistent their data methodologies are across their entire loan book as a measure of quality of metrics, as opposed to the existence of a reporting framework. For example, PCAF is a robust methodology to provide banks with financed emissions, but if it is not consistently applied throughout the entire loan book the results will lack validity.

4.8. Sector Level Comparison

The results of scoring at the sector level are laid out in Table 15, which allows us to compare the average performance of each of the four dimensions of success.

Table 15. Sector Level Comparison of Disclosure Quality

Sector	Governance	Strategy	Risk Mgmt.	Metrics and Targets	Avg. Total	Disclosure Profile
Energy (n=3)	**3.0**	**3.0**	**2.7**	**3.0**	**11.7 / 12**	Comprehensive and quantitative across all dimensions
Banking (n=3)	**2.3**	**1.7**	**1.7**	**1.7**	**7.3 / 12**	Governance strong; strategy and risk management remain largely narrative

By looking at the sectors together, we see the same tendency has been developed from the analysis of the individual companies. The energy sector's average score is higher than banking for each of the four dimensions of performance measurement, with the greatest difference being found between their averages for strategy and metrics and targets (energy average = 3.0, banking average = 1.7). This can be attributed in part to the greater degree of directness and operationality that Climate-Related factors impact on many of their business operations (including financial results) than is true for banks.

Both the energy and banking sectors have many of the same governance elements, all the companies except FinecoBank scored a "3" in common with each other; however, the average score for the energy sector was higher (3.0) than that of the banking sector (2.3). There is a significant explanation for the variation of averages in these governance elements based on the relative maturity of disclosure

responsibilities pertaining to each sector regarding governance and that both sectors have followed appropriate governance practices regarding existing frameworks listed above. Most notably, the corporate governance component related to climate is already embedded in several larger companies across each sector and therefore many of the structural elements of governance (board of director's duties, committing to governance, linking remuneration to governance) have typically been defined adequately.

This paper looks at how the banking sector compares to the energy sector on climate strategy, including metrics and targets, all of which are critical to addressing climate change. Banks have an indirect obligation to connect their climate strategies to their financial performance. Thus, banks must develop overall portfolio strategies and financed emissions targets, which are generally less precise than project specific ones, to understand how their actions affect their profit margins.

FinecoBank is an outlier in the banking sector. The score of 4 is significantly below that of Swedbank (9) and Santander (9), as well as the banking sector average (7.3). This is not only due to its smaller size or simpler business model compared with its peers, although its digital business model reduces the significance of direct operational emissions. More importantly, FinecoBank is in the early stages of developing its climate reporting. In fact, its first double materiality assessment was only completed in its current format in 2024, climate opportunity analysis was also introduced in 2024 and financed emissions were only reported for the first time in 2023. These disclosures form the basis for future, more comprehensive reporting, however, they do not yet conform to the standard of leading firms in this sample.

Overall, the inter sectorial comparison shows that energy companies have greater and more consistent quality of disclosure than any of the other three sectors in each of the four disclosure elements. The most significant difference was found in strategy and metrics where there is a direct link between the climate transition's effects on the financial performance of energy companies. This has created an incentive for energy companies to develop the data infrastructure necessary to create decision-useful disclosures.

4.9. Cross Sector Analysis by Disclosure Dimension

In Table 16 there is a company summary showing evidence that supports each of the key scores at the company level, across the five disclosure dimensions. This organization should assist users in identifying the distinguishing features of the companies' disclosures within and between sectors, as well as provide factual support for the qualitative findings in this chapter.

Table 16. Evidence Summary by Company and Disclosure Dimension

Dimension	Enel	Iberdrola	Ignitis	Swedbank	Santander	Fineco
Governance (max 3)	3 - Board-level oversight via Control Risk and Corporate Governance and Sustainability Committees; climate	3 - Dedicated Climate Action governance; SBTi certified roadmap overseen at board level with	3 - Supervisory Board Risk Management and Sustainability Committee; climate targets embedded in	3 - Board Remuneration and Sustainability Committee with documented oversight of 1.5-degree Celsius alignment	3 - Responsible Banking, Sustainability and Cultural Committee oversees climate strategy and double materiality	1 - Sustainability Committee and Board oversight exist but climate specific roles and processes are described only at a high level

	linked to remuneration	remuneration linkage	executive KPIs			
Strategy (max 3)	3 - Net zero by 2040; coal exit by 2027; EBITDA growth to euro 24.1-24.5 bn linked to renewable investment plan	3 - Net zero by 2040 (SBTi); Scopes 1and2 neutrality by 2030; 40% emissions cut vs 2020 already achieved; specific intensity targets per year	3 - Net zero 2040-2050; 4-5 GW green capacity by 2030; strategy tied to Baltic energy transition infrastructure	2 - Net zero by 2050; 1.5-degree Celsius portfolio alignment; sustainable bond issuance; strategy narrative present but financial linkages not fully quantified	2 - Net zero by 2050; euro 100 bn SRI target; sector decarbonisation targets for 2030 set but implementation pathway less detailed than energy peers	1 - General sustainability commitments stated; no explicit climate scenario analysis; strategy not connected to specific financial or operational outcomes
Risk Management (max 3)	3 - Physical and transition risks identified and quantified; integrated into enterprise risk management and business plan stress tests	3 - SSP2-4.5 scenario used for physical risk; transition risk assessed across short, medium and very long-term horizons (to 2100)	2 - Physical and transition risk categories identified; risks linked to strategy; scenario-based stress testing referenced but limited quantification of financial impacts	2 - Climate risk integrated into credit risk and portfolio management; decarbonisation pathway targets set per sector; scenario-based methodology described at a general level	2 - Climate risk embedded in enterprise risk framework via RBSCC; portfolio alignment targets for 2030 defined; financed emissions tracked using PCAF methodology	1 - Climate risk acknowledged; ICAAP process includes transition risk scenario; physical risk assessed via supervisory guidelines; limited quantification of financial exposure
Metrics and Targets (max 3)	3 - Total GHG ~70 MtCO2eq (down 26% YoY, SBTi certified); Scope 1 intensity target for 2026; net zero 2040 with interim milestones; renewable generation >130 TWh	3 - Emissions intensity target <10 gCO2/kWh by 2030; Scopes 1and2 neutrality by 2030; net zero all scopes by 2040; 65% absolute reduction vs 2020 by 2030	3 - Scope 1: 0.48 Mt, Scope 2: 0.12 Mt, Scope 3: 3.45 Mt; carbon intensity 199 gCO2eq/kWh (−18.4% YoY); net zero target 2040-2050; KPMG assured	2 - Financed emission intensity targets by sector and year; shipping portfolio halved by 2030 vs 2022; 36% of arranged bonds sustainable; Scope 1 and 2 disclosed	2 - Financed emissions tracked via PCAF; oil and gas portfolio target 16.98 MtCO2e by 2030; power sector: 0.11 tCO2e/MWh by 2030; Scope 1 and 2 disclosed	1 - Operational Scope 1and2 emissions disclosed (noted as not significant due to digital model); financed emissions reported from 2023; ESG MYP 2024-2026 targets defined

By examining the table, evidence shows several patterns across the various dimensions that can assist with interpreting the scores, including:

1. The strongest links among the companies' governance disclosures can be found through how they describe their board level committees with regulatory oversight and by describing how they link executive compensation with climate performance. Because of the Task Force on Climate-Related Financial Disclosures (TCFD) and International Financial Reporting Standards (IFRS) S2 frameworks, governance disclosures are relatively similarly structured. The only exception to this rule is FinecoBank, which received a score of 1 on a scale of 1 to 3 for their governance disclosure due to lack of specificity (rather than lack of structure) regarding the specific actions of the board of directors.
2. The degree to which companies embed scenario analyses as part of their overall strategy varies substantially. For instance, Iberdrola has the most robust description of the methodological approach they used to determine appropriate scenarios for evaluating physical climate risks based upon several national and international climate assessments. Similarly, Enel references specific the International Energy Agency (IEA) scenarios for physical climate impacts, however, both Swedbank and Santander referenced the use of scenario based assessments as part of their business strategy but did not disclose any quantitative assumptions relative to those assessments or how financial statements were stress tested based upon the results from the assessments. In terms of individual approaches, FinecoBank presented the most basic approach to scenarios defined by their internal capital adequacy plan (ICAAP).
3. The completeness of emissions data is systematically different between sectors, with all three energy companies providing full Scope 1, 2 and 3 data along with year-on-year comparisons and providing at least one case of external assurance (Ignitis). For the banks, however, there has been only partial disclosure of financed emissions, which represent the largest source of Climate-Related risk for banks, reflecting both data limitations and decisions made by those banks on how best to define and measure their portfolios' emissions.

The evidence from across sectors presented in this section indicates that quality of disclosure can be most consistently differentiated in terms of disclosure level and metrics completeness through the presence of a strategy integration. The stability of governance as a baseline across sectors also demonstrated these same patterns. The theoretical framework for these findings developed in chapter 2 will be further evaluated against the three primary research concepts in the next Section.

4.10. Assessment Against the Three Core Research Concepts

In this section, we will examine both the quality of research outcomes in energy companies and banks and compare those samples. All three analytical lenses used to assess both energy company and bank research outcomes have been established in Chapter 3 and are summarized in Table 17.

Table 17. Empirical Findings Mapped to the Three Core Research Concepts

Concept	Definition (per Ch. 3)	Evidence from Energy Sector	Evidence from Banking Sector
Quality	Degree to which disclosure is clear, specific and decision useful (Di Chiacchio et al., 2024)	High: all three energy companies provide quantified, time bound, SBTi certified targets; financial performance directly linked to climate metrics	Variable: Swedbank and Santander provide structured targets and PCAF aligned financed emissions; FinecoBank's disclosures lack specificity and quantification

Comparability	Whether similar criteria are applied consistently across companies (Di Chiacchio et al., 2024)	Moderate to High: shared use of SBTi, GHG Protocol and Paris aligned scenarios enables cross company comparison within the sector	Low to Moderate: differing approaches to financed emissions (PCAF vs. internal models), varying Scope 3 boundaries and inconsistent scenario definitions limit comparability
Standardisation	Influence of structured reporting frameworks on how climate information is organised (Yoon et al., 2025)	Strong: TCFD, IFRS S2, CSRD and SBTi frameworks visibly shape the structure and content of all three reports	Partial: governance and risk management sections follow TCFD/IFRS S2 structure; strategy and metrics sections show greater variation in framework application

Energy companies perform well against the criteria for clear, specific and decision useful Climate-Related disclosures, including evidence-based linkages between Climate-Related risk and opportunities and financial projections, investment decision making and asset governance methodologies. These linkages provide the information that investors and other stakeholders need to make the necessary decisions and act, whereas most of the banks reviewed have been less successful in providing evidence for this evidence-based linkage. Two banks from our sample that were examined exhibit a high level of both governance and measurement depth. However, most of their strategy and risk management relies on framework commitments, rather than any form of financially quantifiable impact. FinecoBank's disclosures demonstrate that there are measurable impacts, although it does not provide the specificity or breadth of disclosures required to provide investors and other stakeholders with useful decision information across all The Task Force on Climate-Related Financial Disclosures (TCFD) disclosure dimensions.

The energy companies share a greater degree of comparability since they typically utilise comparable frameworks, namely Science Based Targets initiative (SBTi), the Greenhouse gases (GHG) Protocol and the Paris aligned scenario analysis to identify targets and understand performance. Shared standards simplify the measurement of targets and performance across company lines. However, it is prudent to exercise judgement in doing so. Because those standards are not clearly defined for banking institutions there are additional complications. For instance, while Swedbank and Santander both report financed emissions using the PCAF methodology, the differences in their portfolios (including the sectors they invest in) and the ways they calculate those investments make it difficult to fairly compare the two banks. Adding to this challenge is the fact that FinecoBank has a reporting process that is still changing, adding another level of inconsistency between FinecoBank, Swedbank and Santander.

Like TCFD, International Financial Reporting Standards (IFRS) S2 and The Corporate Sustainability Reporting Directive (CSRD) frameworks being aligned across each of the four dimensions, The Energy sector is better standardised across these three regulatory bodies.
About the banks, the alignment is more inconsistent. The governance disclosures for banks tend to align well with the frameworks, while there is greater variability with the strategy and metrics used. This suggests that the frameworks provide a common framework for reporting; however, the frameworks do not fully dictate how companies should report in practice. Prior work has also identified this issue that companies continue to have discretion in determining how they report in practice (Du Toit, 2024; Yoon et al., 2025).

There is substantial evidence that the three underlying principles of quality, comparability and standardisation show that, while structured reporting frameworks, influence trends in disclosure practices with measurable but inconsistent results. There is strong alignment with frameworks and

high level of intrinsic motivation among energy corporations to disclose. Conversely, the banking sector demonstrates that simply adopting a framework alone is not sufficient for the provision of consistent high quality climate reporting.

4.11. Discussion of Findings

Many European Companies have a similar format when they report Climate-Related information. These findings will be discussed according to the five theoretical propositions that were presented in Section 2.7 and in Appendix 6 where each concept is matched to the theoretical foundation as well as an overall evaluation of how well the empirical data supports each of the five theoretical propositions. Proposition 3 (Appendix 6, P3) asserts that the quality of disclosure is positively influenced by the implementation of IFRS Standards 1 and 2. Therefore, the following analysis represents the mapping of empirical evidence to the dimensions of quality defined by Section 2.4 which will provide the basis for evaluating P3 in each of the four dimensions of governance, strategy, risk management and metrics.

While analyzing each individual proposition, it is first useful to look at how the empirical data relates to the multidimensional definition of disclosure quality outlined earlier in Section 2.4. The previous section defined completeness, consistency, comparability, specificity, relevance and decision usefulness as key elements of high-quality disclosures regarding climate change. The empirical data presented in Chapter 4 has a similar relationship with those core elements. Disclosures of Governance have the highest levels of completeness relative to other types of disclosures in that all but one Company provided the minimum required number of structural elements relating to Governance. Energy Sector Companies tend to exhibit the greatest degree of specificity compared to other sectors since they disclose named positions, quantified targets and the existence of verifiable baselines. Conversely, banks generally disclose their strategies and metrics concerning climate change in the most generic way. Similarly, the energy sector's companies are much further along in demonstrating how their commitment to address climate changes is related to financial projections than banks are, thus supporting the definitions outlined in subsections 2.4.3 through 2.4.4. Additionally, comparative disclosures are more similar among Companies in the energy sector because they use the same standards, whereas companies in the Bank sector tend to provide more completed disclosures because there are no industry standards around disclosing financed emissions. The inability to assess consistency directly is due to it being a single year’s study. However, the fact that an identical scoring instrument was used across all companies will provide some degree of proxy to evaluate consistency between companies (as noted in Section 3.5). According to this evidence, all the empirical data supports the existence of an internally consistent theoretical framework and that the scoring process was an accurate representation of the quality elements identified in the literature. Proposition 4 (P4, Appendix 6): The depth of climate-related disclosures is impacted by the institutional context and sector-level exposure. The banks outperform the energy companies because the banks have more direct regulatory as well as market pressures to produce climate-related disclosures than do the energy companies. This supports the conclusion drawn in P4 that the institutional context plays a large role in determining the form and the depth of climate-related disclosures.

The sharpest distinctions occurred between Banks and Energy sectors. Energy Firms generally provided more thorough Climate-Related disclosures than Banks. This is not just a result of Energy Companies' superior organization or more commitment to being transparent, but because Climate-Related factors have a major impact on how these firms do business. The introduction of Carbon Pricing, advances in technology and the growth of Renewable Energy change Asset Values, Expected Revenues and Overall Competitiveness. Therefore, there are more readily available Resources to support reporting the impacts of these factors.

Conversely, the Banks are subject to a different set of circumstances and experience Climate-Related Risk largely indirectly through the activities of the companies that they finance. As a result, it is difficult to estimate accurately the impacts of Climate Risks on Banks and, therefore, they cannot provide extensive information in their Climate-Related disclosures. Proposition 1 (Appendix 6, P1) - standardised framework enhances comparability of data. The governance dimension shows increased uniformity when compared to companies, as some of them are required to meet TCFD and IFRS S2 requirements. As compared to the banks, financial institutions have found it difficult to use standardised rules in order to comply with their different strategic and metrics approach. This can be attributed to a lack of availability of standardised data across jurisdictions.

The second point refers to how strong the different types of governance disclosure are compared to each other out of our sample. Governance is the most consistently well developed of the dimensions with five out of six companies scoring a 3 on that dimension. This suggests that there are developed reporting standards in relation to corporate governance that allow existing governance arrangements to be extended to climate accountability relatively easily, for example, through the establishment of a sustainability committee to oversee climate issues, through assigning climate oversight to an existing risk committee and through linking climate metrics to pay. As these are all structural changes, they can be achieved by companies merely disclosing their underlying systems in a consistent manner without having to create new systems or methodologies to collect data.

In contrast to this, developing an integrated climate strategy and quantifying metrics and targets will require more substantial changes to the way businesses are modelled and managed. The difference between quality of governance and quality of strategy is more than just a reporting difference. It reflects the very real challenges that exist for companies trying to access and use Climate-Related data in support of their business decisions. The functions of stated mechanisms serve as separate channels for minimizing the imposition of information asymmetries between energy-related entities and outside stakeholders. Therefore, Proposition 2 is supported (see Appendix 6) through use of SBTi Certification as well as KPMG Assurances in validating the quantitative component of their commitment to climate action which significantly reduces the information asymmetry between management and investors. In contrast with banks' nearly absent use of PCAF leaves information asymmetries relatively unchecked thus, Proposition 2 is only partially supported (see Appendix 6).

Another way in which external certification and assurance can affect the quality of disclosures is by third party validation of the reports produced by companies. As can be seen from the examples listed above for Ignitis (using KPMG) and Iberdrola (using Science Based targets initiative (SBTi) Certification), there is evidence that the use of these third-party validations is resulting in greater credibility and depth in the amount of information companies report regarding their Climate-Related disclosure.

A very different pattern exists among the banks in this study. Some banks are using the Partnership for Carbon Accounting Financials (PCAF) methodology to validate financed emissions and in some cases, this has been done partially while there are still many banks that have not yet applied the PCAF methodology to all financed emissions. This lack of full validation of financed emissions results in varying degrees of assurance regarding the quality of their Climate-Related disclosures. Evidence in support of Proposition 5 (Appendix 6) is found in the difference in scores between FinecoBank and its competitors, 4 for FinecoBank compared to 9 for both Swedbank and Santander, under the same regulatory requirements. This will suggest that there are managerial and behavioural factors that affect the quality of disclosures independently of whether a corporation operates under a unified accounting standard. Variables such as internal report maturity, management commitment, and the willingness to commit funds to establish data infrastructure are what ultimately drive the quality of disclosures rather than any regulatory framework.

FinecoBank is a bank that demonstrates this difference quite well. Even though FinecoBank is required to comply with the same The Corporate Sustainability Reporting Directive (CSRD) and International Financial Reporting Standards (IFRS) S2 requirements as other banks, they are currently disclosing less developed amounts of Climate-Related disclosures compared to other banks. This proves that the regulatory framework alone is not sufficient to ensure high quality Climate-Related disclosures for companies.

At the same time, FinecoBank shows awareness of these limitations, as they have outlined their plans to enhance the extent of Climate-Related analysis, including recognizing improved reporting of financed emissions on a going forward basis from 2024.

The results of this research not only confirm the results from Auzepy et al. (2023) and Conic et al. (2023) but expand on them. This study indicates that although there are some structured disclosures established by voluntary frameworks, there continues to be considerable heterogeneity in Climate-Related disclosures. The key difference between this study and previous research is that many authors focus on either the voluntary nature of disclosures or firm size as potential reasons for disclosure variation, but this study shows that sector-specific risk exposure is the primary reason for high quality disclosures. Specifically, while energy companies tend to produce higher quality disclosures because of how climate issues are embedded into their overall financial performance, the existing literature does not consider this distinction in its cross-sector examinations of disclosure quality as much have focused on specific industries or TCFD endorsement rates without assessing the quality of Climate-Related disclosures. Finally, this study provides additional insight into the governance and strategy related concerns raised through the research findings. Research has previously identified an advancement in the quality of governance disclosures after the implementation of TCFD (Gebhardt et al., 2024; Moses et al., 2025). However, there has not been a detailed and systematic analysis or comparison of the extent of compliance with governance related models of disclosure and the extent of actual strategy and metrics disclosures that have been made within the same reporting structure. The data presented supports the proposition that there may be continuing gaps between the financial integration of governance convergence with regards to the establishment of quantitative targets and the existing regulatory frameworks to provide more specificity regarding strategy and metrics rather than structural requirements alone. Lastly, the observation that FinecoBank which is exposed to the same regulatory environment as all other banks. Reports at a substantially lower standard than its peer group is evaluated in the context of the decoupling hypothesis (Du Toit, 2024) and provides evidence at a company level after the implementation of IFRS S2, where little previous literature exists.

Conclusions

This research project explored four objectives: (1) to identify the challenges associated with the disclosure of Climate-Related information in companies' financial statements; (2) theoretically ground the concept and assessment of Climate-Related information disclosure quality; (3) develop a research methodology for assessing the quality of Climate-Related disclosures in corporate financial statements in accordance with IFRS S1 and IFRS S2 and (4) conduct an empirical study of the quality of Climate-Related disclosures in the companies' reporting in the energy and banking sectors, taking into account the requirements of IFRS S1 and S2. The conclusions presented below address these four areas sequentially.

The first objective was to identify the disclosure of Climate-Related information that poses as challenges in comapnies' financial statements. The empirical findings validated the identified framework barriers: fragmentation amongst regulatory structures, disparity between number of disclosures and amount of quality disclosures and insufficient ability to link climate change risk with financially relevant information. Additionally, while there is baseline requirements for disclosures set forth in formal accounting standards, simply complying with those standards will not necessarily guarantee a company will provide high quality disclosures. The quality of a company's disclosures will be determined by the way the respective accounting standards will be applied to its disclosures. This was demonstrated by Finecobank, whose climate change disclosures are the least developed of all the banks in peer group, despite fact that Finecobank is subject to the same regulatory standard under IFRS S1 as the other banks in the peer group. This supports the notion of disconnection between the regulatory framework identified in Chapter 2 that disconnection being the lack of guarantee that formal adoption will subsequently lead to a substantive implementation of the standardized disclosures.

The second objective was to develop a conceptual framework grounded in information asymmetry, stakeholder theory, legitimacy theory, and institutional theory to create three core analytical themes of quality, comparability and standardization. There appear to be common trends related to these three themes between sectors: energy companies appear to be producing higher quality disclosures than banks while the banking sector appears to be producing lower-quality disclosures. The frameworks developed by the energy sector are expected to provide the same level of comparability among energy companies as banking provides among itself, however, the methodologies used to assess financial performance vary between banks resulting in greater differences in the level of comparability between banks. Additionally, the energy sector utilizes a greater number of frameworks compared to the banking sector, resulting in a broader range of reporting interpretations among banking companies than energy companies.

The third objective was acieved via the construction of a four-dimensional content analysis and structured scoring system that utilizes the TCFD and IFRS S1 and S2 to evaluate governance, strategy, risk management and metrics and targets. The fourth objective was analysed using this same methodology in an empirical study showing that climate-related disclosures in the banking sector were qualitatively different from those in the energy sector. Although the average score of the three energy companies in the analysis (Enel, Iberdrola and Ignitis) was 11.7/12, the quality and structure of their climate-related disclosures are well defined and include quantitative data to demonstrate their conclusions. Furthermore, they have third-party assurances for many disclosures, and some contain explicit links to long-term financial planning.

While banks in the sample had an average score of 7.3 in relation to climate risk assessment compared to the energy sector, which had higher averages than other sectors, the primary explanation for these differences seems to be the different ways each industry experiences climate-related risks. The direct impacts of both transition and physical climate risk on energy companies have given them incentives

to disclose and access higher quality climate-related data. In contrast, banks are affected indirectly through their lending and investing portfolios, making it more difficult to quantify and assess the effects of climate risk.

Governance is the only dimension within both sectors (TCFD) and (IFRS S2), which have developed to the highest degree. It is clear from the five companies that have achieved this maximum level of maturity that (TCFD) and (IFRS S2) both have relatively mature disclosures regarding the governance structure of board oversight, committees, and connections between executive pay and climate-related issues. Most companies can implement processes to govern the assets that are subject to climate-related issues using these governance structures in accordance with geographic locations.

The substantial difference between the two sectors is the degree of differences with respect to the strategies, metrics and targets within each sector when compared to any other dimension. The best performing sector is the energy sector as evidenced by the overall industry scores. This is a strong indication of a stronger level of alignment between the climate commitments of energy companies and their financial plans including the capital and assets. Some banks have made some progress in this area, particularly in building out their governance structures and, in some cases, adopting third-party validation tools such as PCAF to verify financed emissions, but the energy sector has achieved a greater overall alignment through asset-based reporting. Further evidence is provided by FinecoBank, who is at the lowest level of reporting across all four dimensions relative to the remaining banks and is even further behind than the other banks in terms of progress toward climate-related asset reporting.

Moreover, external assurance and certifications did help to some degree in ensuring the quality of disclosures, for example KPMG's assurance of Ignitis' sustainability indicators and Enel's and Iberdrola's verification of their climate targets by the Science Based Targets initiative provide higher levels of credibility than data self-reported by companies. Furthermore, the PCAF methodology is being implemented at both Swedbank and Santander. This adds to the overall transparency in terms of climate risk but currently only partially incorporates all measurements related to climate risk associated with the company's portfolio.

Many limitations are associated with this paper. First, the sample size examined is small and therefore does not represent the entire European market and therefore we must interpret these results very carefully. Second, all the data used in this paper was obtained from publicly available data via regulatory requirements so therefore will not include aspects such as internal processes or other non publicly available information associated with the companies reviewed. Third, the analysis used in this project utilized a structured scoring process therefore contained some amount of interpretation during the scoring process. Finally, this report is a one-time snapshot of the data at one moment in time and may provide opportunities for future exploration of how the disclosure processes develop over time, especially regarding IFRS S2.

To summarize the contents of this document, there are some recommendations that follow naturally from our conclusions. The recommendation for the banks is firstly to form stronger connections between climate-related governance structures and the measurable financial impact. Although current climate-related governance frameworks are already established, work still needs to be done to incorporate environmental aspects into each of the following entities: credit risk, portfolio value and long-term performance. The extension of methodologies like PCAF could support this effort.

Secondly, through the analysis completed within this report, it appears that there is a great importance placed on supporting environments for climate-related functional and governance-related processes as well as supporting new regulatory requirements. While governance-related disclosures currently show a small alignment, additional guidance regarding climate-related disclosures would aid in

reducing variability between the reporting of strategy and the metrics associated with that strategy is especially true in the financial institutions.

Future research could continue to explore these findings through a larger sample and longitudinally by looking at overall improvements in the quality of climate-related disclosures over time. Additionally, future investigation into the reasons why reporting variability occurs would assist in understanding the overall impact and should therefore be included in future research initiatives at all levels within the company, industry and institution

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Appendices

Appendix 1. Disclosure Quality Scoring Rubric (prepared by the author)

Disclosure Dimension	Score 0 - Absent	Score 1 - Minimal	Score 2 - Moderate	Score 3 - Comprehensive
Governance	No mention of board or management responsibility for Climate-Related matters.	A brief or generic reference to climate oversight with no named roles or processes.	Board and management roles are identified, but the description of oversight processes lacks specific details.	Clearly defined roles, oversight mechanisms and integration of climate considerations into decision making are described in detail.
Strategy	No information on how climate risks or opportunities affect business strategy.	A general statement that climate change is considered in strategy, without specific detail.	Some explanation of how Climate-Related risks and opportunities influence investment decisions or business model planning, with reference to at least one climate scenario.	A detailed account of how physical and transition risks shape long term strategy and business model adaptation, supported by multiple climate scenarios (1.5'C, 2'C pathways) with quantified assumptions and documented business implications.
Risk Management	No description of how climate risks are identified, assessed, or managed.	A brief or vague reference to climate risk management with no described process.	The approach to identifying and assessing climate risks is described, with some mention of the tools or methods used, though without full methodological detail.	A structured risk management process is described with clear methodology, integration into enterprise-wide risk management and explanation of how climate risks are prioritised and monitored.
Metrics and Targets	No quantitative targets or emissions data are disclosed.	Some Climate-Related metrics are mentioned (partial emissions data), but without targets, baselines, or context for measurement.	Quantified targets are set for at least some dimensions, Scope 1 and Scope 2 emissions are disclosed, progress is partially tracked.	Comprehensive metrics and targets are set across all material climate dimensions: full Scope 1, 2 and 3 emissions are disclosed with methodology notes and year on year comparisons, progress against targets is documented with timelines and accountability mechanisms.

Note: Each business has a maximum score of twelve out of an overall total of twelve provided by the four established assessment criteria or characteristics, of which each can be assigned scores of zero to three. All four of those criteria must have been unequivocally satisfied by the company prior to being assigned any one of the higher scores. All borderline cases will be dealt with conservatively.

Appendix 2. Research Design Summary (prepared by the author)

Component	Description
Research aim	The aim of this empirical research is to determine the quality of Climate-Related disclosures in corporate reports of companies in the energy and bank sectors and evaluate the extent to which the use of structured reporting frameworks, like IFRS S1 and S2, has an impact on the level of quality achieved.
Research problem	Despite the adoption of IFRS S1 and IFRS S2, the quality of Climate-Related disclosures varies significantly across sectors, with governance more consistently developed than strategy and metrics, indicating that framework adoption alone does not guarantee comparability or decision-useful reporting.
Research approach	The research is qualitative and deductive: it uses a theoretical framework to measure how good quality corporate reports are compared against each other by processing observation-based evidence obtained in Chapter 4 with theories examined in Chapter 2.
Research method	A content analysis has been conducted on corporate reports, using an established scoring scheme applied to four distinct dimensions to evaluate and compare the quality of disclosures.
Analytical framework	The structured content analysis of corporate reports will consist of qualitative research findings and an associated structured scoring system that measures corporate reporting of Climate-Related disclosures on several dimensions: (1) Governance, (2) Strategy, (3) Risk management and (4) Metrics and targets
Data sources	The research will be based on publicly available corporate reports published in the year 2024 (annual accounts, sustainability reports, integrated reports).
Sample	Six publicly listed European companies operating in climate sensitive sectors: energy (Enel, Iberdrola, Ignitis) and banking (Swedbank, Santander, FinecoBank).
Unit of analysis	Climate-Related disclosure sections within corporate 2024 reports.
Measurement approach	Structured scoring of disclosure quality using predefined evaluation criteria across four dimensions.
Evaluation scale	Each disclosure dimension is scored on a 0–3 scale: 0 = absent, 1 = minimal, 2 = moderate, 3 = comprehensive.
Data analysis technique	The scores for each of the four dimensions will be aggregated and averaged across the participating companies and industry types to identify disclosure quality patterns.
Expected outcome	A comprehensive analysis of the relationship between structured reporting frameworks and Climate-Related disclosure quality will provide insight into whether structured reporting frameworks have improved corporate Climate-Related reporting practices.

Appendix 3. Research Sample and Report Sources (prepared by the author)

Company	Sector	Country	Reports Analysed (2024)
Enel S.p.A.	Energy	Italy	Integrated Annual Report 2024
Iberdrola S.A.	Energy	Spain	Annual Report 2024, Sustainability Report 2024
Ignitis Group	Energy	Lithuania	Integrated Annual Report 2024
Swedbank AB	Banking	Sweden	Annual and Sustainability Report 2024
Banco Santander S.A.	Banking	Spain	Consolidated Annual Report 2024
FinecoBank S.p.A.	Banking	Italy	Annual Report 2024, Consolidated Sustainability Reporting 2024

Note: All reports were sourced from official company websites and investor relations pages. The reporting period for all companies is the financial year 2024.

Appendix 4. Disclosure Quality Scores by Company and Dimension (prepared by the author)

Company	Governance	Strategy	Risk Mgmt.	Metrics and Targets	Total (/12)	Sector
Enel S.p.A.	3	3	3	3	12	Energy
Iberdrola S.A.	3	3	3	3	12	Energy
Ignitis Group	3	3	2	3	11	Energy
Swedbank AB	3	2	2	2	9	Banking
Banco Santander	3	2	2	2	9	Banking
FinecoBank S.p.A.	1	1	1	1	4	Banking
Energy sector avg.	**3.0**	**3.0**	**2.7**	**3.0**	**11.7**	
Banking sector avg.	**2.3**	**1.7**	**1.7**	**1.7**	**7.3**	

Note: The colours used to indicate how well each company performs against the colour coded performance classification are as follows: Green = 3 score (comprehensive), Blue = 2 score (moderate), Amber = 1 score (minimal) and Red = 0 score (non-existent). The total amount of shaded areas in each column will reflect the level of overall performance achieved).

Appendix 5. Evidence Summary by Company and Disclosure Dimension (prepared by the author)

Dimension	Enel	Iberdrola	Ignitis	Swedbank	Santander	Fineco
Governance (max 3)	3 - Board-level oversight via Control Risk and Corporate Governance and Sustainability Committees; climate linked to remuneration	3 - Dedicated Climate Action governance; SBTi certified roadmap overseen at board level with remuneration linkage	3 - Supervisory Board Risk Management and Sustainability Committee; climate targets embedded in executive KPIs	3 - Board Remuneration and Sustainability Committee with documented oversight of 1.5-degree Celsius alignment	3 - Responsible Banking, Sustainability and Cultural Committee oversees climate strategy and double materiality	1 - Sustainability Committee and Board oversight exist but climate specific roles and processes are described only at a high level
Strategy (max 3)	3 - Net zero by 2040; coal exit by 2027; EBITDA growth to euro 24.1-24.5 bn linked to renewable investment plan	3 - Net zero by 2040 (SBTi); Scopes 1and2 neutrality by 2030; 40% emissions cut vs 2020 already achieved; specific intensity targets per year	3 - Net zero 2040-2050; 4-5 GW green capacity by 2030; strategy tied to Baltic energy transition infrastructure	2 - Net zero by 2050; 1.5-degree Celsius portfolio alignment; sustainable bond issuance; strategy narrative present but financial linkages not fully quantified	2 - Net zero by 2050; euro 100 bn SRI target; sector decarbonisation targets for 2030 set but implementation pathway less detailed than energy peers	1 - General sustainability commitments stated; no explicit climate scenario analysis; strategy not connected to specific financial or operational outcomes
Risk Management (max 3)	3 - Physical and transition risks identified and quantified; integrated into enterprise risk management and business plan stress tests	3 - SSP2-4.5 scenario used for physical risk; transition risk assessed across short, medium and very long-term horizons (to 2100)	2 - Physical and transition risk categories identified; risks linked to strategy; scenario-based stress testing referenced but limited quantification of financial impacts	2 - Climate risk integrated into credit risk and portfolio management; decarbonisation pathway targets set per sector; scenario-based methodology described at a general level	2 - Climate risk embedded in enterprise risk framework via RBSCC; portfolio alignment targets for 2030 defined; financed emissions tracked using PCAF methodology	1 - Climate risk acknowledged; ICAAP process includes transition risk scenario; physical risk assessed via supervisory guidelines; limited quantification of financial exposure
Metrics and Targets (max 3)	3 - Total GHG ~70 MtCO2eq (down 26% YoY, SBTi certified); Scope 1 intensity target for 2026; net	3 - Emissions intensity target <10 gCO2/kWh by 2030; Scopes 1and2 neutrality by 2030; net	3 - Scope 1: 0.48 Mt, Scope 2: 0.12 Mt, Scope 3: 3.45 Mt; carbon intensity 199 gCO2eq/kWh (−18.4%	2 - Financed emission intensity targets by sector and year; shipping portfolio halved by 2030 vs 2022; 36% of arranged	2 - Financed emissions tracked via PCAF; oil and gas portfolio target 16.98 MtCO2e by 2030; power sector: 0.11 tCO2e/MWh	1 - Operational Scope 1and2 emissions disclosed (noted as not significant due to digital model); financed

	zero 2040 with interim milestones; renewable generation >130 TWh	zero all scopes by 2040; 65% absolute reduction vs 2020 by 2030	YoY); net zero target 2040-2050; KPMG assured	bonds sustainable; Scope 1 and 2 disclosed	by 2030; Scope 1 and 2 disclosed	emissions reported from 2023; ESG MYP 2024-2026 targets defined

Note: The information in the table below summarises the relevant evidence contained within the Corporate Reports supplied by each company for the 2024 reporting period that led to the assignment of a score for all companies within the sample. Energy sector companies scored green based on their overall performance; The Banking sector companies scored amber based upon their overall performance; FinecoBank scored red based on the lowest overall performance in both samples.

Appendix 6. Research Propositions and Assessment Against Empirical Findings (prepared by the author

Appendix 6 presents a consolidated summary of the five theoretical propositions developed in Section 2.7, identifying the theoretical basis of each proposition and assessing it against the empirical evidence gathered in Chapter 4. The table demonstrates how the findings from the content analysis and scoring exercise relate back to the information asymmetry, stakeholder, legitimacy, and institutional theories that underpin the study's conceptual framework.

Prop.	Statement	Theoretical Basis	Assessment Against Empirical Findings
P1	The use of standardised sustainability reporting frameworks enhances the comparability of climate-related disclosures across companies and sectors.	Institutional theory and information asymmetry theory	Supported. Energy sector comparability rated moderate to high due to shared use of SBTi, GHG Protocol and Paris aligned scenarios. Banking sector comparability rated low to moderate, reflecting inconsistent methodology and scope.
P2	Structured disclosure requirements reduce the information asymmetry between company managers and external stakeholders regarding Climate-Related risks and opportunities.	Information asymmetry theory	Partially supported. Energy companies provide financially integrated disclosures that reduce information asymmetry significantly. Banks provide structured governance disclosures, but strategy and risk sections remain narrative-heavy, limiting the reduction of asymmetry.
P3	The introduction of IFRS S1 and IFRS S2 has a positive effect on the quality of climate-related disclosures in corporate reporting.	All four theoretical perspectives	Partially supported. Governance disclosures across the sample show strong alignment with framework requirements. Strategy and metrics dimensions show greater variation, indicating that framework existence does not guarantee substantive quality.
P4	The institutional context including regulatory environment and industry level expectations and exerts a substantial influence on the form and depth of Climate-Related disclosures.	Institutional theory and stakeholder theory	Supported. Energy companies operate under stronger direct regulatory and market pressure and produce significantly higher quality disclosures. FinecoBank, subject to the same CSRD and IFRS S2 requirements as larger peers, shows that regulatory pressure alone is insufficient without internal capacity.
P5	Managerial and behavioural factors influence the quality and specificity of climate disclosure independently of whether companies report under a universal standard.	Legitimacy theory and stakeholder theory	Supported. The variation within the banking sector - between Swedbank and Santander (score 9) and FinecoBank (score 4) - under identical regulatory requirements indicates that internal commitment and reporting maturity play a decisive role beyond the framework itself.

Note: The propositions were created in the 2.8 section of the theoretical framework; however, they were not tested through any statistical methods. The assessment made has been determined by weighing the evidence gathered from both the qualitative content analysis and the scored analysis conducted within the 4th chapter.