



Navigating Climate-related Risks in Investment Management of Norwegian Equity Funds

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Abstract

This thesis explores the significance and integration of climate-related risks in the investment management of Norwegian equity funds. As global temperatures continue to reach unprecedented levels, dynamic conditions characterized by high complexity and uncertainty pose significant challenges to long-term investment strategies. Extending the nascent literature on climate-related risk in finance, 12 semi-structured interviews with asset management professionals were conducted, investigating their perceptions of relevant climate-related risk factors in the Norwegian market as well as the approaches adopted to assess and manage these.

The findings indicate that certain climate-related risks are significant, with a predominant emphasis on transition risks over physical risks. Climate regulations, market preferences, and reputational concerns emerge as key risk drivers, influenced by stakeholder interests. The temporal horizon within which climate-related risks are anticipated to affect valuations highlights vulnerabilities in climate incentives, prompting conventional fund managers to favor investments in brown sectors like oil and gas over green alternatives. However, identifying firms optimally positioned to navigate evolving conditions within their industries is linked to enhanced investment potential. We observe considerable variability in methods employed to assess and manage climate-related risks, extending beyond traditional investment approaches and ESG assessments. Challenges involve data access, reliability, and comparability, highlighting the need for improved industry standards and reporting methodologies. Tools for assessing valuation impacts in different climate scenarios are increasingly adopted, although active company engagement remains invaluable for informed investment decisions.

Keywords: Sustainable Finance, Climate-related Risk, Transition Risk, Physical Risk, Green Transition, TCFD, Climate Regulation, Green Investments, Stakeholder Impact, Externalities, Risk Management, Fund Management, ESG

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Resumo

Esta tese explora a importância e a integração dos riscos climáticos na gestão de investimentos de fundos de ações noruegueses. Com as temperaturas globais atingindo níveis sem precedentes, condições dinâmicas e incertas representam desafios significativos para estratégias de investimento a longo prazo. Ampliando a literatura emergente sobre risco climático em finanças, foram realizadas 12 entrevistas semiestruturadas com profissionais de gestão de ativos, investigando suas percepções sobre fatores de risco climático no mercado norueguês e as abordagens adotadas para avaliá-los e geri-los.

Os resultados indicam que certos riscos climáticos são significativos, com ênfase nos riscos de transição em detrimento dos riscos físicos. Regulamentações climáticas, preferências de mercado e preocupações reputacionais emergem como principais impulsionadores de risco, influenciados pelos interesses das partes interessadas. O horizonte temporal no qual se espera que os riscos climáticos afetem as avaliações destaca vulnerabilidades nos incentivos climáticos, levando gestores de fundos convencionais a favorecer investimentos em setores marrons, como petróleo e gás, em vez de alternativas verdes. No entanto, identificar empresas bem posicionadas para navegar em condições evolutivas dentro de suas indústrias está associado a um potencial de investimento aprimorado. Observa-se variabilidade nos métodos utilizados para avaliar e gerir os riscos climáticos, indo além das abordagens tradicionais de investimento e avaliações ESG. Os desafios envolvem acesso, confiabilidade e comparabilidade de dados, destacando a necessidade de melhores padrões industriais e metodologias de relatórios. Ferramentas para avaliar impactos em diferentes cenários climáticos estão sendo adotadas, embora o engajamento ativo com empresas permaneça inestimável para decisões de investimento informadas.

Palavras-chave: Finanças Sustentáveis, Risco Climático, Risco de Transição, Risco Físico, Transição Verde, TCFD, Regulamentação Climática, Investimentos Verdes, Impacto das Partes Interessadas, Externalidades, Gestão de Riscos, Gestão de Fundos, ESG

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This thesis marks the culmination of my dual degree program at Católica Lisbon School of Business & Economics and ESCP Business School. Inspired by my internship experiences as an ESG analyst in asset management enriched by my specialization in Sustainable Corporate Finance at ESCP, this research delves into the perceptions of climate-related risks and their manifestation in investment management, offering critical insights into the current incentives that drive capital flows towards greener solutions, a subject I am deeply passionate about.

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It is my hope that this work contributes to the broader discourse on climate topics in sustainable finance, encouraging continued research in this vital field.

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List of Abbreviations

Abbreviation	Description
AUM	Assets Under Management
CSR	Corporate Social Responsibility
CDP	Carbon Disclosure Project
CSRD	Corporate Sustainability Reporting Directive
ESG	Environment, Social, Governance
GHG	Greenhouse gases
GRI	Global Reporting Initiative
IIGCC	Institutional Investors Group on Climate Change
IPCC	Intergovernmental Panel on Climate Change
NBIM	Norges Bank Investment Management
NZAM	Net Zero Asset Manager Initiative
OSEBX	Oslo Stock Exchange Benchmark Index
SFDR	Sustainable Finance Disclosure Regulation
TCFD	Task Force on Climate-Related Financial Disclosures
UCITS	Undertakings for Collective Investment in Transferable Securities
UNFCCC	United Nations Framework Convention on Climate Change
UN PRI	United Nations Principles of Responsible Investments
US EPA	United States Environmental Protection Agency

1. Introduction

1.1 Academic and Managerial Relevance

Investment professionals must comprehend climate-related risks, as these pose material¹ threats to financial assets (Brayshaw & Symes, 2023). The prominence of these risks in finance has surged, driven by the urgent challenge of global warming and stringent climate policies aimed at reducing global carbon emissions (Jung et al., 2021). The Task Force on Climate-Related Financial Disclosures (TCFD) taxonomy classifies climate-related risks into two categories: physical risks, which refer to the direct effects of climate change, and transition risks, which arise from human responses to climate change (TCFD, 2017).

For informed investment decisions, the precise identification, management, and pricing of risks are essential (Norwegian Climate Foundation, 2018). Recent research suggests that markets are beginning to price transition risks, with carbon-intensive firms underperforming during periods of heightened climate awareness, such as extreme heat events (Choi et al., 2020). This trend is expected to intensify as such events become more frequent (European Environment Agency, 2024), favoring the valuations of companies that adapt their competitive strategies to the evolving environmental landscape, such as by reducing energy consumption through more efficient sourcing (Giese et al., 2022; Schindehutte & Morris, 2001).

Despite a growing consensus that investors should consider climate-related risks, several factors complicate their integration into investment management. These factors include the delayed impacts of emissions, potential mispricing of polluters, uncertainty (Government, n.d.), and the complex, nonlinear nature of climate-related risks (Giese et al., 2022). Nevertheless, neglecting these factors can lead to severe consequences (Ranger et al., 2022). As Norges Bank Investment Management's (NBIM) Risk Director Dag Huse notes, despite the limited understanding, climate-related risks may pose the most significant threats to long-term investments (Norwegian Climate Foundation, 2018).

Although climate-related risk management in finance is still in its nascent stages, several indicators suggest that approaches to mitigate these risks are increasingly being adopted. For instance, NBIM actively addresses climate-related risks by supporting TCFD

¹ In this paper, material risks or threats are defined according to the SASB's definition of financial materiality. This encompasses financial impacts that can affect investment decisions based on a firm's financial performance (SASB, 2021).

recommendations, while major players such as BlackRock have implemented climate-hedging strategies to protect beneficiaries through investments that are more resilient in the face of a transition (BlackRock, 2023; Engle et al., 2019; Eren et al., 2022). Such approaches have gained popularity as investors shift their attitudes due to more stringent climate regulations and as the tangible impacts of climate-related risks become more apparent (Gsottbauer et al., 2024; Choi et al., 2020).

Nevertheless, the financial sector has faced criticism for underestimating the potential impacts of climate change, particularly through its continued support of high-emission industries (IPCC, 2022; Strauss, 2023). The Institutional Investors Group on Climate Change's (IPCC) 2023 synthesis report highlights that financial flows toward fossil fuels still exceed those directed towards climate adaptation and mitigation. Furthermore, there is limited evidence on how finance professionals perceive and integrate these risks into investment decisions (Gsottbauer et al., 2024), and the development of effective tools for managing climate-related risks remains incomplete (Battison et al., 2021).

Norwegian fund providers constitute an interesting market for studying climate-related risks in investment management due to the country's heavy reliance on fossil fuels (Lysvoll, 2023). Norway also maintains a strong stance on climate change, with high expectations for stringent climate policies (Government, 2018), and the petroleum industry will inevitably face material impacts from an energy transition (Grippa & Mann, 2020).

This study employs semi-structured interviews with sustainability experts and conventional fund managers in Norway to uncover diverse perspectives on the perception, understanding, and integration of climate-related risks in Norwegian equity funds. The findings will provide critical insights into the key risk aspects and incentives that direct capital towards a low-carbon transition, enriching the existing literature on sustainable finance. Managerially, the study will identify tools and approaches used to price and manage these risks in long-term investment strategies, revealing their application and the associated challenges. These insights are essential for understanding how asset managers can more effectively navigate new sources of investment risk in an increasingly dynamic and unpredictable environment driven by rising global temperatures, thereby informing more resilient and adaptive investment practices.

1.2 Research Purpose and Framing of Research Question

Considering the rising material risks for firms provoked by global warming and human responses to climate change affecting firm valuations as well as the uncertainties linked to how asset managers interpret, quantify, assess, and navigate such conditions in investment management, we outline the following Research Question:

Do asset managers' perceptions of climate-related risks impact investment management of Norwegian equity funds, and to what extent are approaches to navigate these integrated?

By studying how conventional fund managers and sustainability professionals perceive the importance of climate-related risks and opportunities in relevance to the long-term financial performance of their assets under management, examining best practices and approaches adopted to quantify and manage such factors, we aim to expand existing literature and offer new insights within this emerging field of research.

1.3 Thesis Structure

This thesis contains six chapters. First, the purpose of the study, the problem statement, and the objective of the paper are introduced. Chapter 2 presents the theory relevant to framing the research question and the subsequent discussion. In Chapter 3, we outline how the research was conducted and the methodology applied in this study. Following the presentation of the findings in Chapter 4, the discussion of these is provided in Chapter 5. Finally, in Chapter 6, we conclude on the findings of the study, comment on its limitations, and provide suggestions for further research.

2. Literature Review

2.1 Climate-related Risks in Finance

In recent years, as the effects of climate change has become more evident, demonstrated by temperatures and climate hazards reaching all-time highs (European Environment Agency, 2024), climate-related risks have gained recognition as an area within financial studies (Jung et al., 2021). Although historically, investment risk² have been perceived as a multidimensional concept (Gooding, 1978), the financial sector used to pay limited attention to the potential impacts from climate change. However, Mark Carney, the former Governor of the Bank of England, underscored a shift in perception through his influential speech, “Breaking the Tragedy of the Horizon” in 2015. In it, he addressed the prevailing short-term focus within financial markets, outlining a taxonomy of climate-related risks that has since been recognized as a standard framework for categorizing financial threats posed by climate change (Carney, 2015).

2.1.1 Climate-related Risks Defined

The Task Force on Climate-related Financial Disclosures³ (TCFD), building on Carney, defined a widely recognized industry classification of climate-related risks and opportunities in 2017. Climate-related risks are separated into two major categories (1) risks posed to firms arising from the transition to a low carbon economy, and (2) risks that relate to the physical impacts of climate change (TCFD, 2017). Thus, these may arise both from the direct impacts posed by changes in the environment, or as a result of human responses to climate change (IPCC, 2021). Moreover, efforts to adapt to and mitigate climate change may produce opportunities for firms, noted as climate-related opportunities (TCFD, 2017).

² A general definition of investment risk is constituted by attributes of risk factors such as the potential for a below target return, the potential for large loss, the feeling of control as well as the perceived level of knowledge associated with an investment (Olsen, 1997).

³ The Task Force on Climate-related Financial Disclosures was appointed by the Financial Sustainability Board in 2015 to advance the mainstream financial disclosures and encourage investor engagement on climate-related risks and opportunities (TCFD, 2017).

Transition Risks

Transition risks may arise from policy actions, from technological innovations or market sentiment changes as a response to climate change (TCFD, 2017). For instance, the myriad of climate policies supporting the goals outlined in the Paris Agreement⁴ as well as market responses generate transition risks (NBIM, n.d.). Transition risks are generally associated with the extent to which a firm is able to manage and adapt to changing conditions resulting from a low carbon transition. In addition, the pace of effective response to such changes may determine the extent to which a firm faces reputational risks (US EPA, 2024).

Physical Risks

Physical risks on the other hand, can be either event driven (acute) or result from longer-term shifts in climate patterns (chronic) (TCFD, 2017). Acute physical risks refer to extreme weather events or climate hazards, such as heatwaves, flooding, or forest fires, which are becoming more frequent every year (European Environment Agency, 2024). Chronic physical risks include sustained higher temperatures, chronic heatwaves, or sea level rise (US EPA, 2024). Despite global efforts to reduce emission levels, 2023 was recorded the warmest year to date. The European Climate Risk Assessment Report from 2024 refer to the significant damage and losses already caused by physical risks, urging for adaptation as the severity of impacts continue to grow (European Environment Agency, 2024).

Climate-related Opportunities

Through adapting their business models to changing climate conditions, firms can achieve opportunities (TCFD, 2017), an intuition first proposed by The Porter Hypothesis suggesting that stricter environmental regulation allow firms to innovate (Porter & van der Linde, 1995). Adaptation involves improving the firm's competitive posture to better align with the external environment through changes in strategic behavior (Schindehutte & Morris, 2001). For instance, through shifting energy usage towards low emission energy sources, improving

⁴ The objective of the Paris Agreement is to bolster global response to the threat of climate change directing finance flows to foster a climate-resilient pathway. This involves keeping global average temperatures well below 2 degrees Celsius above pre-industrial levels as well as pursuing efforts to limit the temperature to exceed 1.5 degrees Celsius (UNFCCC, n.d.).

sourcing efficiency of raw materials, firms can improve their resilience and positioning (US EPA, 2024).

2.1.2 Climate-related Risks Opportunities and Financial Impacts

Figure 1 below provides an overview of the potential financial implications stemming from the various sources of climate-related risks and opportunities. It displays impacts that pertains to firms’ balance sheets through reduced operating cashflows or asset values, as well as how a firm’s income statement may be affected through changes in capital expenditures or revenues (TCFD, 2017). In reality, financial impacts of climate related issues on firms are not always linear, and may be difficult to quantify (BIS, 2021). Nevertheless, nascent research has started to shape about how these risks pose financial threats to firms.

Figure 1: Climate-related Risks, Opportunities and Financial Impacts



Source: TCFD (2017)

The substantial increase in investments in low emission solutions needed to facilitate a transition that supports ambitious climate objectives expose companies in high emitting sectors to financial hurdles (Monasterolo, 2020; Eren et al., 2022). Emission reductions required to reach net zero by 2050, or 2060 at the latest, equals a year-to-year rate in emission reductions witnessed following the COVID-19 pandemic (Bolton et al., 2023). Thus, proactive management of emission levels and alignment with climate policies can lead to positive earnings growth and improved stock valuations (Giese et al., 2021).

Furthermore, firms that produce fossil fuels will face higher operating expenses and deteriorated balance sheets as they face transition risks of stranded assets and reduced collateral

values (Eren et al., 2022). The estimated short term (2030) financial impacts arising merely from the decline in demand for oil and gas, could result in the loss of 10-15 billion NOK (1-1.2 billion EUR) less in revenue annually for a single oil producing company (Aker Solutions, 2023). Moreover, physical climate risks such as floods, storms and heatwaves impact financing choices and are associated positively with earnings volatility and negatively with firm earnings. This implies that insurance cannot fully offset climate-related physical risks (Huang et al. 2018).

Nevertheless, the financial impact of climate-related issues and opportunities vary significantly across companies and sectors (TCFD, 2017). For instance, physical climate-related risks may have adverse financial effects of assets particularly within real estate, utilities and agriculture diminishing viability and valuations (Brayshaw & Symes, 2023). On the other hand, firms within forestry, transportation, and other emission intensive industries, are more exposed to transition risks. As an example, changes in climate policy such as carbon pricing can affect profitability and debt servicing for such firms (Grippa & Mann, 2020).

2.1.3 The Greatest Market Failure in History

Named “the greatest market failure in history”⁵ climate change is perceived as a financial risk⁶ due to its mechanisms causing non-efficient markets (Government, n.d.). An inefficient market is one where asset prices do not reflect all available information, contradicting the efficient-market hypothesis in economic theory, allowing for opportunities to create excess profit due to assets being over- or undervalued in the market (Hayes, 2022). The IMF (2020) indicated that expected impacts from physical climate scenarios were not priced in the stock market, a phenomenon possibly fueled by a variety of factors causing market inefficiencies.

First, it is a consequence of the fact that parties responsible for causing a negative externality⁷, such as releasing carbon emissions into the atmosphere, does not cover the associated costs including burdens imposed on society (Bowen et al. 2014). Thus, market prices fail to reflect the long-term consequences of fossil fuel combustion, which contributes to further global

⁵ Market failure refers to a situation of less-than-optimal economic outcomes due to inefficient allocation of resources arising from individuals acting in rational self-interest. Negative externalities and incomplete information are underlying causes of market failures (Investopedia, 2024).

⁶ Financial risk refers to the increased variability in the net cash flows to equity owners due to fixed financial obligations from debt financing and cash leasing (Gabriel & Baker, 1980).

⁷ An externality can be either a benefit or a cost that is caused by one party but it financially received or incurred by another (Kenton, 2024).

warming (Government, n.d.). In addition, there is uncertainty regarding the time horizon in which climate-related risks will materialize, illustrating the gap between the release of carbon emissions and its potential impacts (Carney, 2015). Lastly, there is a lack of relevant information about risk and expected returns, as well as the tools necessary to evaluate climate-related risks which further contribute to market failure (Government, n.d.). These will be further outlined in the following chapters.

2.1.4 Climate-related Risk and Stock Performance

Nascent research in finance underscores the significant influence of climate-related transition risk on stock performance, particularly differentiating between “green” and “brown” firms. “Brown” firms, typically high carbon emitters like oil and gas producers, face depreciating stock valuations due to transition risks (Eren et al., 2022). These risks stem from adjustments necessary to align with global climate objectives, as described in the previous chapter. Conversely, 'green' firms, which generate positive environmental externalities, often benefit from increased investor and consumer preferences toward sustainable practices (Pastor et al., 2021).

Empirical studies have found that “green” stocks generally outperform “brown” stocks during periods of heightened climate change awareness or unexpected climate events (Ardia et al., 2023; Antoniuk & Leirvik, 2024). Furthermore, climate policy interventions have been shown to favor companies in the renewable energy sector, enhancing their market performance (Batten et al., 2016). Additionally, financial institutions with significant investments in carbon-intensive sectors often encounter greater systematic climate risks, impacting their credit ratings and debt servicing capabilities (Choi et al., 2020; Hsu et al., 2022). As a result, companies’ emission profiles provide a relevant stock-pricing factor (Giese et al., 2021).

2.1.5 Perceptions of Climate-related Risks in Finance

Despite the consensus that investors should consider climate-related risks, limited research has explored finance professionals’ perceptions of climate change and its impacts (Gsothbauer et al., 2024). Findings by Choi et al. (2020), however, suggest a shift in investor attitudes as the material impacts of climate-related risks become evident. Bolton et al. (2023) further observe that perceptions are shaped by the prevailing socio-economic environment, suggesting that

investors will associate carbon-intensive stocks with more risk and demand higher compensation in societies with strong environmental protection values. Nonetheless, uncertainty regarding the timeline over which these risks will manifest continues to influence perceptions (Barnett et al., 2019), leading to short-term investment perspectives if risks are seen as distant (Carney, 2015).

Institutional investors have begun explicitly linking environmental factors to firm performance (Larcker et al., 2022), and emerging research suggests they increasingly recognize climate-related risks (Krueger et al., 2020). Most institutional investors anticipate rising temperatures by the end of the century and believe that transition risks associated with climate regulation have already started to materialize. Nevertheless, uncertainty remains about the motives for considering these risks. The relevance of climate-related risks for portfolio performance, moral considerations, and reputational concerns is becoming more widely acknowledged (Krueger et al., 2020).

2.2 Fund Management

A mutual fund is a collective investment product where multiple investors pool their money to invest in the securities market together, with a professional asset manager overseeing the financial assets. Mutual funds are commonly classified into equity funds, bond funds, money market funds, and balanced funds, providing investors with diversification without managing individual securities (The Financial Supervisory Authority of Norway, 2024). The fund manager exercises professional judgment on behalf of clients by combining different assets to match the investor's objectives, time frame, and risk-reward preference (Valsan & Yaha, 2013). The asset manager also decides where to invest the capital and manages the investment process (Schoenmaker & Schramade, 2019, p. 206).

2.2.1 Active and Passive Investment Strategies

In the realm of asset management, a significant number of funds are actively managed by fund managers who strive to outperform passive strategies by leveraging their presumed selection skills. Active investment strategies encompass the use of fundamental and technical analysis to identify undervalued stocks, aiming to beat market indices (Chen et al., 2000; Van Duuren et al., 2015). In contrast, passive strategies focus on matching the returns of market indices, based

on the principle that markets efficiently integrate and respond to new information. Active strategies, however, rely on the assumption that arbitrage opportunities, information asymmetries, and other sources of outperformance can be exploited (Malkiel, 2003).

2.2.2 Risk and Returns

The process of assessing investments involve thorough evaluations of risk and reward. Returns refer to the gains obtained from holding an asset, or a collection of assets over a certain period (Munk, 2013, p.8). In financial theory, we decompose the return requirement into the risk-free rate and the risk premia. The risk-free rate is the return an investor can expect from a risk-free asset, often defined by the interest paid on a 10-year US government treasury note. The risk premium on the other hand, refers to the excess return an investor can expect as a compensation for the excess risk associated with an investment. When an asset carries more risk, the demand for compensation through increased returns increases (Gjedebø & Øvreland, 2006).

A successful investment strategy can be defined by obtaining the highest possible risk-adjusted returns. In this context, risk can be considered the uncertainty tied to variations in returns from a period to another, or from one scenario to another. In an efficient portfolio, risk only pertains to the risk the investor is compensated for in the form of higher expected returns. Thus, through diversification, constructing a portfolio of assets with different risk exposures, the total risk will be reduced without lowering the expected returns (Gjedebø & Øvreland, 2006). For instance, all UCITS (Undertakings for Collective Investment in Transferable Securities) funds, a mutual fund that adheres to European rules follow strict requirements regarding risk taking and liquidity (ESMA, 2023).

2.2.3 Asset Pricing

Asset pricing involves models and approaches used to determine the value of financial assets, reflecting fund managers' perceptions of key assessment factors. While various asset pricing models exist, the general characteristics include the current price as well as the future returns that the investor can expect from purchasing an asset (Munk, 2013, p.1-2). Consequently, fund managers focus on the long-term financial performance of companies, particularly the growth rates of earnings and returns on equity. Additionally, they often consider firm-specific factors and prioritize strategic planning and management (Chugh & Meador, 1984). This involves

addressing decisions that have lasting impacts on the firm's business such as the use of natural resources and production technology (Van Duuren et al, 2015).

Nonetheless, there are several additional considerations to asset pricing. The expected earnings of an investment are discounted into the future, which implies that when the discount rate is high, the value of the asset relies heavily on short-term earnings. Furthermore, the value of an asset today is determined by the expected income from an investment and totals the sum of all market expectations. Consequently, it is the potential deviation from the expected value of the asset which often cause volatility. Nevertheless, in liquid markets with many participants, price should reflect a reasonable estimation, totalling the sum of all the investors collective insights (Government, n.d.).

2.2.4 Norwegian Funds

A Norwegian mutual fund, or verdipapirfond, adheres to strict regulatory oversight to ensure transparency and fair practices (Aksjenorge, n.d.). Funds must disclose the risk attributed to the product on a 1-7 scale and clearly express its characteristics to enable potential investors to make informed decisions (The Financial Supervisory Authority of Norway, 2022). This classification is based on standard deviation, a common measure of volatility, indicating how much returns vary around the mean value (Greiner, 2021; Gjedebo & Øvreland, 2006). Index funds typically fall between 1-3, reflecting high diversification, while an actively managed fund with a risk score of 6 suggests greater short-term volatility (Greiner, 2021). As of the end of 2023, 28 investment management firms operated in the Norwegian market, with UCITS funds comprising the majority (The Financial Supervisory Authority of Norway, 2024).

2.3 Management Theory

The changing conditions of the twenty-first-century business world, especially globalization, technological advancements, and increased societal awareness of the impact of businesses on communities, have challenged traditional understandings of management theory (Freeman et al., 2010). Understanding the basic concepts of stakeholder theory and dynamic capabilities provides deeper insights into how firms can excel in such environments.

2.3.1 Stakeholder Theory

The development of stakeholder theory offers insights into how modern businesses can achieve success. Milton Friedman gained recognition for his controversial article in 1970, arguing that a firm's sole responsibility is to maximize profits. However, he later contributed to stakeholder theory, as initially proposed by Freeman in 1984, by integrating stakeholder interests as a core aspect of capitalism. Freeman et al. (2010) define a stakeholder as any group or individual who can affect or is affected by the achievement of an organization's objectives. They suggest that firms can maximize profits by offering attractive products to customers and supporting their communities, thereby fostering an environment where firms can flourish.

Asset Managers and Key Stakeholders

Asset managers have several roles, including long-term fiduciary duties to their shareholders, being shareholders or creditors themselves, and serving the wider community. This explains their emphasis on broader stakeholder interests (Dimson et al., 2015). Eccles & Klimenko (2019) highlight a growing trend of asset managers committing to the UN PRI to tackle urgent challenges such as climate change. The evolving view of fiduciary duties is based on the idea that addressing a broader set of stakeholders helps asset managers perform better on material issues, thereby benefiting from higher returns. This will be further addressed in the next chapter.

In the framework proposed by the TCFD as reviewed in Chapter 2.1, stakeholder theory is linked to transition risks and opportunities. Failure to adapt to a low-carbon society can lead to reputational risks, decreased customer demand, and government sanctions through externality taxation. Consequently, asset managers are incentivized to fulfill their fiduciary duties by aligning with their beneficiaries' preferences and other relevant stakeholders. As a result, large investors have begun altering their engagement strategies with companies and are committed to challenging traditional investment approaches (Eccles & Klimenko, 2019).

2.3.2 Dynamic Capabilities

To achieve superior returns on capital, managers strive to develop, protect, and deploy resources to secure a sustainable competitive advantage (Amit & Schoemaker, 1993). A firm is said to possess a sustained competitive advantage when it implements a unique value-creating strategy that competitors cannot replicate (Barney, 1991). These decisions are made in environments of

high uncertainty and complexity, influenced by innovations, regulatory changes, and evolving customer preferences. Firms with dynamic capabilities can integrate, build, and reconfigure internal and external competencies to meet these rapidly changing demands (Teece et al., 1997). Eisenhardt and Martin (2000) further argue that long-term competitive advantages arise from effective resource configurations, such as transforming assets to achieve high pay-offs at low costs, thereby enhancing long-term performance (Amit & Schoemaker, 1993). Thus, firms that effectively adapt their business models to address climate change threats may achieve superior performance, aligning with the concept of climate-related opportunities previously discussed.

2.4 Managing Climate-related Risks in Funds

Although climate-related risks pose threats to investment firms holding diverse assets (Brayshaw & Symes), the objective for investors is not to avoid risk, but to identify, understand, and accurately price it. This involves accounting for how firms' cashflows or overall profitability of an investment can be affected in different climate scenarios (Norwegian Climate Foundation, 2018). Climate-related risks challenge traditional investment strategies due to their inherent uncertainty and complexity. As Giese et al. (2022) and Simpson et al. (2021) describe, accurately forecasting these evolving risks requires advanced, dynamic modeling. Obersteiner et al. (2001) highlight the timing challenge—understanding the delayed impacts of emissions complicates risk assessments. While conventional risk management approaches provide a foundation (BIS, 2021), there remains a gap in methodologies for effectively analyzing the financial implications of climate-related risks (Battison et al., 2021).

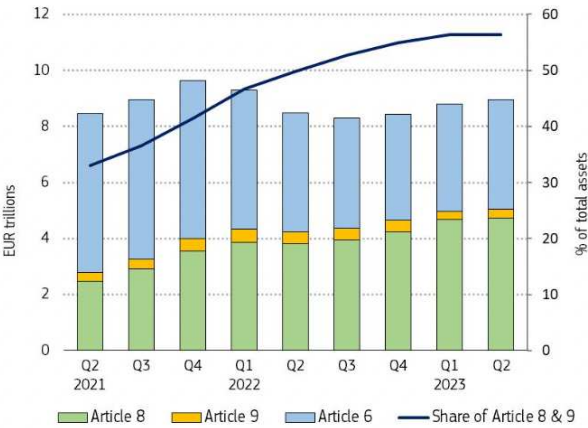
Developing and applying sophisticated tools for detailed assessments and pricing is crucial, as underscored by Bressan et al. (2023). Transition risks associated with decarbonization and the limitations of conventional hedging strategies, such as insurance, necessitate innovative financial approaches (Grippa & Mann, 2020; Engle et al., 2019). Traditional predictive models have been criticized for underestimating unforeseen climate disasters (Obersteiner et al., 2001). However, scientific uncertainties should not impede proactive climate risk management (UNFCCC, n.d.). Ranger et al. (2022) emphasizes that scenarios failing to encompass critical sources of material risks can lead to asset price devaluation and market chain reactions.

2.4.1 The Rise of Green Finance and Sustainable Investment Products

Finance professionals play a pivotal role in climate mitigation by directing capital flows towards sustainable financial products, which have experienced significant growth in response to heightened climate regulation (Gsothbauer et al., 2024; European Commission, 2023). In addition, green investment products, designed to incentivize climate transition through specific sustainability targets, have gained popularity among fund managers concerned with environmental impact (Clapp et al., 2015). For instance, in 2022, green bonds accounted for 16% of all new bonds issued in the EU (European Union) (European Commission, 2023).

The wider acknowledgement of stakeholders in investments, including environmental and climate impacts are embedded in the United Nations Principles of Responsible Investments (UN PRI), in which signatories commit to recognize environmental, social and governance (ESG) issues in investment management. The number of signatories have been subject to a steep growth since 2006, with well above 3500 signatories worldwide in 2021, amounting to over 120 US trillion in assets under management (UN PRI, n.d.).

Figure 2: Assets Under Management by the SFDR Classification



Source: European Commission (2023)

Europe, in terms of both the number of funds and assets under management, represents the largest market for sustainable investment funds, largely due to regulatory pressure and societal awareness of sustainability issues (Brito-Ramos et al., 2022). In 2023, over half of EU funds were classified under the Sustainable Finance Disclosure Regulation (SFDR)⁸ as Article 8 or 9, integrating or primarily focusing on ESG objectives, reflecting an upward trend since 2021 as

⁸ The Sustainable Finance Disclosure Regulation, applicable since 2022 aims to enhance transparency about investment funds and their sustainability claim, classified as Article 6, Article 8 or Article 9 (European Commission, 2023).

shown in Figure 2 (European Commission, 2023). However, this trend has also allowed fund providers to gain reputational benefits from sustainability attributes (Strauss, 2023), fostering the prevalence of greenwashing⁹. This complicates the verification of how sustainability dimensions are genuinely considered in investments (European Commission, 2023).

2.4.2 ESG Assessments

ESG ratings can serve as indicators of a company's commitment to aligning its activities with climate risk mitigation strategies (Eren et al., 2022). These ESG metrics, provided by specialized firms, aim to enhance investors' risk management capabilities, allowing for targeted investments and the identification of potential red flags (Larcker et al., 2022; Van Duuren et al., 2015). ESG criteria have become pivotal in the decision-making process for investors concerned with corporate social responsibility (CSR)¹⁰, operating under the assumption that environmental impacts are financially material (Dorfleitner et al., 2015; Larcker et al., 2022). However, various studies have identified that external ESG measurements often rely on limited and sometimes contradictory data, earning them the characterization of "a compass without direction" (Larcker et al., 2022). The varied emphasis on different ESG dimensions (Van Duuren et al., 2015) does not necessarily ensure effective management of climate-related risks, as climate change constitutes only one of several components within the environmental pillar (Larcker et al., 2022).

2.4.3 Hedging Strategies for Climate-related Risk

Employing what is perceived as a climate-related risk hedging strategy, fund managers focus investments on environmentally strong companies or diversify into sectors less affected by climate volatility. This approach is supported by findings from Engle et al. (2019) and Eren et al. (2022), who note that portfolios with high environmental risk scores better withstand climate-related financial shocks.

Such approaches are increasingly embraced by major industry players. For instance, BlackRock, the world's largest asset manager, has implemented strategies designed to align

⁹ Greenwashing refers to the deliberate actions taken by corporations to deceive stakeholders by presenting a false or misleading image of environmental responsibility (de Freitas Netto et al., 2020).

¹⁰ Corporate Social Responsibility can be defined by the idea that firms have a responsibility to society, which involves recognizing a set of stakeholders, rather than just shareholders and executives. These include environmental, ethical, philanthropic, and economic responsibilities (Stobiersky, 2021).

with, prepare for, and benefit from a low-carbon transition (BlackRock, 2023). Additionally, the Net Zero Asset Manager Initiative (NZAM), representing USD 57 trillion in assets under management (AUM) with 273 signatories (NZAM, 2022), asserts that asset managers have a fiduciary duty to safeguard their portfolios against climate-related risks. This entails setting decarbonization targets for their asset owners and establishing and reviewing interim targets for their AUM (PWC China, 2022). Nevertheless, UNEP FI cautions that the focus on transition risks by many financial institutions may lead to a “blind spot” regarding physical risks, potentially resulting in the neglect or underestimation of exposure to unforeseen financial consequences (Brayshaw & Symes, 2023).

2.4.4 TCFD Recommendations for Asset Managers

The TCFD recommendations are recognized as market-correcting approaches that enable more accurate pricing of climate risks and opportunities (IPCC, 2021). Implementing these recommendations helps asset managers enhance investment assessments, facilitate informed decisions, and provide transparency to beneficiaries on asset performance. Key recommendations include scenario analysis and tracking carbon metrics and targets (TCFD, 2017).

Scenario Analysis

Scenario analysis informs strategic decision-making, risk management, and strategy setting (CFRF, 2023). These tools enable stress testing of portfolios against various climate scenarios, supporting due diligence, portfolio allocation, stewardship efforts, and strategy adjustments for potential future climate trajectories (UN PRI, 2020). Although increasingly adopted by asset managers (CFRF, 2023), climate scenario modeling remains a developing field in asset management (NBIM, 2021).

Carbon Metrics and Targets

Carbon metrics provide insights into asset exposure to transition risks by measuring emissions over a reporting period. Key metrics include carbon intensity, total carbon emissions, and carbon footprint. Carbon intensity, representing Scope 1 and Scope 2¹¹ greenhouse gas (GHG) emissions per million dollars of revenue, serves as a proxy for carbon efficiency, indicating

¹¹ Scope 1 emissions cover the direct emissions arising from the sources controlled by the company, while scope 2 emissions include indirect emissions generated from its purchased energy (GHG Protocol, n.d.).

firms' progress in efficiency output. Total carbon emissions track GHG emission changes in a portfolio, while the carbon footprint helps compare portfolios against a benchmark. However, carbon metrics have limitations, such as favoring firms with higher pricing levels in trend analysis and excluding Scope 3 emissions, which cover indirect upstream and downstream emissions, representing companies' most significant GHG impacts (GHG Protocol, n.d.).

2.5 Relevance in the Norwegian Market

Norway has firmly recognized the critical importance of managing climate-related risks in Norwegian funds. The Norwegian Ministry of Finance endorsed the TCFD recommendations back in 2019, officially announcing their support by May 2021 (Financial Stability Board, 2021). In addition, the Norwegian Climate Foundation published a handbook which provide asset managers with detailed guidelines, including specific metrics and targets to effectively identify, evaluate, and manage climate-related risks (Norwegian Climate Foundation, 2017). It also encourages asset managers to openly discuss their methods for handling climate risks and to consider how existing and upcoming regulations, such as emission allowances, might impact their investment decisions. This underscores the expectation for transparent reporting on how climate considerations are integrated into their overall risk management and investment strategies. Nevertheless, a report from The Norwegian Climate Foundation in 2018 discovered that many Norwegian financial institutions as well as the largest companies on Oslo Stock Exchange have significant improvement potential when it comes to identifying and handling climate-related risk (Norwegian Climate Foundation, 2018).

2.5.1 Climate-related Risks in Norway

Funds that invest in the Norwegian stock market are exposed to transition risks particularly due to Oslo Stock Exchange Benchmark Index's (OSEBX) high reliance on companies that produce oil and gas (Lysvoll, 2023). In 2022, oil and gas amounted to 73% of the total value of Norway's export goods and represent a key contributor to the Norwegian national budget (Norsk Petroleum, n.d.). To illustrate market sensitivity to fossil fuels, Equinor, a Norwegian oil and gas producer, is responsible for around one quarter of OSEBX's value (Lysvoll, 2023). The effective global and domestic climate policies towards a low carbon transition will eventually reduce the value of Norway's remaining petroleum reserves (Government, 2018). As more

stringent climate policies are introduced, aligned with Norway's ambitious climate objectives following the EU Green Deal (European External Action Service, 2023), production costs of oil and gas may be subject to significant increases in the coming years (Grippa & Mann, 2020).

Furthermore, Norway is already experiencing physical risks such as more flooding and precipitation, associated with climate change. In addition, Norway is exposed to summer droughts, sea level rise, more frequent landslips and ocean acidification (Government, 2018; World Bank, n.d.). Large amounts of rainfall and regular flooding may become a significant problem when water systems are unprepared, presenting particular risks to water and sewage. In addition, infrastructure, buildings and the natural environment are particularly vulnerable to climate change in Norway (World Bank, n.d.).

2.5.2 The NBIM Approach

Norway hosts the world's largest sovereign wealth fund NBIM, renowned for its flexible investment strategy and strong emphasis on transparency and long-term governance (Chambers et al., 2021). The fund aims to lead globally in managing financial risks and seizing opportunities arising from climate change, aligning its portfolio with the 2050 global net zero target. The fund's goal is to maximize returns while maintaining acceptable risk levels, with a focus on enhancing climate-related risk management (NBIM, n.d.). NBIM recognizes the deep transformations required in global markets, as well as the possible dramatic increase in physical climate risks if the energy transition does not accelerate (NBIM, 2021). In 2018, the Chief Risk Officer at NBIM Dag Huse described climate-related risk as one of the least understood and most intangible dimensions of risk, yet possibly the most significant (Norwegian Climate Foundation, 2018).

Working continuously to update strategies to better understand and mitigate climate risks, NBIM's actions to mitigate climate-related risks includes active ownership, scenario analysis, and reducing exposure to high-emission sectors following the general framework set by the Ministry of Finance. In addition, they acknowledge the systemic characteristics of climate-related risk, and its mitigation limitations through traditional diversification strategies. They have also emphasized challenges such as data availability as well as weaknesses tied to using carbon intensity as a proxy for climate transition risk (NBIM, 2021).

3. Methodology

This chapter outlines the research methodology, detailing the approach used to conduct the study. It highlights the relevance of the methods employed for data collection and analysis, as well as for presenting the findings in the next chapter, providing a robust foundation for addressing the research question. First, the methods for data collection and analysis are explained. Second, the quality and reliability of these methods are discussed.

3.1 Research Design

Research design is an overarching plan which indicates the procedures adequate or suitable to answer the research question of the study (Saunders et al., 2019, p.173). When one wishes to investigate relationships or phenomena that are less known, or unknown, an exploratory research design is employed (Johannesen et al., 2011, p.62). Aiming to investigate asset managers perceptions of climate-related risks and how they link to investment management approaches in Norwegian equity funds, we seek to explore a phenomenon that can be described as less known or unknown. Therefore, an exploratory research design is a suitable approach for our research. Moreover, it holds beneficial characteristics in this context, as predetermining the outcomes of my study is difficult, and the exploratory design allows for flexibility and adaptability (Saunders et al., 2019, p.187).

3.1.1 Qualitative Research

An important aspect of a qualitative approach is that data usually is rich and well suited for in-depth analysis, allowing for context to be related to the themes that emerge from the analysis (Saunders et al., 2019, p.639). In qualitative research, the analysis is undertaken both during the data collection and after, and the analysis helps to shape the direction of data collection, especially when following an inductive approach (Saunders et al., 2019, p.640). In this study, the qualitative approach was particularly relevant because it enabled a comprehensive understanding of the nuanced perceptions and practices of investment managers regarding climate-related risks.

3.1.2 Method for Primary Data Collection: Semi-structured Interviews

In this thesis, twelve semi-structured interviews were conducted as the primary data source. Semi-structured interviews employ an interview guide as a foundational tool, enabling the researcher to adapt themes, questions, and their order based on the interviewee, thereby facilitating a flexible and dynamic conversation (Johannessen et al., 2011, p. 145). This approach was selected because the respondents possess diverse professional perspectives and areas of expertise, allowing for tailored and relevant questions. Additionally, it enabled a deeper investigation of emergent themes, ensuring a comprehensive exploration of the subject matter.

3.1.3 Approach to Primary Data Analysis and Theory Development: Thematic Analysis

Thematic Analysis, initially proposed by Braun & Clarke 2006, is a systematic, yet flexible research approach in which the essential purpose is to search for patterns or themes that occur across a data set (Saunders et al., 2019, p.651). It can be helpful to comprehend large amounts of qualitative data, identify key themes or patterns from the data for further exploration and to draw conclusions (Saunders et al., 2019, p.651). As our qualitative data consists of comprehensive transcripts from 12 semi-structured interviews with asset management professionals, undertaking thematic analysis was a useful approach for processing, structuring and analyzing the data.

Coding refers to the labeling of data units within a data item, such as a transcript, in order to extract its meaning and to categorize data that implies similar meanings. A code can be a single word or a short phrase. A unit of data may be a line of a transcript or a sentence (Saunders et al., 2019, p.653-655). Themes are wider categories which incorporates multiple codes that seem relevant to one another and that contains an idea that is relevant to the research question (Saunders et al., 2019, p.657).

Braun & Clarke (2021) suggest that both theory-led (deductive) and data-driven (inductive) approaches can be applied to thematic analysis. A deductive approach uses existing theories to shape the aspects and process of data analysis, offering a structured way to examine the data and explore established concepts through rigorous theoretical frameworks. By coding the data in this manner, the direction of the themes directly reflects the theoretical concepts under investigation. Conversely, an inductive approach allows theory to emerge from the data itself.

This “bottom-up” method enables narratives to naturally arise, facilitating the discovery of new concepts (Saunders et al., 2019, p. 642).

In this study, we employ a mix of established theories and emergent focal points to shape the analysis. We apply the taxonomy outlined by the TCFD and incorporate findings from preexisting studies that gauge the perceptions and incentives of professional investors. Additionally, we utilize established theories within management and finance to structure relevant dimensions. Simultaneously, we aim to develop new concepts and understandings regarding the perceptions of climate-related risks in the Norwegian fund market, as well as the methods used to price, evaluate, and measure such risks, emphasizing their significance.

3.1.4 Approach to Secondary Data Collection: Document Analysis

Document analysis is a valuable approach for analyzing information. Qualitative document analysis gathers explicit meanings and provides illustrative examples from texts, such as institutional documents (Morgan, 2022). In this study, the reports of the Norwegian Equity funds of the targeted sample were analyzed to enhance the understanding of their strategic priorities in investments, providing a basis to evaluate their perceptions and integration of climate-related risk.

3.2 Data Collection

This section delineates the methodologies employed for the collection of both primary and secondary data, adhering to the previously outlined approaches.

3.2.1 Sample

Sampling involves selecting the study participants (Johannessen et al., 2011, p. 108). While there are no strict limits on the number of interviews for a research project, 10 to 15 participants are common for smaller studies. However, practical considerations, such as time and funding constraints, often necessitate limiting the number of interviews, particularly in student projects. In such cases, conducting fewer than ten interviews may be advisable (Johannessen et al., 2011, p. 108).

The sample for this study comprises a diverse group of asset management professionals specifically chosen to address the research question: *Do asset managers' perceptions of climate-related risks impact the investment management of Norwegian equity funds, and to what extent are approaches to navigate these risks integrated?* The sample includes two main groups: conventional fund managers and sustainability professionals from asset management companies offering equity funds to retail and institutional clients in the Norwegian market. Companies A-E operate in the Norwegian market, while Company F, located in France, provides additional expert opinions on the climate subject.

Conventional fund managers in this study manage active equity funds aimed at achieving long-term excess returns, particularly in the Norwegian stock market. Focusing on Norwegian equity funds ensures comparability and eliminates biases from different regulatory, geopolitical, or environmental conditions. Additionally, concentrating on active funds with similar characteristics further enhances the comparison of the fund managers' responses in regards to their priorities and perceptions of relevant risk factors. An analysis of fund characteristics as and fund objectives was conducted through the document analysis, covered in chapter 3.2.4.

Sustainability professionals include a fund manager of an Article 9 fund, ESG/responsible investment managers/directors, and sustainability/ESG analysts. Their roles involve supporting investment products with sustainability objectives, analyzing portfolio companies for sustainability aspects, developing internal sustainability frameworks, or integrating regulatory sustainability frameworks or standards. Most of these professionals' work with funds investing in Norwegian assets, providing relevant expertise for the study. Expert 12 from a French asset management company on the other hand, was included to provide expert opinion on climate-related risks, best practices and provide nuanced perspectives.

Including both conventional asset managers and sustainability professionals ensures a balanced perspective, reflecting realistic insights and practices among Norwegian Equity fund providers. Sustainability professionals offer expertise in sustainability and climate-related risk management, often providing support and frameworks for fund managers. Conventional fund managers provide practical insights into investment decision-making and asset management over time. Overall, the sample consists of 8 sustainability/ESG experts and 4 conventional asset managers, ensuring a comprehensive knowledge base to answer the research question.

Table 1: Summary of Interview Participant Profiles

Participant	Candidate Denotation	Title	Company	Primary Area	Country
1	SE1	Junior ESG Analyst	A	Sustainability	Norway
2	SE2	ESG Manager	A	Sustainability	Norway
3	CE1	Portfolio Manager Norwegian Equities	A	Conventional	Norway
4	SE3	Senior Analyst Responsible Investments	B	Sustainability	Norway
5	SE4	Senior Analyst Responsible Investments	B	Sustainability	Norway
6	CE2	Fund / Portfolio Manager Norwegian Equities	B	Conventional	Norway
7	CE3	Fund /Portfolio Manager Norwegian Equities	C	Conventional	Norway
8	CE4	Fund / Portfolio Manager Norwegian Equities	C	Conventional	Norway
9	SE5	Fund / Portfolio Manager Global Equities	C	Sustainability	Norway
10	SE6	Senior Analyst Responsible Investments	D	Sustainability	Norway
11	SE7	Senior Analyst Responsible Investments	E	Sustainability	Norway
12	SE8	Manager Responsible Investments	F	Sustainability	France

The candidate denotations “CE”, which stands for Conventional Expert, and “SE”, which stands for Sustainability Expert, followed by a number, are used in the analysis and presentation of the findings to clearly indicate the candidates’ fields of expertise. The country in this table indicates where the company mainly offers their fund products.

The names and detailed characteristics of the participants in this study are kept confidential for two primary reasons. First, when discussing themes related to moral and ethical considerations, such as climate concerns, participants may provide socially desirable answers rather than realistic reflections if they know their statements will be published and linked to their profiles and firms. Additionally, the reputational risks associated with sustainability practices or making statements that might contradict ethical and moral considerations could potentially harm the firms involved in the study. Thus, to obtain a nuanced, unbiased, and realistic picture of relevant climate-related risks and the approaches to mitigate these, maintaining confidentiality is crucial.

3.2.2 Interview Process

The relevant interview candidates were invited to participate either by phone, LinkedIn, or email. Regardless of the initial invitation format, all participants were presented with a brief summary of the research purpose, practical information about the interview procedure, confidentiality assurances, and their right to withdraw from the study. Interviews were conducted in the language preferred by the participant. In total, nine interviews were held in English while three were held in Norwegian and later translated to English. Eleven interviews were conducted online using Microsoft Teams, and one was conducted in person. The interview guide can be found in Appendix A.

To ensure compliance with the Norwegian “Personvernforordningen” and the EU General Data Protection Regulation (GDPR), no personal data was collected through recording voices or online meetings for transcription purposes. The majority of the interviews were transcribed using an integrated Microsoft Transcription tool. When this was not possible, the interviews were transcribed manually. To supplement the transcriptions, analytical aids and transcript summaries were used. After each interview, a transcript summary and additional reflections were noted, compressing longer statements into briefer ones. This practice helps to remember the circumstances of data collection and to recall the context for further analysis. It also aids in familiarizing with the principal themes emerging from each interview (Saunders et al., p. 648-649).

Moreover, allowing sufficient space between each interview is necessary to have adequate time to process the transcript, organize the data, and related documentation (Saunders et al., p. 641). Therefore, a maximum of one interview was conducted per day. The interviews were conducted between March 4th, 2024, and April 22nd, 2024, spanning approximately seven weeks. The duration of the interviews ranged from 30 to 55 minutes, with most lasting approximately 40 minutes.

3.2.3 Primary Data Analysis Process: Thematic Analysis

The analysis and theory development of the interview transcripts follow the method outlined in Chapter 3.1.3. First, data units with similar meanings were extracted as longer phrases and grouped into codes. The codes relevant for further analysis were carefully selected based on their frequency in discussions and their relevance to answering the research question. The 13

codes chosen allowed for the emergence of three main themes, which shaped the main dimensions for presenting the findings and facilitating further discussion. The themes were then assigned to aggregated dimensions to illustrate their relevance in covering the components of the research question.

The first step involved identifying perceptions of climate-related risks and mapping the main risks factors and incentives to manage such risks in relation to the established investment frameworks of Norwegian equity funds. The second step involved analyzing the investment approaches that potentially emerge as a result of these perceptions and their integration into investment management practices. The analysis is summarized in the coding tree below. The numbers in the far-right column indicate the frequency of each code, emphasizing its relevance.

Table 2: Coding Tree Overview

Aggregated Dimensions	Themes	Codes	Number of Citations
Identification of Perceptions and Incentives	Climate-Related Risks: Relevance and Meaning	Climate crisis and urgency for transition	5
		Defining climate-related risks	6
		Physical risks	4
		Transition risks, expectations, and valuation impact	8
	Navigating Incentives: Transition Risks and Opportunities	Climate policies and sustainable finance regulations	9
		Fossil Fuel Dependence	8
		Green investment opportunities and fiduciary duties	11
		Market sentiment & customer preferences	7
Level of Integration	Approaches to Manage Climate-related Risk	Integration in traditional investing and ESG	11
		TCFD recommendations	13
		Industry standards & reporting frameworks	6
		Assessment challenges	12
		Active engagement	6

The full coding table, which includes the 106 relevant data units for each code can be found in Table 5 in Appendix B. To demonstrate the structure, a simplified table is provided below, indicating how phrases are linked to a single code, relating to a theme and the aggregated dimension.

Table 3: Example of Thematic Analysis Structure

Aggregated Dimensions	Themes	Codes	Quotations
Identification of Perceptions and Incentives	Climate-Related Risks: Relevance and Meaning	Transition risks, expectations, and valuation impact	<p><i>“The simplest way to look at climate-related risks is as a form of cost of capital, costs in the form of having a higher return requirement and a lower multiple because the firm is doing something that is harmful to the environment. This is due to a weaker position facing regulations that support a low carbon transition. In addition, you may turn it around and say that firms that pose less harm to the environment can benefit from more stable growth.”- CE2</i></p> <p><i>“I think climate-related risks will be much more important in the long run than it is now, for instance, I am not very worried about more frequent extreme weather now, but in some years, some companies might have overestimated their income.” – CE3</i></p>
	Navigating Incentives: Transition Risks and Opportunities	Green investment opportunities and fiduciary duties	<p><i>“There are many incredibly innovative and interesting solutions and technologies within renewable energy in Norway. They take quite a long time to develop and cost a lot of money but it's absolutely necessary. - CE4</i></p> <p><i>“In my fund, our task is to generate alpha for the beneficiaries, which means that whether we invest in a high emitting industry or not does not really matter to us in itself, what matters is our expectations of its risk exposure and how the market is pricing those risks.” - CE3</i></p>
Level of Integration	Approaches to Manage Climate-related Risk	Integration in traditional investing and ESG	<p><i>“We analyze the impact of CO2 emissions in the same way we analyze whether we think stocks are expensive or cheap. So, I would say that this is naturally one of the variables in the investment decision.” - CE2</i></p> <p><i>“The assessment of climate-related risks challenges traditional investment strategies and is inherently different from other sustainability aspects because you cannot use historical data to predict future impacts, these are unknown.” - SE8</i></p>

In qualitative research, the presentation of findings is often governed by the research approach employed. In thematic analysis, this involves crafting a coherent narrative based on identified themes, which are derived from the participants’ codes (Harding & Whitehead, 2013, p. 138). Accordingly, Chapter 4 presents the findings through a narrative flow, emphasizing the main topics and ideas central to our research under the main themes.

3.2.4 Document Analysis Process

The document analysis aims to map key characteristics of the investment profiles and strategies of funds managed by the interview participants overseeing active Norwegian equity mandates. This supported the interviews and contextualized their emphasis on relevant risk aspects, confirming the comparability of the funds studied.

The analysis of reports from the Norwegian Equity Funds managed by the professionals highlight key aspects relevant to achieving long-term excess returns, based on explicit priorities disclosed about the investment frameworks. These characteristics are summarized in Table 4, divided into “Financial” and “Strategic” aspects. Each fund manager employs a unique strategy tailored to their fund's mandate, considering various determinants of long-term performance and sound investment.

Table 4: Strategic Priorities in Management of Norwegian Equity Funds

Financial	Strategic
<ul style="list-style-type: none"> ○ Solid Key Figures ○ Historical Return on Equity (ROE) ○ Reasonable Price ○ Projected Earnings Growth 	<ul style="list-style-type: none"> ○ Market Position / Competitive Advantages ○ Governance and Management ○ Value Creation ○ Solid Outlook for Future Growth/ Long-term Potential

Additionally, other fund characteristics such as risk exposure, main objectives, investment horizon, and integration of sustainability aspects were analyzed for the funds managed by interview participants. An overview can be found in Table 6 in Appendix C, showing that all funds have long-term investment horizons, are actively managed with significant risk exposure, and consider ESG aspects. The Norwegian equity funds aim for excess returns, while the global fund also incorporates sustainability into its objectives. This analysis covers only the funds managed by the interviewees, excluding the variety of different fund products offered by the companies in the study. These insights provide a robust foundation for contextualizing and supporting the findings that emerged from the thematic analysis.

3.3 Research Quality

3.3.1 Validity

In examining climate-related risks in Norwegian equity funds, it is crucial to consider the study's validity as defined by Johannessen et al. (2011). The internal validity of this research, which assesses the relationship between fund managers' perceptions of climate risks and their investment practices, may be impacted by confounding variables not fully controlled in the qualitative design. While the focus on Norwegian equity funds with similar characteristics enhances the external validity within the specific context of Norway, it may limit the generalizability of the findings to other markets or fund types. Additionally, the construct validity, concerning how accurately the study measures the integration of climate-related risks, relies heavily on subjective interpretations from interviews, which could benefit from triangulation with quantitative data to reduce potential biases and enhance the robustness of the findings (Johannessen et al., 2011, pp. 73, 365).

3.3.2 Reliability

Reliability refers to the accuracy of the data used in the study, including its collection and processing. Consistent results across multiple studies indicate high reliability (Johannesen et al., 2011, p. 44). Saunders et al. (2019) note that semi-structured interviews can be problematic for reliability due to their flexible format, potentially yielding different results if the study is repeated, as they reflect the specific reality and circumstances at the time of data collection. Nevertheless, two factors help reduce potential bias and enhance data reliability in our study. First, the interview guide was carefully designed with clear, open, and neutral questions to avoid leading responses (Saunders et al., 2019, p. 457). Second, by including both sustainability professionals and conventional asset managers, the study captures a more nuanced perspective and representative sample, thus enhancing reliability.

Nevertheless, given that the study explores current perceptions and practices in a developing area, its reliability may be subject to question as the relevance and sentiment around climate change and its potential impacts continues to evolve and may be impacted by various external and dynamic factors. It should also be noted that the interviews were conducted during a period of geopolitical uncertainty and global tension, in particular in Ukraine and Gaza, which has impacted financial markets and expectations. Over time, interviewees' perceptions may change, potentially altering the results.

4. Findings

This chapter presents the findings from the thematic analysis, supported by document analysis, highlighting critical discussion points. Expert reflections and ideas are denoted as outlined in Chapter 3.2.1 and are contextualized with relevant theories. Selected citations from the coding table are included for illustrative purposes. The complete list of codes with citations is available in Table 5 in Appendix B.

4.1 Climate-related Risks: Relevance and Meaning in Investment Management

This first part is dedicated to the findings that display the interpretations of the concept of climate-related risks, and its relevance in investment management, particularly in Norway.

4.1.1 The Climate Crisis and Urgency for Action

First, we find that Norwegian fund managers and sustainability experts demonstrate high levels of awareness regarding the current climate crisis. CE4 acknowledged the inevitable energy transition required to reduce global emissions, while CE2 and SE6 voiced significant concerns about exceeding the thresholds set out by the Paris Agreement, indicating the presence of misconceptions about the global progress of an energy transition:

“There is no doubt that we recognize the challenges caused by anthropogenic GHG emissions. Do I believe we can stay below the 1.5-degree threshold with today's existing frameworks - no. Unfortunately, I am even worried that the world is moving in the wrong direction when it comes to staying below 2 degrees as well. “ - CE2

4.1.2 Defining Climate-related Risks

Furthermore, we find that asset management professionals largely refer to the taxonomy outlined by the TCFD to define the concept of climate-related risks, in particular sustainability professionals. SE3 and SE8 explicitly mentioned the TCFD, suggesting that Norwegian fund providers are well-acquainted with the TCFD recommendations. While SE2, SE6, and CE4 did not explicitly mention the TCFD in their definitions, they provided explanations that align with the intuitions of both transition and physical risks indicating that the concept is well comprehended among Norwegian asset management professionals:

“These include risks that can have a material impact on a company, such as stranded assets, poor adaptation to the transition, capital expenditures and revenue tied to oil and gas, or regulatory impacts. Physical risks include flooding, hurricanes, wildfires, or other climate events that affect resources or the sourcing of raw materials, such as agricultural production.” – SE2

Bolton et al. (2023) find that investors’ perceptions are influenced by the prevailing socioeconomic environment, suggesting that in a country like Norway, known for its high climate awareness and ambitious targets, investors are likely to prioritize climate aspects. Our findings indicate that Norwegian asset managers highly recognize climate-related risks and their potential material impacts on firms, showing that these risks are increasingly acknowledged. Interestingly, there is generally less emphasis on physical climate-related risks compared to transition risks, consistent with recent research in finance (Eren et al., 2022). Consequently, a separate chapter is dedicated to exploring how transition risks are perceived and navigated by asset managers.

4.1.3 Physical Risks

One Norwegian equity fund manager (CE3) hypothesized that as extreme weather events, such as flooding, become more frequent in Norway, insurance companies and banks might face significant payouts. This view aligns with Huang et al. (2018), who suggest that such risks cannot be fully hedged. The high uncertainty about the frequency of these events would increase the perceived risk for these companies as temperatures rise, as noted by CE4. Conversely, consulting companies specializing in flood solutions could become more attractive investments (CE3). Thus, applying the intuition of climate-related opportunities (TCFD, 2017), more frequent physical risks would benefit firms that can better align their strategic behavior with external conditions (Schindelhutte & Morris, 2001).

The global equity fund manager expressed greater concern with physical risks in the fund, accounting for such risks on a regular basis. Higher temperatures and risks of droughts could significantly impact access to critical resources such as water, implying substantial costs for their investment firms (SE5). Moreover, CE4 suggested changing weather patterns could pose material risks on their investments in wind parks, influencing the capacity of wind turbines. At the same time, SE8, the climate expert in the French asset management company, emphasized that physical risks such as extreme heat and droughts are highly dependent on the location of firms. Thus, as Norway might be less exposed to physical risks compared to more central

European countries in the coming years (European Environment Agency, 2024), their relevance might be somewhat neglected in the Norwegian market.

4.1.4 Transition Risks, Expectations & Valuation Impact

Conventional fund managers associated transition risks with valuation aspects, aligning with the TCFD's framework that links climate-related risks to financial impacts. CE1 suggested that a firm's positioning within a low-carbon transition context is linked to its discounted cash flow. CE2 elaborated, indicating that firms generating negative externalities, such as high-emission activities, are disadvantaged under stringent climate policies, consistent with Eren et al. (2022). This results in a higher cost of capital due to increased return requirements and a lower multiple, serving as a proxy measure of a firm's pricing relative to its value generation potential. As fund managers generally focus on the long-term performance of companies when pricing assets and aim to select undervalued assets as noted in Chapter 2.2, these findings suggest that Norwegian fund managers, whose primary investment objective is to achieve excess returns, consider transition risks important in identifying companies with high value creation and robust business models, as displayed in Table 4 Chapter 3.2.4.

Furthermore, from a valuation perspective, the time horizon over which transition risks are expected to materialize is crucial, as noted by SE8. Referring to "The Tragedy of the Horizon" proposed by Carney (2015), it was highlighted that most market participants consider a 5-7 year horizon when pricing assets, often neglecting long-term impacts. However, all Norwegian equity fund strategies exceed 5 years, as noted in Table 6 in Appendix C. Fund managers are concerned with long-term rewards, with CE1 considering an asset's investment potential over a 20-year period. This suggests that climate-related risks should be deemed material. Yet, the timeline for transition risks, particularly the exit from oil production, remains highly uncertain:

"You cannot expect that Equinor, in its current form will exist forever. Oil companies does not have a terminal value, because at some point, we have to stop the production, whether that is in 5, 10 or 30 years, I bet the on the last one."- CE2

Although the Norwegian petroleum industry is expected to face financial challenges in the coming years due to stricter climate policies, consistent with Grippa & Mann (2020) and Aker Solutions (2023), we found a general anticipation that climate-related risks have minimal influence on current market prices. These risks are perceived as distant, reducing their impact

on present value (Government, n.d.). Thus, assessing whether emission-intensive stocks are accurately priced remains challenging (CE2). Nonetheless, CE3, who was not particularly concerned about current climate-related risks, noted that future income for certain companies might be overestimated, suggesting the market may not fully account for these risks in asset prices.

4.2 Navigating Incentives: Transition Risks and Opportunities

Transition risks and opportunities emerged as primary topics in the conversations, providing a basis for further analysis on the perceptions of these risks and the incentives to manage them. This chapter is dedicated entirely to exploring these aspects in detail.

4.2.1 The Power of Climate- and Sustainable Finance Regulation

Regulation promoting a 1.5-degree scenario is recognized as a major source of transition risk, especially to high emitting sectors. Companies that fail to adapt their business models to a low-carbon trajectory risk facing financial hurdles as noted by CE1 & CE2. For instance, carbon taxation and a global carbon price will incentivize investments in green technologies and play a critical role in fostering the global transition (CE1). In addition, SE8 noted the expected regulatory impact is greater in countries with more ambitious climate pledges, particularly affecting fossil fuel producers, consistent with Monasterolo (2020) and Eren et al. (2022). Conversely, companies in low-emission sectors could benefit from structurally higher and more stable growth, favored by governments with stringent climate policies (CE2).

Nevertheless, the lack of global regulation is regarded as a significant barrier to reducing global emissions (CE1 & SE6). Current regulations are not perceived as robust enough, potentially leading fund managers to overlook such risks in their investment strategies (SE1). However, SE2 noted this is expected to change as climate policies become more stringent. The interviews further revealed a consensus that fund managers may currently disregard climate-related risks, assuming they are not deemed particularly material at present. SE8 suggested that, without climate regulation, asset managers would not consider climate-related risks at all. SE5 emphasized that substantial international cooperation is necessary to create global incentives to mitigate climate change. Overall, these findings suggest that regulation is viewed as a crucial mechanism to incentivize investors to consider transition risks.

Moreover, sustainable regulation in the finance industry in Norway and the EU is seen as a critical tool for imposing transparency on how fund managers consider a wider set of stakeholders, an aspect which could enhance fund performance (Eccles & Klimenko, 2019). For instance, the SFDR encourages fund managers to disclose how climate and other sustainability aspects are managed in investment management (SE3). SE1 noted that compliance with such frameworks is essential for providing attractive and competitive products, suggesting that incorporating sustainability aspects can help fund managers attract and retain customers while avoiding reputational risks.

4.2.2 Fossil Fuel Dependence

Noted as a pivotal challenge of dealing with climate change in Norway, was the economic reliance on oil and gas, challenging the achievement of a low carbon transition (SE4). Oil and gas provide more than half of global energy supply, and to reach the objectives of limiting global warming to 1.5 degrees, oil and gas must decline by 75% by 2050 (IEA, 2023). In the intuition proposed by the TCFD (2017), as regulation becomes stricter, renewable energy technologies becomes more efficient and customers shift their preferences to more sustainable solutions, oil and gas producers will inevitably face material impacts.

The findings suggest that despite holding pessimistic views on the progress of limiting global warming to critical thresholds, investments in oil and gas are still perceived as necessary and reasonable from an investment perspective. Firstly, the massive energy demand associated with production of essential raw materials is expected to increase in the coming years. Examples highlighted include the expected continuous rise in demand for chips supporting AI solutions, which consists of silicon, copper and other materials which are highly energy intensive (CE1). CE4 also noted that global energy networks are not yet ready to replace fossil fuels, stressing that the necessary energy transformation will take time (CE4).

Moreover, incentives to replace energy solutions were perceived as weak as the Norwegian government does not impose constraints on oil and gas production, despite its ambitious climate pledges (CE1, SE6). This is unlikely to change soon, as the Norwegian welfare system benefits significantly from export income, and thousands of jobs depend on it (SE4, CE3). Consequently, restrictions on oil and gas are not anticipated in the near future (CE2). This perception extends to global production in the absence of a global carbon price (CE1).

Additionally, CE2 hypothesized that geopolitical tensions, high interest rates, and inflation have made oil stocks more attractive investments due to changing sentiment:

“Climate probably has a lower sentiment now due to geopolitical tension and the fact that oil stocks have become more attractive investments again. When interest rates are at 5%, caring about the climate might be perceived as too expensive.”- CE2

An important finding was that, despite recognizing the potential material risks associated with emission-intensive stocks, deviating significantly from the OSEBX benchmark through reduced positions in oil stocks was perceived as riskier for equity funds investing in the Norwegian market, who all have significant exposure to oil and gas companies (SE6 & CE3). CE3 noted a European trend of divesting from oil and gas but emphasized that, given the large market share of these stocks, Norwegian investors remain pragmatic. SE8 supported this view, suggesting that excluding entire industries could cause systemic risks and that assisting companies in adapting their business models might be a more prudent approach.

4.2.3 Aligning Green Investment Opportunities and Fiduciary Duties

As noted previously, investing in firms with lower carbon exposure may present climate-related opportunities (TCFD, 2017). CE2 pointed out that these firms possess more resilient business models during a climate transition, aligning with fiduciary duties to create excess returns for beneficiaries. Additionally, Norway sources 90% of its power from hydro and is the largest hydropower producer in Europe (Statkraft, n.d.; Statista, 2024). CE1 and CE4 highlight Norway's strong position for an energy transition, fostering optimism for new solutions and technologies. However, development is perceived as time-consuming and costly (CE4), particularly for younger companies (CE1):

“It has become clearer that although green contribution is good and necessary, it is also often associated with high costs. At the end of the day, we need to invest in a good business model. I am convinced transition is better dealt with by well established companies and transforming commodities.”- CE1

In 2020-2021, Norwegian equity fund managers experienced a green tech bubble driven by high climate sentiment (CE3 & CE1). CE1 notes that capital costs in brown industries are lower than in green ones, leading to higher multiples in green firms and suggesting overpayment for

“mediocre businesses”. Investments must be economically viable and profitable, aligned with the framework presented in Table 4 Chapter 3.2.4, and be based on earnings expectations rather than solely promoting a green transition (CE2 & CE1). Consequently, opportunities for excess returns through renewable energy investments are perceived as limited, as they may conflict with conventional funds' mandates and fiduciary duties.

CE3 emphasizes that risk exposure and pricing expectations are more important than an industry's emission levels, as climate considerations are not part of the mandate. CE4 links climate-related risk management to CSR, highlighting that while large investors have moral and ethical considerations, these must align with their mandate to generate alpha for their beneficiaries, who are the primary stakeholders. Nevertheless, it should be noted that all funds in the study were categorized as Article 8 or 9 and were signatories of the UN PRI, committing to integrate ESG aspects in analysis and decision-making, thereby inherently incorporating a broader responsibility that includes various stakeholders, as noted in Table 6, Appendix C.

4.2.4 The Impact of Market Sentiment and Customer Preferences

As noted in the previous chapter, asset managers rely on their beneficiaries and are thus influenced by market sentiment and customer preferences (SE3). Institutional clients, such as pension and professional clients, have a stronger focus on climate-related risks and expect more from fund managers, as noted by CE1 and SE3. This drives fund managers to enhance their knowledge of climate topics (CE2). Additionally, CE4 noted new investment products with lower carbon exposure has been launched specifically due to client requests, which have gained traction for hedging against oil prices. Moreover, thematic funds on environmental aspects had become popular also among retail clients looking to invest their savings in a sustainable manner. CE4 further noted that climate had become a more important theme for Norwegian fund managers, leading to the offering of more specialized green investment products to meet customer demands.

Conversely, SE3 observed that the prominence of climate or ESG concerns fluctuates and is generally lower now compared to 3-4 years ago. SE2 had further noted a growing misconception in the US perceiving ESG aspects as separate from fiduciary duties. SE3 attributed the recent change in sentiment to geopolitical risks, high interest rates, and inflation, echoing CE2's earlier observations. CE3 also noted that geopolitical risks are much higher on the agenda now, significantly impacting the market.

4.3 Approaches to Climate-related Risk Management

This chapter outlines findings pertaining to the integration of climate-related risks into existing approaches such as fundamental and ESG analysis. It further explores the discovery of tools and approaches employed to evaluate, price, and manage climate-related risks in the Norwegian fund market, as well as the challenges inherent in these practices.

4.3.1 Integration in Traditional Investing and ESG Assessments

Conventional fund managers prioritized long-term considerations when evaluating indicators of profitable business models, recognizing the significant material impacts that can result from inadequate positioning for a low-carbon transition (CE1 & CE2). Additionally, the Norwegian Equity funds in the study were classified as Article 8, signifying that fund managers possess varying degrees of expertise in evaluating ESG aspects. Sustainability experts specialize in analyzing and managing sustainability aspects, including the mitigation of material impacts associated with climate topics.

CE2 posits that the material impacts of a firm's emission profile are evaluated with the same rigor as other factors in asset pricing, considering it a “natural” variable in investment decisions. Thus, transition risks were deemed equally relevant as other aspects relevant to the investment framework, including management quality, earnings trends, and stability. Similarly, CE3 integrates climate-related risks into the investment process, observing that no specific ESG features are particularly highlighted, though the focus on climate-related risks has intensified recently. CE1 asserts that environmental considerations are more material than other sustainability aspects over the long term.

SE1, also from company A observed that fund managers exhibited heightened interest in climate related topics, an integrated part of their ESG assessments under the “Climate and transition” category. This focus had a profound impact on their overall assessments (SE2). Particularly for firms in highly emitting sectors such as oil and gas and shipping, they assessed whether the companies managed their risks in accordance with the TCFD guidelines. Additionally, they paid close attention to the amount companies spent on carbon offsets, and analyzed how carbon pricing could affect their financials, aiming to identify firms performing relatively better than their industry peers.

Nevertheless, consistent with the literature (Giese et al., 2022; Simpson et al., 2021), it was underscored that climate-related risks are inherently distinct from other aspects often considered in investments and are associated with high degrees of uncertainty and complexity, thereby challenging traditional investment strategies (SE8). For instance, evaluating historical performance cannot reliably predict future impacts (SE8). SE3 acknowledges that many portfolio managers account for climate-related risks in their assessments but underlines conventional fund managers lack incentives found in Article 9 funds with respect to their mandates. Hence, conventional fund managers possess greater latitude in their investment selections, and the emphasis on such aspects remains subjective in investment management.

SE6 observed that fund managers generally do not prioritize climate-related risk assessments, delegating this responsibility to the sustainability department to identify and flag such risks. SE3 posits that ESG metrics can influence fund managers' investment decisions and are used to assess climate-related risks. However, SE3 highlights the problematic nature of this approach as noted in the literature by Van Duuren et al. (2015) concerning the varied emphasis on different ESG dimensions between external providers. Additionally, the quality of the data can be inconsistent. SE1 extends this perspective, underscoring that due to such inconsistencies, in-house assessments and direct interaction with firms are essential for properly evaluating how firms manage their potential risks.

4.3.2 TCFD Recommendations

Providers of financial products in Norway are advised to adhere to the TCFD recommendations on climate-related risk management (Financial Stability Board, 2021). These guidelines encompass conducting scenario analysis and tracking emission metrics and targets, which appeared to be adopted approaches among most of the professionals.

Scenario Analysis

Both conventional fund managers and sustainability professionals employed scenario analysis or stress tests to evaluate the resilience of firm value under various climate scenarios. To account for transition risks, CE1 assessed the impact on company valuation in a scenario with a carbon price of 100 EUR per ton of CO₂, examining its influence on margins. Similarly, SE8 used stress tests to measure the impact on key financial metrics such as operational and capital expenditures, as well as asset robustness. While CE2 performed scenario analysis, it was not

frequently incorporated into their traditional investment framework. SE4 from Company B noted that they had a dedicated team for mapping climate-related risks. Additionally, the use of scenario analysis was becoming increasingly prevalent among fund managers:

“I think more fund managers have started using risk measures such as Climate Value-at-Risk (CVaR), which models a world with rising temperatures to assess the potential financial impact on portfolios. Additionally, new tools are being introduced that allow for the construction of scenarios for specific climate events, identifying the potential value at risk for all companies in a portfolio” - SE4

This also suggests that more tools specifically aimed at climate-related risk management are being introduced to the market. SE3 noted that more Article 8 funds are attempting to quantify environmental impacts in general. In the Article 9 fund at Company C, a tool called PACTA, an open-source software, was used to measure sector exposure under different climate scenarios, which was then incorporated into an aggregated scorecard.

Metrics & Targets

Tracking carbon metrics emerged as a frequently used and integrated component of assessing the environmental dimension in ESG within companies A-F. These metrics serve as indicators of firms' emission exposure, enabling comparisons with industry peers and monitoring progress over time. Consequently, such assessments may offer insights into potential transition risks. CE3 noted the significant emphasis on the carbon footprint metric but stressed that it is not necessarily an adequate measure for capturing transition risk due to its complex features. SE4 highlighted their focus on production-based intensity metrics rather than financial metrics.

Company B employed an “avoided emissions” metric as a proxy measure for Scope 4 in its green funds, which perform more rigorous climate-related risk assessments (CE2 & SE3). Avoided emissions have gained traction among funds promoting low-carbon products, as they provide a measure of the positive impact compared to a baseline scenario where the product would not have been used. This helps identify products that are effectively reducing emissions relative to others in the market (Russel, 2019). The aim was to better capture and quantify climate-related opportunities, suggesting that other scopes do not provide sufficient information to assess transition risks (SE3). This approach was also endorsed by NBIM. SE2 noted that the market has increasingly focused on Scope 3 emissions, recently expanding coverage of these metrics.

Targets were emphasized as a key indicator to assess firms' progress and commitments to emission reductions. The Science Based Targets initiative (SBTi) was acknowledged for its standardized and robust methodology, providing guiding frameworks to firms in various industries toward net-zero emissions. The framework's restriction on carbon offsets ensured the reliability of a firm's positioning concerning emission reductions (SE2). Company B developed an internal assessment framework based on the SBTi methodology, evaluating firms using nearly 50 metrics to score their progress relative to their targets. Additionally, they set ambitious objectives to cover all assessments by this framework by 2040 (SE4). However, CE1 stressed that while targets can serve as relevant indicators for investments in a changing competitive landscape, assessing the capital required to achieve these objectives was also critical. This involves understanding the necessary adaptations for the company to meet these targets as well as the associated costs (CE1).

4.3.3 Guiding Industry Standards & Reporting Frameworks

Industry standards and reporting frameworks were instrumental in navigating relevant indicators, metrics, and methodologies to measure firms' positioning facing transition risks. For instance, the TCFD and the Global Reporting Initiative (GRI) have proven helpful by providing guiding principles on carbon metrics (SE2). Additionally, the Carbon Disclosure Project (CDP), an independent global disclosure system for environmental impacts, was valued for identifying areas where a company lagged in climate aspects. SE2 further emphasized that many firms' disclosures on climate-related topics could be perceived as marketing, often referred to as "greenwashing", making neutral reporting initiatives such as the CDP particularly useful. Furthermore, companies' capital allocation was assessed concerning transition risks, with the Institutional Investors Group on Climate Change (IIGCC) framework proving helpful in identifying investments aimed at continued carbon emissions exploration (SE7).

Moreover, the EU Taxonomy was deemed helpful for identifying economic activities that contribute to environmental objectives, serving as a valuable indicator for managing transition risks (CE2, SE2, and SE3). Additionally, CE2 highlighted the usefulness of taxonomy alignment, particularly as it began to include transitional energies such as nuclear power, thereby reflecting "reality" and not solely focusing on green technologies or low-emitting industries. This approach facilitates the identification of companies' positioning across various sectors. Thus, regulations such as the Corporate Sustainability Reporting Directive (CSRD)

were critical in improving data access, requiring more companies to disclose their taxonomy alignment and emission metrics (SE2).

4.3.4 Assessment Challenges: Uncertainty, Data Access & Quality

Climate-related risks possess complex characteristics that challenge traditional assessments (SE8). The temporal aspect of these risks represents significant uncertainty, leading to varying expectations among fund managers (CE3). CE1, CE2, and SE7 note the difficulties in quantifying the impacts of such risks, often resulting in approximations and conjectures to account for “unknown unknowns”. Acute physical risks are particularly challenging to quantify. Furthermore, CE3 underscores the potential inadequacy of carbon metrics in assessing climate-related risks. Reflecting Battison et al. (2021), who highlighted the absence of efficient tools for navigating these risks, professionals suggest that no best practices currently exist (SE8 and CE2):

“There is no clear quantitative answer to the impact of climate-related risks, it's very very difficult to quantify mechanically, you just have to try to make an assessment of it.” - CE2

Moreover, data availability and quality present significant challenges, as comprehensive transition risk assessments require extensive data. Small to mid-sized companies particularly struggle to meet the demanding reporting requirements due to limited economic resources (CE1, CE2, CE3 & CE4). Additionally, the lack of sustainability-related data among smaller companies has led to larger companies in the Norwegian market being favored by ESG scores, potentially overlooking smaller firms that merit recognition for their environmental efforts (CE2 & CE3). Furthermore, non-financial reporting and sustainability indicators suffer from inconsistent methodologies, impeding comparability and transparency in risk assessments (CE1). The differing methodologies within ESG frameworks further complicate precise assessments of asset impacts (SE2). These issues have persisted for some time (SE3).

4.3.5 Active Engagement

Finally, the interviews revealed that active engagement with companies plays a vital role for asset managers in managing climate-related risks and protecting unitholders (SE7), among both conventional fund managers and sustainability professionals. Company engagement facilitates

an understanding of how firms assess and address relevant risks (CE4), fostering dialogue and trust to enhance communication and transparency (CE1). CE1 emphasized that active engagement with companies is more valuable than any risk screening tool available on the market.

SE4 noted an increasing appetite among fund managers to engage not only about financials but also to become more curious about firms' performance on their emission targets. Additionally, as unitholders become more aware of these topics, fund managers should be more informed on climate issues regardless of their mandate (SE4). CE2 stated that although the company has a dedicated team working on engagement regarding sustainability topics, company engagement is a natural part of the fund manager role, where climate is discussed with the same relevance as other financial aspects. Furthermore, client meetings were found to be helpful in supporting company data used for climate-related risk assessments (SE3).

5. Discussion and Results

In the following chapter, the most intriguing findings will be explored. These findings will be discussed in relation to relevant literature, framed to address the problem statement:

Do asset managers' perceptions of climate-related risks impact investment management of Norwegian equity funds, and to what extent are approaches to navigate these integrated?

5.1 The Importance of Climate-related Risks: Drivers and Incentives

Our investigation uncovers widespread recognition of climate-related risks among both conventional and sustainability asset management professionals operating within the Norwegian market. Consistent with the findings of Krueger et al. (2020), it is apparent that these professionals possess a profound awareness of the advancements and severity of global warming, recognizing the critical need for regulatory measures to bolster global incentives for an energy transition and to prevent temperatures from surpassing critical thresholds. While both physical and transition risks are recognized, there is a predominant focus on transition risks. This emphasis aligns with prior research on climate-related risks in the financial sector, as highlighted by Eren et al. (2022).

The literature indicates that the complex and evolving conditions associated with global warming present material threats to equity values (TCFD, 2017), suggesting that fund managers should integrate such risks into long-term investment strategies (Brayshaw & Symes, 2023). Despite this, our examination of the incentives guiding Norwegian fund managers concerning the significance of climate-related risk factors in investment management reveals a nuanced perspective. While fund managers assess the positioning of firms, particularly within high-emitting industries, they also place considerable importance on the climate sentiment among their beneficiaries and adherence to industry standards for sustainable practices. This approach aligns with the evolving interpretation of fiduciary duties, which posits that fund managers should consider a broader set of stakeholders to address material issues and achieve higher returns (Freeman et al., 2010; Eccles & Klimenko, 2019). Consequently, the emphasis on managing climate-related risks in funds encompasses both the transition risks impacting the competitive positioning of assets and the transition risk factors affecting asset management firms, as preferences and regulations within the financial industry evolve.

Firstly, we found that market demand, particularly the preferences of beneficiaries who are key stakeholders, exerts a significant influence on fund managers. This can incentivize asset managers to more actively manage climate-related risks within their portfolios, thereby fulfilling their fiduciary duties and offering more attractive investment products, consistent with the findings of Eccles & Klimenko (2019). Consequently, the TCFD (2017) framework positions the “market” as both a pertinent climate-related risk factor and a climate-related opportunity for Norwegian asset managers. For instance, several institutional clients have demanded greater transparency from fund managers regarding their climate-related practices and have even incentivized the adoption of climate risk hedging strategies (Engle et al., 2019; Eren et al., 2022), thereby promoting products with fully green investment themes. This approach, increasingly embraced by major global players, seems to be an increasingly adopted approach in the industry (BlackRock, 2023; NZAM, 2022). Furthermore, such investment products have gained traction among retail clients seeking to invest in a more climate-friendly manner or as hedging instruments against oil price volatility. The growing interest among clients in these topics has, in turn, led to a rising interest among fund managers, with climate considerations becoming more integral to strategic aspects within investment frameworks.

Additionally, it was emphasized that prioritizing climate-related risks within investment management frameworks is crucial for maintaining a competitive position in the industry and for avoiding reputational risks associated with regulatory compliance. For instance, the SFDR has contributed to enhancing transparency regarding how asset managers address sustainability aspects, thereby incentivizing more fund managers to incorporate these considerations. This is consistent with the rising trend in Article 8 and 9 funds, observed in Figure 2 seen in Chapter 2.4.1, and again demonstrates that increasing pressure from stakeholders serves as a primary incentive to consider climate aspects, beyond merely their anticipated impact on asset values.

Thus, we find that the investment strategies adopted by asset managers targeting greener firms and renewable technologies in the Norwegian market are likely driven by market demands and compliance with industry regulations, rather than solely by the pursuit of better returns. Conventional fund managers justified this from an investment standpoint, suggesting that green firms were priced at high levels in the market relative to their expected ability to generate returns. While green firms may benefit from climate-related opportunities (TCFD, 2017), operating in more stable markets expected to grow during the transition and being favored by climate regulation and more frequent climate hazards (Batten et al., 2016; Ardia et al., 2023; Antoniuk & Leirvik, 2024; European Environment Agency, 2024), there was a general

perception that these firms were not particularly attractive investments for mandates primarily aiming to achieve excess returns, highlighting their fiduciary duty to beneficiaries. These observations align with Borio et al. (2022), who propose that mispricing may also occur in the opposite direction, potentially leading to a “green bubble” wherein the market overestimates the speed of the transition.

Despite not favoring green technologies over brown firms, fund managers recognized the material threats faced by companies in high-emitting sectors such as oil and gas and shipping, prompting more thorough assessments for these firms. Additionally, they demonstrated a preference for identifying firms within these sectors that were exposed to less climate-related risk, recognizing opportunities to transform commodities in well-established companies poised to outperform industry peers during the transition. This approach aligns with the theory by Teece et al. (1997) and Amit & Schoemaker (1993), who suggest that firms capable of reconfiguring their assets to meet rapidly changing demands can achieve superior returns.

Despite the increasing popularity of climate as an investment theme in response to changing conditions, as noted previously, our findings suggest a consensus that climate salience remains vulnerable to geopolitical and economic conditions. Norwegian asset managers have observed a shift in sentiment over the past few years, noting that higher interest rates and inflation make climate considerations seem too expensive. Additionally, geopolitical uncertainty prioritizes energy security over energy transition. This underscores the necessity of regulation to correct the market failure of climate change and to internalize externalities, compelling investors to consider these aspects as material. Otherwise, climate solutions, perceived as more costly, are not favored, especially during economic downturns. This also suggests that the incentives for investing in green firms may be susceptible to such conditions.

5.2 The Tragedy of the Horizon

Our findings further reveal critical insights into the significance of the time horizon within which risks are expected to materialize in relation to investment decisions. Since beneficiaries of conventional funds were generally not primarily concerned about climate-related risks and mandates were focused on achieving excess returns, fund managers had greater latitude in their subjective interpretations. This suggests that the primary remaining incentive to consider such risks is the anticipated material impact on asset values. As highlighted by professionals, this is largely driven by climate regulations, which pose financial challenges to firms that fail to adapt

to a low-carbon society (Eren et al., 2022). This aligns with Gsottbauer et al. (2024), who link the rising popularity of climate as an investment theme to increased climate regulation.

Investors generally consider risks that could materially impact their valuations in the short term, typically evaluating risk and reward to identify undervalued stocks, as discussed in Chapter 2.3, often leading them to neglect climate-related impacts, a phenomenon Carney (2015) termed “the tragedy of the horizon”. Nevertheless, Table 4 in Chapter 3.2.4 illustrates that investment frameworks that characterize ideal investments with both strategic and financial considerations attributed to firm-specific factors, aligned with Chugh & Meador (1984), are considered on a long-term basis. Thus, we would expect climate-related impacts to deem relevant in the investment frameworks of Norwegian equity funds, especially considering the depreciating value of the Norwegian petroleum sector facing an energy transition (Grippa & Mann, 2020).

Nevertheless, we find that there appear to be weak incentives to consider transition risks as significant, primarily due to the lack of regulation at both national and global levels. This contributes to the perception that significant financial impacts from an energy transition are “a matter of the distant future”. In Norway, this view is reinforced by the country's economic reliance on export income from the petroleum sector, despite its ambitious climate policies (Norwegian Ministry of Finance, 2018). Moreover, there is a prevailing belief that oil production will continue until 2050, thereby minimizing its impact on current equity valuations, despite the absence of a terminal value for such companies. Additionally, the heavy reliance of the Norwegian stock market on oil and gas producers means that reducing positions in these companies is currently perceived as a greater systemic risk than the potential transition risks to equity valuations.

Additionally, several other factors contribute to the perception of an energy transition as distant, including high fossil fuel dependence, rising energy demand, and the need for international cooperation to achieve a global carbon price. Although there are many promising renewable investment opportunities that have significantly replaced fossil fuels, the global energy network is not yet perceived as ready to fully rely on renewable sources. Furthermore, the rising demand for materials, such as those used in AI chips, which are energy-intensive and rely on fossil fuel combustion, creates skepticism about the pace of the transition. Consequently, conventional fund managers view oil companies as delivering promising value relative to their market pricing. Moreover, achieving a global carbon price, essential for steering incentives and promoting a level playing field, faces challenges due to current geopolitical conditions. This

underscores the critical need for effective global regulation to steer incentives and direct capital flows towards companies that pose less harm to the climate.

Lastly, although financial implications from climate-related physical risks cannot be fully offset by insurance (Huang et al., 2018), and neglecting such risks has been argued to potentially lead to an underestimation of unforeseen financial consequences (Brayshaw & Symes, 2023), these risks are not heavily prioritized by fund managers in Norway. As reviewed in Chapter 2.5, Norway is already experiencing increased physical risks, such as flooding from heavy precipitation (Norwegian Ministry of Finance, 2018). Fund managers acknowledge the potential material effects of such risks, citing the financial implications for insurance companies and banks from the extreme weather event Hans in Norway last year. However, physical risks are likely more thoroughly considered in the investment management of global funds, where physical factors harming critical resources are perceived as more relevant material impacts. Overall, in Norway, physical risks are not expected to be particularly material to assets in the coming years. Consequently, from the perspective of materiality horizons, these aspects are considered to have little impact on current priorities in fund management.

5.3 Integration of Climate-related Risk Management: Approaches and Challenges

As noted in the literature, assessing and evaluating climate-related risks is crucial for long-term investors (Norwegian Climate Foundation, 2018; Brayshaw & Symes, 2023). However, effective methods to price and measure the impacts of climate-related risks are still developing (Battison et al., 2021). Similar to findings by Kruger et al. (2020), our research shows that approaches to managing climate-related risks vary significantly. Climate-related risks are perceived as an integrated part of traditional investment approaches, a key aspect of ESG assessments for high-emitting industries, and a source of risk challenging traditional valuation methods due to the limitations of historical data in predicting uncertain future outcomes. We further found that the recommendations from the TCFD, acknowledged for enabling more accurate assessments of climate-related risks (IPCC, 2021), were employed in various ways.

Aligned with TCFD (2017) recommendations, we discovered that asset managers employ carbon metrics and place particular emphasis on verified emission targets to evaluate firms' exposure to transition risks. These metrics are instrumental in assessing companies' progress and commitments to emission targets relative to industry peers, providing critical insights into

realistic trajectories and potential costs associated with transition initiatives from an investment perspective. Sustainability professionals managing funds with a stronger focus on climate aspects have even adopted approaches to measure Scope 4 emissions, which quantify the extent to which a company reduces emissions within its industry, thereby indicating a competitive and resilient position, employing a climate-related risk hedging intuition, as previously discussed.

Nevertheless, as highlighted by NBIM (2021) in Chapter 2.5.2, significant challenges accompany these approaches. Professionals particularly emphasized issues such as the exclusion of Scope 3 emissions and the weaknesses inherent in metrics like carbon footprint and emission intensity. Additionally, inconsistent methodologies and incomplete reporting by companies, especially smaller entities, further complicate the assessment process. These issues make it difficult to obtain a comprehensive understanding of a firm's overall emission profile and transition risk exposure. Consequently, industry reporting frameworks that aim to enhance data quality, standardization, and transparency are crucial. Moreover, industry initiatives that offer independent and reliable methodologies are imperative for making well-informed investment decisions, as non-financial reporting could be susceptible to greenwashing. By addressing these challenges, investors can better evaluate the potential positioning and risk profiles of their investments, facilitating more informed choices.

Furthermore, the literature suggests that to make accurate predictions and assessments, more advanced and dynamic models that account for the inherent uncertainties and complexities of climate-related risks are necessary (Giese et al., 2022; Simpson et al., 2021). This need for sophisticated models was also acknowledged by the professionals. Scenarios that fail to encompass critical sources of material risks can lead to asset price devaluation (Ranger et al., 2022). Professionals emphasized the importance of factoring in "unknown unknowns", recognizing the absence of effective tools to measure such risks accurately. Nevertheless, scenario analysis proves effective for stress testing portfolios under various climate scenarios (CFRF, 2023).

NBIM (2021) notes that scenario analysis is still a developing field in asset management. Survey insights from the TCFD in 2022 indicate that only 30% of 151 asset managers, typically those already identified as responsible investors, use scenario analysis in their investment decisions (TCFD, 2022). Our findings suggest that scenario analysis is becoming more frequently adopted among both conventional fund managers and sustainability professionals. However, its incorporation into investment frameworks varies. It ranges from serving as an

indicator in aggregated in-house ESG risk assessments to stress testing valuation models in scenarios with more rigorous regulation of externalities. In this light, our results suggest that Norwegian asset managers demonstrate a proactive stance on climate-related risk management compared to the industry.

Finally, company engagement consistently proves to be an effective approach for assessing and navigating climate-related risks. As highlighted in Table 4 in Chapter 3.2.4, management and governance are crucial strategic aspects in the investment frameworks of Norwegian equity funds, serving as indicators of sound and stable growth. Fund managers use this focus to evaluate how companies map and manage their climate-related risk exposure, particularly in high-emitting sectors. Active dialogue fosters open communication and enhances transparency, aiding in the validation of company data, which was often perceived as risky to accept at face value.

6. Conclusion

6.1 Conclusion

The aim of this thesis was to assess how perceptions of climate-related risks impact the investment management of equity funds in the Norwegian stock market and understand the approaches adopted to manage and navigate these risks. By interviewing 12 asset management professionals and analyzing investment frameworks, we addressed the following research question:

Do asset managers' perceptions of climate-related risks impact investment management of Norwegian equity funds, and to what extent are approaches to navigate these integrated?

Our study reveals that the severity of the global climate crisis and its potential financial implications on equity funds are well understood shaping the perceptions of Norwegian asset managers. Transition risks are the primary focus, although physical risks are also acknowledged. We find that there is a rising interest among conventional fund managers in gaining more knowledge on climate topics due to its perceived impact on firms strategic positioning for long-term performance.

We further discovered that the most significant drivers for fund managers to improve portfolio resilience against transition risks include market preferences, reputational concerns, and climate regulation. Market demand for green investment products, particularly from institutional clients, incentivizes fund managers to invest in firms less exposed to climate-related risks and to adopt climate-related risk hedging strategies. Additionally, compliance with industry regulations is crucial for maintaining attractive investments. However, the current market sentiment to favor investment products with resilient strategies to climate-related risks is weak, possibly due to economic and geopolitical tensions, which reduces the incentives for fund managers to consider these risks. Despite this, the primary incentive for conventional fund managers to account for climate-related risks remains the expected material effects from stricter climate policies imposed on their assets.

From a valuation perspective, the time horizon over which relevant risks materialize significantly influences asset prices and fund managers' investment decisions. Despite long-term strategies, several factors contribute to the perception that the energy transition is distant, supporting continued investment in "brown" firms even as the fossil fuel phase-out approaches.

Concurrently, “green” stocks are viewed as expensive and high-cost. Consequently, fund managers currently lack incentives to favor green firms over brown firms for excess returns, despite potential long-term stability. Fund managers primarily manage transition risks by considering assets’ positioning within high-emitting industries, focusing on how firms may transform traditional commodities to achieve superior returns, aligning with traditional management theories.

The study highlights that tools such as tracking carbon metrics, scenario analysis, and active engagement are commonly adopted to assess and manage climate-related risks, particularly for industries more prone to be affected by climate regulation. However, challenges related to data access and quality necessitate internal analysis and the development of standardized methodologies. Additionally, scenario analysis is increasingly implemented to evaluate material portfolio impacts under various climate scenarios, while close dialogues with companies are crucial for understanding and managing risk exposure due to often unavailable or unreliable data.

Overall, this thesis finds that asset managers’ perceptions of climate-related risks impact how they navigate investments amidst rising temperatures, changing global conditions, and mandates to deliver excess returns, while highlighting the critical role of incentives in addressing these risks. It further uncovers the primary transition risk drivers in the Norwegian market, emphasizing that climate sentiment for green investments may be vulnerable to economic and geopolitical tensions. Finally, this research uniquely assesses the extent to which climate-related risk management is integrated into Norwegian equity funds, demonstrating that asset managers actively explore tools and approaches to manage a complex and dynamic investment environment.

6.2 Limitations

This study has several limitations. The qualitative design does not fully control for variables influencing experts’ perceptions, challenging validity. Incorporating a quantitative component could enhance the understanding of these relationships. The flexible format of semi-structured interviews poses reliability issues, for instance due to the influence of current economic and geopolitical conditions. In addition, a broader sample could yield other relevant insights.

Focusing the study on investment management of equity funds in the Norwegian market limits the study's generalizability to other national contexts and investment products. Norwegian fund managers' potential pragmatism towards oil production or perceptions of specific risk factors are influenced by local climate regulations and market sentiment and may differ with priorities of asset managers in regions with less economic stability or greater exposure to physical climate risks. Moreover, ESG was incorporated in the investment frameworks of the companies in the study. SFDR Article 6 funds or other investment products that do not consider such aspects are likely less concerned with climate-related risks. Finally, the qualitative approach inherently subjects the analysis and results to the subjective interpretations of the researcher.

6.3 Suggestions for Further Research

To deepen the understanding of the significance of managing climate-related risks for Norwegian fund managers, assessing the impact of climate-related risks on Norwegian stocks represent an interesting avenue for further research. Applying a quantitative method, constructing a climate news index to predict the returns of Norwegian assets, similar to the approaches of Ardia et al. (2023) and Antoniuk & Leirvik (2024) would reveal potential market reactions to transition risks, and uncover whether certain firms demonstrate greater resilience.

Second, this study revealed that market sentiment to prioritize climate-related risks and opportunities among clients had potentially experienced a decline due to rising geopolitical tensions and worsening economic conditions. Conducting a study to investigate these relationships in greater depth could yield interesting results.

Lastly, to gather a broader impression of the perceptions and integration of tools used to manage climate-related risks, distributing a survey to a diverse group of asset managers could be beneficial. This survey should target professionals working on various investment products with differing characteristics and span among several geographies. By doing so, a broader set of insights could be gathered, offering a more holistic view of the strategies and challenges faced in navigating climate-related risks in investment management.

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The AI tool Chat GPT was used to check for grammar, spelling and for reformulating sentences in this thesis. Link <https://chat.openai.com/>

Appendices

Appendix A: Interview Guide for Asset Management Professionals

Introduction

- Can you briefly introduce yourself and your current role in the company?

Part 1: Perceptions of Climate-related Risks in Investment

- What are your thoughts on climate change? And can you describe your current understanding of the global progress in reaching the goals outlined in the Paris Agreement?
- Can you explain how you would define climate-related risks and its meaning from an investment perspective?
- In what ways do you think climate-related risks could potentially affect the financial position of companies in Norway? And can you explain how and when you would expect to see such impacts?
- Can you briefly explain how you assess portfolio companies or potential investments in your strategic framework, and if you think key assessment factors for good investments align with firms' that better withstand external shocks attributed to a changing climate?
- What do you think are the prevailing motivations to assess climate-related risks in fund management in the Norwegian market?
- How do you perceive the role of equity funds when it comes to fostering a climate resilient economy? Do you think active climate-related risk mitigation is consistent with your fiduciary duties? If so, why, or why not or in what ways?
- How do you experience the focus on climate-related risks among your clients, or for instance compared to other risk factors such as ESG or financial risk, and are customers interested in such aspects? If so what and who?
- Do you think the perceptions of the potential impacts of climate change and climate-related risks in investment decisions have changed over time and why?
- How would you describe the importance of climate-related risk compared to other assessment aspects in your general investment or ESG framework?
- What are the biggest challenges in terms of navigating climate-related risks at this current stage?
- What are the opportunities of actively managing climate related risks in the Norwegian market? and what would this imply?

Part 2: Integration in Investment Management Practices

- How do you consider climate-related risk aspects in your investment framework? And if you do, what tools or strategies do you employ to measure or manage the impact of climate-related risks?
- What approaches, if any, have you adopted specifically aimed to manage potential impacts from climate change or from human responses to this in investment decisions / fund management?
- Can you explain how you use information to assess such risks for investment decisions, and whether you prefer to use primarily qualitative, quantitative information or a mix?
- Do you have an example of when you took action to manage climate-related risk in your portfolio or an equity fund that you work with?
- Do you think tools specifically aimed at managing climate-related risks will be more commonly adopted among fund managers in the coming years and why?

Appendix B: Full Coding Table with Primary Data Units

Table 5: Full Coding Table with 106 Primary Data Units

Quotations	First Order Codes
<p><i>“There is no doubt that we recognize the challenges caused by anthropogenic GHG emissions. Do I believe we can stay below the 1.5-degree threshold with today's existing frameworks - no. Unfortunately, I am even worried that the world is moving in the wrong direction when it comes to staying below 2 degrees as well.” - CE2</i></p> <p><i>“I am afraid there is a misconception that the climate objectives outlined in the Paris Agreement can still be reached, while little evidence currently indicates that this is actually going to happen.”- SE6</i></p> <p><i>“It is quite clear that we face a huge challenge when it comes to the climate crisis. We must undergo an energy transition. We can't continue in the manner we have been.” - CE4</i></p> <p><i>“Climate change has affected everything we do, impacting both societies and companies. Although we are on a more sustainable path, the emissions are increasing, which indicates that we are missing something and that regulations are not functioning optimally. We especially need to onboard more polluting sectors that rely on oil and gas to facilitate a real transition.” - SE2</i></p> <p><i>“Although climate as a theme is not of particular relevance to my mandate, I am very concerned about the state of progress when it comes to preventing temperatures from exceeding critical thresholds” - CE3</i></p>	<p>Climate crisis and urgent transition (5)</p>
<p><i>“It covers the direct financial risks on the companies we own for instance caused by physical risks, or by changing external conditions.” - SE6</i></p> <p><i>“I refer to the definition given by the TCFD, we talk about acute and chronic physical risks as well as transition risks.” - SE8</i></p> <p><i>“We use the definition provided by the TCFD, transitional and physical risks and chronic and acute risks. This framework outlines the opportunities and threats, linking climate risk to financial aspects.” - SE3</i></p> <p><i>“Yes, that's a very good question. When I think about it, I'm not sure I have it off the top of my head, but I guess climate-related risks speaks to the various impacts as a result of climate change that can pose material threats to firms” - CE4</i></p> <p><i>“These include risks that can have a material impact on a company, such as stranded assets, poor adaptation to the transition, capital expenditures and revenue tied to oil and gas, or regulatory impacts. Physical risks include flooding, hurricanes, wildfires, or other climate events that affect resources or the sourcing of raw materials, such as agricultural production.” – SE2</i></p> <p><i>“Climate-related risks speak to how companies should adapt their business models to improve their position facing a low carbon society, avoiding stranded assets for instance. On the other hand, climate change can affect access to raw materials or resources” - SE5</i></p>	<p>Defining climate-related risks (6)</p>
<p><i>“I think in terms of physical risks, medium to long term risks will for sure impact many companies with exposure to areas at risk of extreme heat and drought. If you look at the recent research from the European Environmental Agency, the magnitude of these risks depends a lot on the company locations” - SE8</i></p>	<p>Physical risks (4)</p>

<p><i>“Higher temperatures causing more frequent droughts can threaten critical resources. For instance, water access can have substantial impacts on some of our investments - so this is something we consider” - SE5</i></p> <p><i>“A hypothesis is that more frequent extreme weather will cause more frequent payouts for banks and insurance companies and challenge infrastructure in Norway. Just look at the storm “Hans” from last year. At the same time, consulting companies that provide flooding solutions may benefit from this in the coming years, which in that view could be a more attractive investment” - CE3</i></p> <p><i>“There is more uncertainty in estimates, especially regarding extreme weather. When this becomes more frequent we see the impact on insurance companies in particular. We also try evaluate the impact of changing climate conditions such as wind patterns if we invest in a new windpark as this may have significant impacts on how the capacity of turbines are optimized” - CE4</i></p>	
<p><i>“Climate-related risks relate to the discounted cash flow of companies depending on the positioning of the industry facing the low-carbon transition.” - CE1</i></p> <p><i>“The simplest way to look at climate-related risks is as a form of cost of capital, costs in the form of having a higher return requirement and a lower multiple because the firm is doing something that is harmful to the environment. This is due to a weaker position facing regulations that support a low carbon transition. In addition, you may turn it around and say that firms that pose less harm to the environment can benefit from more stable growth.” - CE2</i></p> <p><i>“Climate-related risks represent a huge risk to the value of investments, so there is no doubt we must take this into account. However, we do not really know how and when it will impact yet. However, I think that as we approach 2030 it will become even more important” - CE4</i></p> <p><i>“You cannot expect that Equinor, in its current form will exist forever. Oil companies does not have a terminal value, because at some point, we have to stop the production, whether that is in 5, 10 or 30 years, I bet the on the last one.” - CE2</i></p> <p><i>“When we make an investment decision, the perspective is always on the long term rewards - if I do an investment today, what can it yield in 20 years?” - CE1</i> <i>“I think climate-related risks will be much more important in the long run than it is now, for instance, I am not very worried about more frequent extreme weather now, but in some years, some companies might have overestimated their income” - CE3</i></p> <p><i>“The tragedy of the horizon is evident in investment management. In fundamental analysis, you only consider maybe 7-8 years from now, while material impacts from climate-related risks is associated with high uncertainty in this time aspect” - SE8</i></p> <p><i>“It is hard to say whether emission intensive stocks are currently over or undervalued in this regard, however, probably, climate-related risks have little impacts on the market because they are very far ahead, which minimized the impact on the value today.” - CE2</i></p>	<p>Transition risks, expectations and valuation impact (8)</p>
<p><i>“If it was not for climate regulation, asset managers would not consider climate-related risks” - SE8</i></p> <p><i>“For example, the SFDR which forces funds to disclose a certain level of sustainability integration and regulatory changes in the EU and in Norway is driving more portfolio managers to incorporate more sustainability.” - SE3</i> <i>“SFDR and sustainability compliance in general is very important to have attractive investment products” - SE1</i></p>	<p>Climate policies and sustainable finance regulations (9)</p>

<p><i>“A significant challenge in terms of climate change is the lack of a global regulation of the carbon market and a global carbon price. There are currently a lot of loopholes in the current carbon market and European companies will end up losing their competitive position if there is no global regulation applicable to emitters.” - CE1</i></p> <p><i>“I honestly think that for a lot of fund managers, the value of managing for instance transition risks are not that visible at the present. However, I strongly believe that this perception will change as climate regulation becomes more stringent. I believe the regulation is definitely a key driver.” – SE2</i></p> <p><i>“Carbon tax, for instance, depends on how you look at the supply chain. This will stimulate companies to invest in greener technology, this will contribute positively. Taxation of emitters is key, and especially on a global scale, to avoid worse competitive positioning of European companies and an even plainfield.” – CE1</i></p> <p><i>“The impact of transition risks for instance depends on whether the country is imposing a lot of regulations on polluting sectors, this will represent a risk, especially for countries that are producers of fossil fuels” - SE8</i></p> <p><i>“Companies in low emitting sectors have a structurally higher and more stable growth as they benefit from a government that is motivated to foster a low carbon society” - CE2</i></p> <p><i>“I am concerned geopolitical risks threaten international cooperation, which is critical for facilitating global incentives to support the climate objectives”- SE5</i></p>	
<p><i>“The biggest challenge of achieving a low carbon future is definitely dealing with oil and gas, especially when the welfare system and thousands of jobs rely on this” – SE4</i></p> <p><i>“Climate probably has a lower sentiment now due to geopolitical tension and the fact that oil stocks have become more attractive investments again. When interest rates are at 5%, caring about the climate might be perceived as too expensive”- CE2</i></p> <p><i>“There is no light switch, and it will take time before we can expand renewable energy parks to replace fossil fuels. In addition, the energy network is not yet built for this, wich means it will take time. 2030 is approaching fast, and we see that some push the time horizon to 2050, but we need to put down dedication to reach it.”- CE4</i></p> <p><i>“I fear that we currently underestimate the global energy demand in the coming years, and the energy required to produce materials we highly depend on. If you look at Envidia and the amount of chips they are estimated to deliver in the coming years, these are made of silicone, cobber and other materials that are still produced by fossil fuels. Incentives for replacing the enormous amount of energy in production are currently not strong enough. As long as we don’t have a global price on carbon, the incentives for the transition is not present.”- CE1</i></p> <p><i>“It is possible to exclude entire industries which have higher risk exposure, but this can cause systemic risks, and may not be better than helping the companies transition” - SE8</i></p> <p><i>“We have noticed a trend of divesting from oil and gas in Europe, however I do think we are more pragmatic to oil in Norway, as it represents our main export commodity and is key to the Norwegian welfare system. In addition, oil makes up a large percentage of the market, which means that limiting exposure in this sector would quickly impose a lot of risk compared to the benchmark.” - CE3</i></p> <p><i>“The Norwegian market is heavily tilted towards the petroleum industry. The regulatory environment does not favor a transition in Norway, as long as this</i></p>	<p>Fossil fuel dependence (8)</p>

<p><i>persists and there is no regulations putting constraints on oil production we will not see a change.” - SE6</i></p> <p><i>“Right now, I think many in the industry is sharing the perception that there is more risk in deviating from the market index, compared to reducing financial climate risk” - SE6</i></p>	
<p><i>“If the customer demand increases for more green investment products, it means the market will put more money into such companies, which will drive green asset prices up. Just look at the tech bubble from 2020-2021. I think a lot of people overestimated the pace of the transition. However, what matters is your anticipation compared to the rest of the market.” – CE3</i></p> <p><i>“There are many incredibly innovative and interesting solutions and technologies within renewable energy in Norway. They take quite a long time to develop and cost a lot of money but it's absolutely necessary. It is all about finding the balance when choosing investments, but the idea of contributing to new solutions that reduces the impact on climate while making money is exciting. I have faith in an energy transition.” - CE4</i></p> <p><i>“If you look at the cost of capital in green and brown industries, you have to pay a much higher multiple in green firms for the same business, which means you overpay for a mediocre business.” - CE1</i></p> <p><i>“I think Norway is well positioned due to hydro. In addition, a significant amount of fossil fuel production is gas, which in relative terms is much less polluting than oil” – CE1</i></p> <p><i>“During covid we experienced a green tech-bubble, where the market priced high multiples on companies that were not making money. It has become clearer that although green contribution is good and necessary, it is also often associated with high costs. At the end of the day, we need to invest in a good business model. Thus, I am convinced transition is better dealt with by well established companies and transforming commodities” - CE1</i></p> <p><i>“To cut to the bone, what we do is maximize returns for our beneficiaries. Apart from that we adhere to sustainability guidelines and our company standards for responsible investments.” - CE2</i></p> <p><i>“We have a mandate and can not invest in a “castle made of air”, we need to focus on profitability and what is truly a good investment, we do not receive any subsidies for investing in renewable energy, so in the end it needs to be a profitable company on its own.” - CE2</i></p> <p><i>“Generally, I definitely think that we who manage the capital have an important social role in terms of climate risk, but it must also somehow be balanced with our mission which is to create excess returns for the customers we have.” - CE4</i></p> <p><i>“In my fund, our task is to generate alpha for the beneficiaries, which means that whether we invest in a high emitting industry or not does not really matter to us in itself, what matters is our expectations of its risk exposure and how the market is pricing those risks” - CE3</i></p> <p><i>“For us, an investment must always make economic sense, and not just to promote a green transition. It is all about what the investment can yield long term ”- CE1</i></p> <p><i>“Portfolio managers must be able to reach their fiduciary duty while also integrating the climate aspect. I think there is a big misconception of this in the US in particular where ESG and the fiduciary duty is seen as to different concepts or not compatible. In addition, how fund managers evaluate the impacts of regulation are different causing a variety of anticipations of how strong the impacts related to climate will be in in the near term.” - SE2</i></p>	<p>Green investment opportunities & fiduciary duties (11)</p>

<p><i>“More institutionalized clients such as pension and professional clients have a stronger focus on climate-related risks and expects a lot from us” – CE1</i></p> <p><i>“Institutional clients definitely have a preference for supporting climate friendly solutions and pay attention to how these risks are taken into account and incorporated in investment management. When it comes to retail clients it depends on their preferences. – SE3”</i></p> <p><i>“I generally think that as customers are more aware of climate-related topics, portfolio managers must also be more knowledgeable on these topics.” - CE2</i> <i>“I think fund managers around here in Oslo think climate change is an important theme, and more and more green funds are being offered because that's what customers are also asking for.” - CE4</i></p> <p><i>“We launched a fossil free product highly due to customer requests. We also see that clients use our fossil-free products for hedging purposes against the oil price which also makes them attractive. In general the thematic funds for sustainability has been quite attractive, also among private investors who wants to save their money in a sustainable way” - CE4</i></p> <p><i>“We are much driven by the sentiment among our customers, and I would say climate or ESG sentiment goes in waves. Around the pandemic and until 2022, climate was very on top of mind, but now sentiment is actually low. I think this is due to geopolitical risks, high interest rates and inflation.” - SE3</i></p> <p><i>“After Covid, geopolitical risk has been much higher on the agenda, which impacts the market and energy prices a lot. Just look at the price of defense companies.” - CE3</i></p>	<p>Market sentiment & customer preferences (7)</p>
<p><i>“We analyze the impact of CO2 emissions in the same way we analyze whether we think stocks are expensive or cheap. So I would say that this is naturally one of the variables in the investment decision. It generally has the same impact as other aspects that may be helpful to assess whether an investment is successful such as quality of the management, earnings trends or stability. ” - CE2</i></p> <p><i>“Long term, we believe the environmental aspect will have the most material influence on companies - so it is an important factor in our assessments” – CE1</i></p> <p><i>“The assessment of climate-related risks challenges traditional investment strategies and is inherently different from other sustainability aspects because you cannot use historical data to predict future impacts, these are unknown.” - SE8</i></p> <p><i>“Assessing anticipations for climate-related risks is just a part of the investment process. We do not look at specific ESG features of a company. However, I have personally paid more attention to this recently.” - CE3</i></p> <p><i>“I think many fund managers still look at ESG metrics to assess climate-related risks which is problematic when they are taken at face value, and it can influence how investments are made. Metrics vary in data quality, the weighting of the dimensions as well as its reliability. “- SE3</i></p> <p><i>“Climate-related risks are integrated as a topic in the environmental dimension of our ESG assessments. In the aggregated scores we assess the different dimensions equally. However, the fund managers is usually particularly interested in the climate-related risk topic when they review our assessments” - SE1</i></p> <p><i>“Climate-related risk assessments are per now an integrated part of our internal ESG assessment. It is located under the E pillar, under “climate and transition”, where we generally identify some sectors that are more exposed to risk, such as high emitting industries like textile, oil and gas or shipping. We then assess whether the company performs scenario analysis according to the TCFD. If they</i></p>	<p>Integration in traditional investing and ESG (11)</p>

<p><i>do, we often see the risk as limited. However, this aspect affects our ESG assessment significantly. “ - SE2</i></p> <p><i>“We are starting to account for the ETS scheme, and carbon offsets as well. How much companies spend on such credits is important. In addition, the impact of the price of carbon needs to be accounted for in financial statements because it impacts financials.” - SE2</i></p> <p><i>“I am convinced there is more value added with inhouse work and interacting with the businesses. When it comes to ESG topics, I think the environmental aspect will be the most important in the long term” - SE1</i></p> <p><i>“I don't think the fund managers do any integrated climate risk assessments at all. I think it lies with the sustainability department, and we are currently updating our risk mapping framework” - SE6</i></p> <p><i>“My impression is that many portfolio managers account for climate risks, however I also think that because it is a part of our mandate in the fund that I work on, we have a stronger incentive to do extensive analysis, and funds that do not have this as part of their mandate have a lot of freedom in how they select and choose their companies.” - SE3</i></p>	
<p><i>“In the fund that I work with, which is Article 9, we actively seek to find companies that have positive environmental impacts which is different from a regular fund. However, I believe more article 8 funds are conducting scenario analysis and trying to quantify impacts from climate-related risks.” - SE3</i></p> <p><i>“We use stress tests to measure impacts on revenues, asset robustness, opex, capex etc. in different scenarios” - SE8</i></p> <p><i>“For climate-related risks in particular, we use different tools for scenario analysis such as PACTA - which allows you to measure sector exposure in different temperature scenarios. We then assess this as a parameter in a more complete scorecard. ” - SE5</i></p> <p><i>“I think more fund managers have started using risk measures such as Climate Value-at-Risk (CVaR), which models a world with rising temperatures to assess the potential financial impact on portfolios. Additionally, new tools are being introduced that allow for the construction of scenarios for specific climate events, identifying the potential value at risk for all companies in a portfolio“ - SE4</i></p> <p><i>“SBTi has also become an important indicator to recognize companies that are on a path to reduce their emissions - for instance, they have restrictions in the amount of emissions firms can offset which is good for reducing risks such as additionality.” - SE2</i></p> <p><i>“We do perform scenario analysis, but I would not say it is a frequently used tool in our investment framework at least.” - CE2</i></p> <p><i>“Scenario analysis is used by our own team who is responsible for mapping climate-related risks” - SE4</i></p> <p><i>“We did a stress test on the portfolio recently, where we set the price of carbon to 100 EUR per ton CO2e emitted, to measure how this would impact the margins of the companies in our portfolio.” - CE1</i></p> <p><i>“Over the last two years we have developed an internal assessment framework, based on the SBTi methodology where we assess around 50 metrics. We then provide a score for companies on their progress relative to reaching their emission reduction targets. Our objective is to cover all investments by this</i></p>	<p>TCFD recommendations (13)</p>

<p><i>framework by 2040, however, there is still a lack of methodologies for certain companies” - SE4</i></p> <p><i>“We pay attention to SBTi, which are important as the competitive landscape changes. It is also important to assess the aspiration levels against the Paris Agreement, the tangibles and intangibles of the company and how it needs to adapt. It is easy to flag targets, but you need capital behind the roadmap to reach it.” - CE1</i></p> <p><i>“We look at all emission metrics, but avoided emissions is something we have started to incorporate a lot. The other scopes does not provide a lot of information on transition risks. This allows us to learn about the opportunities and quantify these. This approach is also supported by NBIM who recently encouraged more companies to disclose this data.” - SE3</i></p> <p><i>“If you look at the investment frameworks of green funds which have much more rigorous climate-related risk assessments, they use a metric called avoided emissions, a kind of scope 4, which tells you how much CO2 you can save by investing in a company. However, this is not something we look at at all.” - CE2</i></p> <p><i>“Scope 3 is becoming more important, and there is a big pressure from investors on companies to disclose this, which has increased the coverage on this metric.” – SE2”</i></p>	
<p><i>“Taxonomy alignment is definitely an indicator we find very useful, especially because it now covers nuclear power which is a transition energy, which in our eyes is a measure more aligned with reality.” - CE2</i></p> <p><i>“I would say that the EU Taxonomy disclosures are good indicators attributed to managing climate-transition risk. However, several industries are not covered by this as of now, such as agriculture. I think that as the CSRD requires more companies to disclose on Taxonomy, this will be very helpful” - SE2</i></p> <p><i>“The EU Taxonomy is helpful to identify green revenues, capex and opex” - SE3</i></p> <p><i>“The TCFD and GRI have guiding principles which are helpful on how to measure carbon footprint, and we generally follow such guidelines. Initiatives such as the SBTi are also helpful as a reliable indicator of whether a company has a realistic net zero aligned trajectory. It for instance has clear restrictions on carbon offsets and what can be compensated with carbon credits.”- SE3</i></p> <p><i>“The company’s capital allocation is important, for instance we use the IIGCC framework help identify the investment used to keep exploring carbon emissions” – SE7</i></p> <p><i>“The CDP is a good tool as it provides clear indications in terms of where the company might be lagging on climate. Firms often provide reports where a lot of the information is marketing. CDP however, is neutral.” – SE2</i></p>	<p>Industry standards & reporting frameworks (6)</p>
<p><i>“I think one of the challenges of anticipating climate change on investments is the different expectations of its possible impact. Portfolio managers may have different perceptions on when disasters may hit, and how fast climate risks may cause financial implications for the companies.” - CE3</i></p> <p><i>“There is no clear quantitative answer to the impact of climate-related risks, it's very very difficult to quantify mechanically, you just have to try to make an assessment of it.” - CE2</i></p> <p><i>“Quantifying climate-related risks is one of the major challenges, and it still involves a lot of approximation and guesses. Working with climate-related risks, you cannot look at the history to make projections. You are only concerned with the future. For instance strong winds and heat waves are nearly impossible to</i></p>	<p>Assessment challenges (12)</p>

<p>quantify, especially acute risks. I don't think anyone is doing things correctly and so far, how to do things is still a mystery. " - SE8</p> <p>"There is a lot of uncertainty, we need to factor in unknown unknowns" – CE1 "The biggest challenge as a portfolio manager, when it comes to making assessments of climate risk, is clearly the need for a lot of data, which currently does not exist for small-mid cap." - CE4</p> <p>"Data quality and availability gaps have been a real struggle for some time. There has also been a focus on carbon footprint which is not necessarily a good measure for transition risks. It is much more complex." - SE3</p> <p>"We definitely struggle to receive full disclosures from companies. Especially, many of the smaller companies lack resources to report according to industry standards" - SE1</p> <p>"There are many misconceptions out there due to differing ESG frameworks, making it difficult to assess the real impact on the assets" – SE2</p> <p>"Fund managers have different ways of assessing climate-related risks, but right now, due to the inconsistencies in non-financial reporting, we are not comparing apples with apples. Improved methodologies for Scope 3 emissions is also vital" - CE1</p> <p>"Only the large companies that can afford to report on all necessary data and disclosure requirements are rewarded with a good ESG score, which means that smaller companies that may deserve credit for their environmental efforts are not recognized in these frameworks" - CE2</p> <p>"Companies have to report on a lot, and larger companies that have economic muscles to deliver on these requirements are the ones being rewarded. The smaller companies typically get a bad score because they cannot provide the data." - CE3</p> <p>"Data availability and reliability represent a huge issue. Especially for scope 3, which many companies do not disclose. Scope 3 may account for 70% of the emissions for many companies – so it's a problem. Today, companies forecast their emission paths in 5-10 years, but how can you actually do that if you have not even completed the starting point?" - SE2</p>	
<p>"We see active stewardship as a key way to manage climate-related risks and protect unitholders"- SE7</p> <p>"There is an increasing appetite among fund managers to engage not only about the financials, as many portfolio managers want to know whether their companies can reach their emission reduction targets" - SE4</p> <p>"We have a dedicated team that work on company engagements on ESG topics, however, us fund managers of course also engages with the companies on a regular basis - and climate is a topic we discuss similar to other aspects that affect sales or costs" - CE2</p> <p>"There is more value added in internal work and interacting with companies than any screening tool available on the market. Engagement opens for dialogue and trust which facilitates more transparency and proves us a better understanding of their risk management " – CE1</p> <p>"We actively engage with companies to understand how the companies deal with climate-related risks" - CE4</p> <p>"Client meetings are critical to back up the data, which can never be taken at face value" - SE3</p>	Active Engagement (6)

Appendix C: Fund Characteristics Table from Document Analysis

Table 6: Relevant Characteristics of Funds Managed by Interview Participants

Fund Manager	Fund Type	Risk Classification	Primary Investment Objective	Investment Horizon	SFDR Category	PRI Signatory
CE1	Norwegian Equities	6	Excess returns (risk adjusted)	Long term, 5+ years	Article 8	Yes
CE2	Norwegian Equities	6	Excess returns (risk adjusted)	Long term, 5+ years	Article 8	Yes
CE3	Norwegian Equities	6	Excess returns (risk adjusted)	Long term, 5+ years	Article 8	Yes
CE4	Norwegian Equities	6	Excess returns (risk adjusted)	Long term, 5+ years	Article 8	Yes
SE5	Global Equities	6	Solving UN SDGs	Long term, 5+ years	Article 9	Yes

Source: Company Reports of Funds Managed by Interview Participants (fund managers only)