Bracing the winds of change

Exploring strategies in a net-zero phase out: An analysis of Nordic Oil and Gas Majors

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Abstract

This study explores the how sustainability reporting communicates strategies adopted by Nordic Oil and Gas Majors (OGM) in transitioning towards net-zero emissions, with a focus on Equinor, Neste Oyj, and Ørsted over the period 2008–2024. Using a qualitative comparative content analysis of sustainability reports, the research examines how these companies communicate their approaches to decarbonisation through greenhouse gas (GHG) reporting, carbon management accounting (CMA), the guiding Global Reporting Initiative (GRI) standards, and sustainability visioning. Based on the frameworks of strategies in response climate change (Bui & De Villiers, 2017) and sustainability visioning (Madsen & Ulhøi, 2021), the analysis identifies distinctive strategies taken during these OGM transition to net-zero. The transitions explored during this study ranged from Ørsted's full transition to renewable energy, Neste's innovation in biofuels, to Equinor's continued reliance on fossil fuels alongside gradual diversification. Findings highlight that there are four distinct drawbacks leading to the communication of insufficient data found among sustainability reports. Firstly, there is a lack of reporting either in sustainability visioning or Carbon Management Accounting responses to climate change due to the evolving nature sustainability reporting standardisation. Secondly there can be insufficient data reported as an aversion technique by the Oil & Gas Major as they do not wish to address climate change and their role in contributing to this. Thirdly there can be insufficient organisational insights regarding transitions as the energy producer is not engaging or envisioning strategies towards a complete phase out of black energy but is expanding their product mix. The last drawback can be identified as there is lack of data collection and reporting from the businesses themselves. Other key findings include, that the expansion of product portfolio could be seen as first step towards the transition goals set by the Nordic energy producers explored within the study. As reporting becames more standardised sustainability visioning tokes precedence and, in most cases, reframes strategic vision. Reporting quality has also increased over time while net-zero has became a goal among the energy producers either eminently or futuristically

Keywords

Oil & Gas Majors, Sustainability Transitions, Sustainability Reporting, Net-Zero, Climate Change

Contents

List of Abbreviations

1. **CC- Climate Change**
2. **CMA- Carbon Management Accounting**
3. **CSR- Corporate Social Responsibility**
4. **ESG - Environmental, Social & Governance**
5. **ESRS – European Sustainability Reporting Standards**
6. **GHG - Greenhouse Gases**
7. **GRI - Global Reporting Initiative**
8. **NCI- Net Carbon Intensity**
9. **OGM- Oil & Gas Majors**
10. **WWF – World Wildlife Fund**

1. Introduction

1.1. Background

Energy production and consumption is changing in tandem with current climate requirements, and this in turn has implications towards Oil & Gas companies as they face the issue of how to position themselves within this evolving industry environment (Fattouh, Poudineh and West, 2018). Furthermore, climate discourse continues to build pressure on oil and gas companies, globally to find sustainable solutions to provide energy supply (Morgunova and Shaton, 2022). While these uncertainties remain, we know for certain that with the Paris Agreement 197 countries have agreed to limit global warming to below 2 °C in global temperatures and thereby to limit the increase of temperature to 1.5 °C. In order to stay within the necessary target there is only a certain amount of Carbon Dioxide and other Greenhouse Gasses that can exists within the Earth's atmosphere at a given time and one way of ensuring that this amount remains at equilibrium is to attain Net-Zero Emissions. Net-zero is societal choice of climate goal which is guided by climate science (Fankhauser *et al.*, 2022). Simply put, net-zero means that there is a budget or limitation of gasses that can be within the atmosphere, and to maintain that amount organisations and countries will have to sink the amount of gas emissions that they cause to enter into the atmosphere.

With these environmental concerns, companies can have sustainability approaches ranging from reactive to proactive strategies where proactive strategies, according to scholars, provide more socially and environmentally excellent products and services leading to value propositions not yet available to the companies (Madsen & Ulhøi, 2021). According to Atkins J.F. et.al (2015) disclosure and reporting of risks and strategy is a feature of proactive response strategies. Organisation strategy in response to climate change risks can range from anticipatory, proactive and creative strategies or regressing and reactive strategies (Bui & De Villiers, 2017). Oil & Gas Companies are facing the problem of how they should position themselves at this time of uncertainty, where they do not know the final energy-mix that should be used, the speed of transition away from non-renewables and the best technology for said transitions (Fattouh, Poudineh and West, 2019).

A sustainability transition within the Oil & Gas industry is deemed as a radical shift in the energy system, from an existing system to a newer model that consists of complex changes and goes beyond only the replacement of one source of fuel with another. In essence, energy transitions like sustainability transitions involves changes in three interrelated dimensions.

In essence sustainability transitions are multidimensional, complex, non-linear, non-deterministic, and are highly uncertain (Geels and Schot, 2007). Although energy transition is often assessed based on the speed of changes in the tangible dimension, it is a multilayered process with multiple actors involving changes in three interrelated dimensions. Firstly, changes in technology, infrastructure, market, production equipment, consumption patterns and distribution. Secondly, actors and their conduct, which includes new strategies, investments, coalitions and capabilities of actors and thirdly socio-technical regimes (Farla et al., 2012; Fattouh, Poudineh and West, 2019; Morgunova and Shaton, 2022). These socio technical regimes consist of regulations and policies, institutions as well as mindset and belief systems, discourse on norms and social practices that take place mostly within the external environment of the businesses in question. Within the sustainability transitions literature, some OGM can be identified as incumbents and have often been viewed as actors opposed to the energy transition (Moncreiff, Bolton and Winskel, 2024). In multilevel transitions such as transitions in OGM, incumbents, are more often addressed as those who trigger the destruction of existing regimes (Geels and Schot, 2007; Morgunova and Shaton, 2022). However, Europe leads ahead of the curve in the energy transition with both disclosing sustainability among Oil & Gas Majors (OGM), actually engaging in activities to transition away from Oil & Gas (Comyns, 2014; Fattouh et al., 2019; Li et al., 2022) and also communicating about climate change (Li, Trencher and Asuka, 2022). Much can be learned through OGM within the Nordic Region in regard to transitions as they have some of the most ambitious targets. The region is 87 % carbon free with most countries aiming to be fossil fuel free and carbon neutral. The transition within the Nordic countries is ongoing and even considered to be cost-effective as they use a mix of energy sources (Sovacool, 2017).

In summary, OGM aim to attain net-zero like many other organisations to align with their country's or institutional commitment to the Paris Agreement (Sovacool, 2017). OGM can have different strategy towards this which either can be seen as proactive or reactive or otherwise. These strategies can be identified through their sustainability reports (Hourneaux Junior *et al.*, 2017; Fattouh, Poudineh and West, 2019; Li, Trencher and Asuka, 2022). To study more on these, the paper will review existing literature on sustainability reporting among OGM and what strategies can be found through these.

1.2 Problematization

The Oil & Gas industry sees climate change mitigation policies and public debate on climate-change, differently, across different geographical and socio-political backgrounds (Morgunova and Shaton, 2022). Sustainability transitions research mainly investigates complex interactions in large socio-technical systems to enable radical shifts to the new kinds of systems as there are environmental and climate problems, and societal challenges. (Fattouh et al., 2019). According to Morgunova & Shaton (2022) sustainability transitions literature focuses on creation and facilitation of innovations, where majority of this literature focusses on the acceleration and initiation of renewable energy innovations and green niche innovations which are seen as the key element within transitions.

The strategic planning and activities companies undertake to anticipate, respond and even gain a competitive advantage among their competitors, to transition, is known as transition strategy. (Halttunen et al., 2023). The topic of green transitions in relation to the Oil and Gas industry remains mostly unexplored or dismissed as the extraction and business of Oil and Gas contradicts ecological environmental sustainability. However, transitions or phase-outs towards net-zero are taking place within the Oil and Gas industry, either due to fossil fuels reaching an all time low in reserve levels or due to institutional and policy pressures, or, simply because this existing business model no longer works for all stakeholders involved (Delannoy et al., 2021; Fattouh et al., 2019). The phase at which these transitions are taking place might be uncertain due to various factors and the reasons as to why these transitions are taking place may vary from one OGM to others in the industry (Morgunova & Shaton, 2022). While the Nordic region has very ambitious goals to be fossil free by 2050 (Sovacool, 2017) there are different strategies that these actors, in this case the OGM within the region, have taken, and are taking towards this phase out to net-zero. These strategies can be from disinvestment in fossil fuels (Ørsted, 2021) or technological innovation, use of other energy sources or improved infrastructure (Sovacool, 2017).

There is a dynamic interplay of the different actors involved in this innovation and sustainability transition process therefore it is important to identify the strategies as they impact and trigger the overall system of sustainability transitions (Farla et al., 2012). While resources and capabilities of organisations and individuals influence this system change , strategies of an organization are also crucial in understanding how these organizations can influence the overall sustainability transition (Farla et al., 2012). Within Europe mandatory reporting on complete environmental social and governance aspects came into play with the introduction of the European Sustainability Reporting Standards (ESRS) and the implementation Corporate Sustainability Reporting Directive (CSRD) (*Corporate Sustainability Reporting*, n.d.). Despite this there are previous studies(Hourneaux Junior et al., 2017; Madsen & Ulhøi, 2021; Morgunova & Shaton, 2022) that have identified strategies and perception towards transitions of selected global Oil & Gas Majors's via the reports published by these respective OGM's.

The present study will further funnel down and explore the Nordic context through identifying the strategies presented within the sustainability reports of select OGM within the region. An underlying gap is to study how these strategies are reported by these Oil & Gas Majors over time. For the purposes of this study, three energy producers that are OGM or were once listed as Oil and Gas Majors' (OGM) in the NASDAQ Nordics markets were chosen. These organizations were selected to explore the net -zero transitions that take place in OGM within the region. Due to their public enlisting and their investments in different projects globally at one point or another they can be identified as a OGM (Halttunen et al., 2023b). Another notable commonality among these organizations is that their majority shares are held by the State of the country they originate from, and these majority shares are above 50.1% to the highest state ownership being 67.0% (*Equinor ASA- Company Report*, 2024; *Neste Oyj NESTE- Company Report*, 2024; *Ørsted A/S- Company Report*, 2024)

i. An Energy producer which has transitioned away from generating traditional, non renewable fossil fuels and crude oil and is transition towards net-zero across operations - **Ørsted** based in Denmark. *State ownership of shares 50.1*('Ørsted A/S- Company Report', 2024)
ii. An OGM that is transitioning through innovation and investment in renewable energy sources - **Neste Oyj** which is based in Finland. State ownership of shares 50.10% ('Neste Oyj NESTE- Company Report', 2024)
iii. An OGM that is still operating in non-renewable oil & gas – **Equinor** based in Norway. State ownership of shares 67.00% ('Equinor ASA- Company Report', 2024)

1. 3 Research Aim

The aim of this thesis is to explore the transition strategies to net-zero as communicated through the sustainability reporting of Oil and Gas Majors in the Nordic region.

1.4 Research Question

How have Oil and Gas Majors in the Nordic region reported their strategies (or lack thereof), to transition to net-zero?

2. Literature review

This section begins with providing an overview into strategies taken by OGM in transitioning towards a net-zero phase out and is followed by how these strategies could be identified within sustainability reporting. The literature presented in this section finally explores sustainability reporting within the Oil & Gas industry and the topics and reporting standards which provide insights into the strategies taken by the OGM to phase out to Net-Zero.

2.1 Strategies towards a net-zero phase out at OGM

Fattouh, Poudineh, and West (2019) address the question of what strategies should Oil & Companies take during this uncertain period of global transition to non -renewables. The author's states that Oil & Gas Majors may perceive moving beyond their core business as risky and discourages a 'wait-and-see' strategy as it could be costly and suggests that oil companies need to gradually 'extend' their business model, rather than a completely shift from non-renewables to renewables. Thus, OGM should aim to build an integrated portfolio "which includes both hydrocarbon and low-carbon asset" (Fattouh, Poudineh and West, 2019). The authors state that the Oil & Gas industry usually operates according to three key features. Firstly, there is irreversible sunk cost in non-renewable extraction assets, then there is an uncertainty over which decision to take and which decision has a higher reward manifest through profits and finally, decision makers rely on the possibility to delay making decisions and await more information in the future . However, within a transition context decision making becomes further complex as wrong assumptions can result in misallocation of capital and thereby write-offs. There is a risk that OGM can underinvest in conventional energy leading to shortage of supply for various necessities of the general public. And a 'wait-and- watch' strategy in decision making can lead way for competition to swoop in and on the flip side, Fattouh et.al (2019) states, that early investments can restrict the company when it comes to future investments and keep the company bound to suboptimal investment decisions. Therefore, the authors recommend that OGM should consider multiple variables at the same time and create strategies that can withstand most possible outcomes, given the uncertainties surrounding energy transitions.

In lieu of their arguments Fattouh et. al (2018) recommend OGM to consider adaptation strategies. A not straightforward approach, the authors states that there is no one-size-fits-all solution. The authors also stated, "Oil companies have had a different path and risk attitude, different endowments, have operated in different geographies, and have different types of expertise (some, for example, are more experienced in offshore operation than others)"(Fattouh, Poudineh and West, 2019). A successful response by OGM is beyond the scope of the question to integrate or not to integrate new energy sources. In fact, it is proven among some large scale OGM that integration comes in as a solution for declining and uncertain oil reserves. While authors also suggest other strategies such as investments in natural gas and supporting carbon taxes, they state that oil companies need to evaluate which part of their business model is at risk with this energy transition and within what time frame. This way the adaptation strategies can be as in the past have unlocking new sources of demand, improving efficiency, and deflating costs.

2.2 Identifying strategy through sustainability reporting

There is very little known about the role of management accounting under conditions of climate change or other high-risk considerations from the environment (Bui and De Villiers, 2017). Hourneaux Junior et al. (2017) identifies that sustainability reports are proxy to represent organization's sustainability and thereby their strategies. In their comparative analysis of the two Oil and Gas Companies i.e. Repsol and Petrobras the authors aim to identify the association between firm's strategy and sustainability aspects disclosed within the companies' reports. They further claim that the demand of sustainability reporting is increasing worldwide as it is the standardized reference for companies to for companies to disclose their sustainability activities(Hourneaux Junior et al., 2017). To supplement their analysis towards identifying the strategies of Repsol and Petrobras, the authors also used strategy documents besides the company reports as these companies' reports simply provided information which was a snapshot in time (Ibid.)

Bui & De Villiers (2017) in their research aimed to explore the relationships between climate change risks, strategies to manage these risks and carbon-related management accounting. As the exposure towards climate change risk and uncertainty keeps changing within companies both suitable strategies and carbon-management accounting need to be adapted by these said companies to manage fluctuating risks effectively whilst achieving company objectives. (Bui and De Villiers, 2017) This indicates that there is a connect between company strategy and environmental disclosures and this connection if further reinforced as the research results. These aforementioned results indicates that companies' carbon management accounting is designed to match the chosen risk management strategy which will be in line to the company's exposure and responsiveness towards climate change. Due to this connection between strategy and carbon management it can be found that where there are short-term physical accounts of sustainability there are more reactive strategies used within decision making. As companies shift to proactive strategies, there is an higher indication that there is long term physical and monetarized activities for sustainability improvement which is used for setting future strategy and in extensive decision making. It should be highlighted where management accounting focuses on sustainability account and uses proactive and creative strategies there is more likely to be reductions in carbon emissions (Bui & De Villiers, 2017)

It is however noteworthy that there are still significant differences in sustainability strategy and reporting within companies in same industry (Bui and De Villiers, 2017; Hourneaux Junior *et al.*, 2017) which is contrary to the literature examined by Comyns. B (2014) that states that companies in the same organizational field (or industry sector) will in any case adopt similar practices and mimic the behaviours of other companies in said organizational field (Comyns, 2014). Sustainability reporting changes over time and its use is determined by the climate change risk management strategies implemented within an organization. Bui De Villiers (2017) matched carbon management accounting activities according to the strategies implemented within an organization and this is depicted in Table 1 which will be presented in this research's theoretical framework. Companies, however, firstly need to define what sustainability means to them and how they can adapt that to their strategies. Hourneaux Junior et al. (2017) states that how companies may adapt this to strategies will depend on a range of organizational and contextual factors which is broad and is still complex and yet to be determined and comprehended.

2.2 Sustainability reporting within Oil & Gas Majors

Hahn et al. (2023) states that sustainability reporting is associated with sustainability strategy among other higher levels of sustainability implementations. Sustainability reporting has become a staple practice over the recent years and through which process companies can include and communicate their strategy specifically to sustainability practices (F. Hourneaux Junior et al., 2017). According to Kwarto et al. (2022) it is important for oil and gas companies to practice sustainability reporting and therefore it is important to know that OGM are motivated by either ecological awareness or legitimacy concerns.

However, the authors identified that there are six distinct potential biases when it comes to reporting about CSR activities and attributed this to the studied OGM having not implemented the triple bottom line and to the overall irregularities found within Corporate Social Responsibility (Kwarto et al., 2022) The first potential bias , the authors point out, is that sustainability reporting can be less informative and transparent often presenting information that is more declarative, narrative and positive. Secondly, Kwarto et.al (2022) states that sustainability reporting among OGM can be unfocused and disoriented with mismatch in activities against what is reported as sustainability reports are used as a complement. Thirdly, the authors found that OGM engage in regulatory and legal avoidance and state that Corporate Social Responsibility (CSR) is a capitalism promoting strategy. The fourth and fifth biases stated respectively are that organisations avoid the law and regulations and that OGM can cover up their actual business practices. This was indicative as several OGM would operate 'business as usual' and thereafter conduct some social actions to promote their reputation. Finally, the authors state that biases which can be found in sustainability reporting among OGM are the cover-ups of actual business practices and that reporting in itself unsustainable due to the mismatch between CSR activity and what is reported, where they conduct CSR and sustainability reporting to gain awards from sustainability assessment institutions and to gain investors (ibid.).

Despite the biases and shortcomings presented by Kwarto et al. (2022) previous literature has found that sustainability reporting over time has lead to increased transparency , specifically in terms of Scope 1 & Scope 2 emissions within energy intensive industries (Matisoff et al., 2013). Sustainability reporting when studied over-time can be a tool for transparency in regards to a mismatch between the expectations of the business and the businesses actual actions to this end (Higgins et al., 2020) . This transparency can indicate when organisations conduct 'greenwashing' or legitimacy seeking behaviours. Legitimacy seeking means when organisations take a desirable form or accept an pre-existing desirable form within the market (Lee et al., 2018) . As DiMaggio and Powell (1983) states legitimacy goes hand in hand with

Isomorphism. Isomorphism at its crux is when organisations within a similar field or industry , become similar to each other as they start to adapt to the same norms, ideology, regulation and culture (DiMaggio & Powell, 1983). Greenwashing on the other hand is communication that misleads people in terms of environmental performance where negative information is disclosed and positive information is disseminated (De Freitas Netto et al., 2020)

In trying to research if actions match words, Li et.al (2022) conducts a discourse analysis of sustainability and annual reports among European and American Oil and Gas Majors and have found the following insights on European OGM. Over the study period European OGM more consistently embraced climate science, "participated in industry climate- change frameworks, adopted internal carbon pricing, spent and pledged more on clean energy, and recently set net-zero transition and energy product decarbonization goals" stated Li et.al (2022). However, the authors also noted that OGM had tendency to attempt much 'low-hanging fruit' strategy or easier strategies in the form of disclosure and pledges which was usually depicted as simple statements of support for climate science or carbon pricing and even disclosures of Greenhouse Gas (GHG) emission data. The authors state that each OGM still need to formulate concrete strategies to transform pledges into actions

Li et.al (2022) also found in the research that some actions even contradicted the pledges made by OGM that concerns intentions to curb the production of fossil fuels as well as reduce exploration and new developments. All the studied Oil & Gas Majors, continued to lobby governments to hamper or weaken carbon pricing policies, to gain favourable fiscal support, and to weaken environmental regulations. In attempts to obstruct the decarbonisation progress. Also, they continue to place the responsibility for reducing GHG emissions to consumers, engage in misleading advertisements claiming natural gas as green and exaggerating the scale of their clean energy investments. Ther authors also analysed investments in renewables revealing no evidence to suggest any major has entered the renewables market at a scale that would indicate a shift away from fossil fuels. In conclusion their study of keyword use in annual reports (discourse); business strategies (pledges and actions); and production, expenditures and earnings for fossil fuels and Li et. al. (2022) states the following: -

"Given the mismatch between discourse, pledges, actions and investments, aligning with recent studies, we conclude that no major is currently on the way to a clean energy transition."

(Li, Trencher and Asuka, 2022).

2.3.2 The role of GRI standards

The voluntary adoption of Global Reporting Initiative (GRI) Sustainability Reporting Guidelines by oil and gas companies has increased transparency, credibility, and comparability in sustainability reporting (Alazzani et al., 2013). These guidelines provide a comprehensive tool for reporting environmental performance, with some companies obtaining third-party assurance to further enhance credibility. The GRI was created as a voluntary co-operative initiative in 1997 by the Coalition for Environmentally Responsible Economies and aims to layout a standardized and widely accepted sustainability reporting framework (*GRI - Mission & History*, 2025) that performance indicators cover and are used to measure and report an organization's economic, environmental, and social performance, in what is also known as 'triple bottom line' or 'People, Planet, Profit' reporting (Alazzani and Wan-Hussin, 2013) .

There is very limited academic literature on the GRI standards (Safari & Areeb, 2020) and the GRI frameworks and indicators have evolved from providing guidelines to creating the first global standards in sustainability reporting in 2016 (GRI - Mission & History, 2025) and has been updating their 'Topic's' i.e. reporting areas and 'Sector Standards' which is their standards for industries (GRI - Sector Standard for Oil and Gas, n.d.). These topics, through the intervention policy makers and specifically through the principal of materiality have evolved to be called materiality topics (De Villiers et al., 2022; Torelli et al., 2020). Materiality represents the principle through which companies can ascertain which topics to include in their sustainability reporting while meeting the needs and requirements of all respective stakeholders.(Torelli et al., 2020)

The Oil & Gas Sector or GRI 11 was updated in 2021 and was the first industry standard to be updated. In terms of content and comprehensiveness, sustainability reporting has changed substantially (Barkemeyer et al., 2014). However, the CEO statement which is usually present hasn't changed much in over a decade and this statement can cover the company's overall vision and strategy in managing key challenged associated with economic, environmental and social performance for the short-term, medium-term, and in the long-term (Ibid.)

Alazzani et.al (2013) chose the GRI indicators to answer their research question "What level of data reporting by these companies (eight OGM) is needed to allow the assessment of environmental practices?¨ (Alazzani & Wan-Hussin, 2013). The GRI was chosen by Alazzani

& Hussein (2013) as it provided the most comprehensive reporting framework of principles, standard disclosures, indicators and reporting protocols, augmented by a series of sector-specific supplements and resource documents. The GRI guidelines at this point covered three dimensions: environment, economic, and social and the authors choose to research extensively the environmental dimension which had 30 indicators. Only one of the companies studied reported on at least 28 of the 30 indicators and there were some companies that started reporting much later and still managed to collect data and report on at least 2 environmental indicators. The authors through their case study found that environmental related data could be more easily traced because of the GRI guidelines even the indicator of 'Oil Spills' had been disclosed by a majority o the OGM studied. Overall, the adoption of the GRI framework substantially improves the reporting quality (Alazzani and Wan-Hussin, 2013; Comyns and Figge, 2015) and the economic, environmental, and social aspects of sustainability performance (Orazalin & Mahmood, 2018)

2.3.3 GHG Emissions Reporting

As with Alazani and Wan Hussein's study (2013) a key indicator and now a topic in the sector standards are the emissions of Greenhouse Gases (GHG). GRI guidelines act as a norm to influence the quality and quantity of GHG reporting (Comyns, 2014). GHG emissions reporting plays as a key element within sustainability reporting and has been represented over the years as carbon management accounting, which in essence is a part of sustainability accounting that is designed to support organizational mangers and leadership to make decisions about the organization's carbon emissions. (Burritt et al., 2011) . The oil and gas industry has shown increasing interest in GHG and sustainability reporting. Institutional pressures, such as EU emissions trading regulations GRI guidelines, lead to better quality and more extensive GHG reporting (Comyns and Figge, 2015). The influence of institutional pressures on sustainability reporting has been examined by Comyns. B (2014) and they note that companies within the EU came under more political and social pressure regarding climate change. However even though EU companies have more proactive climate change strategies this does not necessarily mean that these companies better quality or more extensive GHG reporting (Comyns, 2014). In a previous study Comyns et al. (2013) presented the role of 'search' , 'experience' and 'credence' in sustainability reporting. These three categories were applied to the information in sustainability reports (Comyns et al., 2013). Search meant that the information presented in the sustainability reports could verified by the report reader easily, whereas experience terms of information meant that a particular set of information could be verified in the long term once the reader has experienced this information (Comyns & Figge, 2015). Finally ‘credence’ was associated with information which could not be verified by the report reader (Comyns et al., 2013). Connecting back to the longitudinal study by Comyns & Figge (2015), the authors found that overall GHG reporting within the Oil and Gas industry did not significantly improve between 1998 and 2010, with reporting quality varying across different dimensions based on information typology.

2.3.1 Sustainable visioning as a reframing of strategic vision

Madsen and Ulhøi (2021) brings together the term of sustainable visioning which they introduce as a “managerial framework capable of directing profound organizational transformations” (Madsen & Ulhøi, 2021). In their study they explore use of sustainability visioning at Ørsted as the OGM spearheaded a strategic transformation from what the authors recognize as “‘black’ (non-renewable) to ‘green’ (renewable) energy” (Ibid.) Sustainability visioning is described by the authors (Madsen & Ulhøi, 2021) as a concept that links the theoretical concepts of sustainability and strategic vision and can be used as a concept for achieving both strategic and sustainability goals . Vision in itself can be identified as the intellectual framework for a company strategy, defining strategic direction and presenting how the company can move towards this desired future state. Madsen and Ulhøi presents ‘visionary sustainability’ as a holistic and strategic approach addressing the triple bottom line and other aspects such as circular circular economy and sustainable development, to drive innovation and evolve business models along the way. To study why the transformation at Ørsted was possible, the authors used a wide variety of data sources including the energy producers own sustainability reports. CEO statements were insightful data sources i.e consisting of statements both within company documents such as the GRI reports and sustainability reports and statements provided within documents published by policy making bodies.

The authors further state that Ørsted used sustainability visioning for three specific ends i.e. first to initiate innovation and develop technologies which lead to the substantial cost reduction of their renewable investments (offshore wind production), secondly, grow the business and investment portfolio and lastly to attract financing and increase their competitive position within the growing global ecosystem of sustainable development (ibid.) In conceptualizing sustainability visioning Madsen & Ulhøi (2021) proposed the concept to be that of one that communicates a shared ownership beyond a company's boundaries which will contribute to transforming the industry in embracing sustainability practices as a norm.

3. Theoretical background and framework

A theoretical framework is guide developed from previously tested and published literature which is synthesised as a basis for the analysis data and its interpretation.(Kivunja, 2018).As this paper addresses how selected OGM have communicated their strategies to transition in response to climate change, it was purposeful to consider previous literature to guide the theoretical background towards an apt conceptual framework. Firstly, this chapter of the paper will explore the theoretical concept of sustainability visioning and how this will be applied to the study. sustainability visioning which had served as an essential means through which Ørsted could strategically reinvented as an energy company(Madsen & Ulhøi, 2021).This will be followed by the contingency based theoretical framework which was developed by Bui and De Villiers (2016) to understand how organizations can develop strategies which can be identified by the carbon management accounting practices taken in response to climate change. These strategies are taken by organizations in response to Climate Change and will present the theoretical framework was developed by Bui and De Villers (2016).

3.1 Sustainability Visioning

Madsen and Ulhøi argue that sustainable visioning serves as the "glue" that facilitates a cohesive and strategic approach to sustainability by binding an organization's commitments to people, planet and prosperity. With this theoretical concept the study will be able to explore the following questions points and will be used upon the selected organisational reports to examine and identify how these OGM have communicated and achieved these three significant points, as with the study conducted by Madsen & Ulhøi

1. Have the OGM initiated innovation and develop technologies which lead to the substantial cost reduction of their renewable investments?

2. How have the energy producers grown the business and investment portfolio towards

green energy production and distribution?

3. Have they attracted financing and increase their competitive position within the growing global ecosystem of sustainable development?

3.2. Identifying strategies through Carbon Management Accounting

Table I : Strategies and the CMA activities that arise when these strategies are used (Bui and De Villiers, 2016)

Strategy	Short description of strategy vs business activity focus	Strategic Orientation	Business Activity Focus	Examples of key initiatives
Stable	This strategy is used where there is an understanding of low climate change risks and opportunities. When a business organization uses this strategy carbon management accounting is internally focused towards the functional area of production and logistics. It is also evident that there is 'environmental efficiency' which the authors describe as being situations where environmental initiatives are ad-hoc and have received less attention from management both at an operational and strategic level. When such strategy is used, environmental efficiency can lead to cost savings	Internal	-Production	-Pollution Control
Reactive	When reactive strategy is at play, environmental problems are not seen as strategic. However, policy monitoring in this regard takes by the legal and	Internal + External	-Production -Policy Oversight	-Climate change policy oversight

	external relations of the organization. This strategy is used where climate change risks are accepted to be moderate and high This strategy is particularly useful when the risks of climate change are moderate and high and when pollution control is of importance. It results in environmental control that is limited. Companies prefer to buy permits rather than changing their practices to reduce emissions.			-Buy Carbon Offsets for production
Anticipatory	This strategy is suitable for companies in resource-based industries who face risks in climate change that can either become an advantage or a disadvantage. When companies see good market opportunities or climate change risks, they often get involved in policymaking instead of just waiting for rules to be imposed. Some companies push for early policies so they can benefit from them. Others, worried about risks, prefer to slow things down or push for policy changes.	External	-Lobbying -Product design sales	-Lobby for introduction/change in climate change policy -Investigate green products -Limited carbon reduction initiatives

Proactive	This strategy is suitable for the type of organization that sees many market opportunities, so marketing plays a role in identifying customer needs that drive product innovation. This reflects an opportunistic or product stewardship strategy. It also includes a focus on reducing carbon in products. Companies may also buy voluntary carbon offsets for their products or services, even beyond their production processes. Lobbying is important, as firms aim to benefit from carbon-related policies. If companies see moderate climate change risk, they also need to invest in pollution control and prevention to manage carbon costs and protect legitimacy. Emissions are reduced through innovation. Instead of only responding to laws, firms adopt carbon accounting for market reasons. When companies see opportunities but low risk, they may take a limited proactive approach.	External	-Product Design -Sales and Marketing -Lobbying	-Develop and market low carbon products - Carbon disclosure -Buy voluntary carbon
Creative	When climate change becomes a major concern for a company's future, a creative approach to carbon management is needed. Companies see both high risks and big opportunities from climate policies, so they must watch developments closely and invest in new technologies or replace old	Internal + External	-R&D Product -Design Sales & Marketing -Trading	-R&D in Carbon mitigation technologies Replace current asset base

	equipment. This approach requires strong leadership, teamwork across departments and affects financial planning. Firms often collaborate with suppliers and other industry partners. They also focus on launching green products and getting involved in carbon markets. Success depends on coordinating efforts across the company and keeping sustainability at the core. This approach matches what's called an "independent" climate change strategy.			-Strategic partnerships with industry and supply chain partners - Developing and marketing low carbon products

4. Methodology

This chapter entails the presentation, motivation and discussion of the epistemological and methodological choices used to achieve the aim of this study. Firstly, the research approach is presented, followed by the strategy which explains the research design, continued by an explanation to the identification of data sources, and the process of data collection and analysis. This section ends with an insight into limitations.

4.1. Research Approach

The research approach came about in the process to attempt and present the data and its analysis, as is. Meaning, without interpretation of narratives or analysis of the discourse as the aim of this study is to identify strategies to transition as presented within the reports. This study aims to add into the growing body of knowledge about strategies to transition which is specific to OGM or the oil and gas industry. Previous studies in this context have taken a quantitative content analysis approach (Li et al., 2022) a literature review (Morgunova & Shaton, 2022) or qualitative mixed methods approach (Alazzani & Wan-Hussin, 2013). Four OGM documents were used as a text for analysis.

To fulfill the purpose of this study, a qualitative research approach was implemented. Qualitative research is especially valuable when the objective of the study is to understand why and how a social phenomena happens, rather than measuring the frequency or the causal impact of it (Bryman, Bell and Harley, 2021). Given that this study aims to explore the transition to net-zero within the oil and gas industry, a comparative analysis of the sustainability reports from Ørested, Neste Oyj and Equinor was deemed to be most appropriate as it allows for an overview of the companies' transition to net-zero.

Boréus and Bergström (2021) highlight that content analysis is an appropriate method for finding patterns in larger bodies of data, in the case of this study being sustainability reports from oil and gas companies. It is also useful for comparing different corpora and analyzing changes over tune by comparing data from different time periods (Ibid.)

According to Gray (2017), there are many ways to approach analysis of qualitative data, and the rules to which approach to adopt in different circumstances are not clear. There are however general principles that should be applied in qualitative data analysis, including coding, which is used in this study to conduct the analysis of the sustainability reports. In qualitative analysis, the rules for how data should be coded are not clear or definite, and converting a big amount of written data into comprehensive and compelling analysis and argument can be challenging(Gray, 2017). Boréus and Bergström (2021) describe coding as the word 'code' having to do with elements in texts being recorded by means of a numerical code, and mention that this method is at least partly inductive, coding narrows down from starting from broader themes and research questions to categories growing out from the coding.

The first step to coding is to familiarize with the data by reading all of it, or going through relevant parts to the study (Boreus & Bergström, 2021). It is important to have knowledge of the discourse and the social context that they were produced in. In this research of the oil and gas companies' approach to net-zero, a research of the phenomenon of transitioning to net-zero and the companies was first conducted to gain knowledge about the subject before starting the qualitative comparative analysis. The reports were read and reflected upon several times before the coding process, as recommended by Gray (2017). After the coding process, testing the coding on parts of the material was done in order to reveal any need for modifications of the coding scheme, as recommended by Boréus and Bergström (2021)

4.2. Research Strategy

The research takes a comparative design, which is particularly suitable when the aim is to understand a phenomenon through identifying similarities and differences across two or more cases. Bryman, Harley and Bell (2021) describe the comparative design approach as a better way to understand social phenomena by comparison, comparing the phenomena to two or more contrasting cases or situations. They explain that "within a comparative research design there are at least two cases, and data are collected from each, usually within a cross-sectional format." (Bell et al., 2021).This research design enhances understanding of social phenomena by situating them in context and examining how they manifest differently across contrasting cases. In this study, the comparative design is applied by analysing the sustainability reports of Ørstad, Neste Oyj, and Equinor. The approach allows for an exploration of how different oil and gas companies frame and present their strategies for transitioning to net-zero, and whether patterns or divergences exist between them. By comparing multiple reports, the study is able to uncover not only individual company strategies but also broader sectoral tendencies in how the oil and gas industry responds to the pressures of climate change and the global energy transition.

One key strength of the comparative design is its ability to generate richer insights than a single-case analysis since it enables the researcher to see whether certain findings are unique to one context or indicative of more general trends(Bell et al., 2021). In this study, this design makes it possible to evaluate whether companies share common strategies or diverge in their approaches to net-zero, depending on their geographical, political and economic contexts. Gray (2017) highlights that comparative studies are valuable in business research where the objective is to identify patterns across different organizations, especially when investigating practices or narratives embedded in organizational outputs like sustainability reports. In this sense, the comparative design is a good fit to the study's purpose of identifying strategies for transition as they are articulated in corporate sustainability documents. Upon studying previous academic literature, it was initially thought best to conduct a historical comparative content analysis to show the longitudinal nature of the research, but this was later excluded.

4.3. Selection of data sources

As mentioned earlier the chosen organizations were selected to explore the net-zero transitions that take place in OGM within the region due to some key similar factors. Firstly due to their public enlisting and their investments in different projects globally at one point or another they can be identified as a OGM (Halttunen et al., 2023b). Another notable commonality among these organizations is that their majority shares are held by the State of the country they originate from, and these majority shares are above 50.1% to the highest state ownership being 67.0%

There were a few criteria used to select these OGM for this research, the first of which was that the case should be able to be called a Oil and Gas major within a region that is affected by similar regional policy and pressure. All select OGMs were from the Nordic region even though one of the select OGM can no longer be called an OGM but an energy producer. This change in business classification aligned well with the purpose of this study as the study aims to explore the strategies to transition towards net-zero emissions. Secondly the selected OGM should have and are able to document business activities based on the GRI industry standards and or GRI3 materiality topics at large. Thirdly the select OGM should and are communicating calculated GHG emissions. Other key considerations were firstly authenticity: i.e. if the documents were of unquestionable origin. Next, representativeness, meaning that the document was typical of its kind. Finally, I considered if these documents have meaning where the evidence clear and comprehensible. The time frame of 2008 – 2024 was chosen as Ørsted began their communications on the green transition in 2008 and the year 2024 provides the most current insight into present day operations.

Document name	No of Pages	Organisation	Link to document
Statoil Factbook extract 2008	24	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/aa6c5146ac92e4a9c98fa3a73fcc6ff2e609366f.pdf?sustainability-report-2008-equinor.pdf
Neste Oil 2008 Annual Report	154	Neste	https://www.neste.com/news/neste-oil-publishes-its-annual-report-for-2008
Responsibility 2008	48	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-

			ratings-and-reporting#our-sustainability-reports-2008
2016 Sustainability Report	62	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/514d634e9d374f377762386b4d0262d0cf301989.pdf?sustainability-report-2016-equinor.pdf
Neste Annual Report 2016	202	Neste	https://ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchsLEg5GaWxlQXR0YWNobWVudBiAgOD_mtDqCAw?language_no=0
Sustainability Report 2016	38	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-ratings-and-reporting#our-sustainability-reports-2016
Annual Report 2024 Equinor	336	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/16ccbc5a098c3b971979118420c4f83ddee18fb4.pdf?annual-report-2024-equinor.pdf
Neste Annual Report 2024 Annual Review	62	Neste	https://ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchsLEg5GaWxlQXR0YWNobWVudBiAgLC3l-bxCAw?language_no=0
Ørsted Annual Report 2024	258	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-ratings-and-reporting#our-sustainability-reports-2024

Figure I , provides a visual mapping of the data sources used to analyse the sustainability reports providing an analytical framework. This illustrated analytical framework was developed as the data sources had evolved over the years, from the report's contents, integration within other management accounting and the reports' classification i.e. how the reports are named. Simply put data could be found among stand-alone sustainability reports, excerpts of environmental or standardised reports such as GRI reports and more prevalent towards 2024 the data was integrated within the annual report of the OGM. The sustainability reports varied in, were sometimes integrated into the rest of the financial reports and sometimes were stand alone reports. These reports were also named differently according to the reporting needs of the organisation as per the year they were published as with the case of Equinor's sustainability reporting in 2008 which was a factbook. The selection of company reports as primary data is deliberate as sustainability reporting is the platform through which OGMs communicate their strategies for external audiences. However, using other sources such as media reports or social media would have shift the focus from reporting to action, which is not the aim.

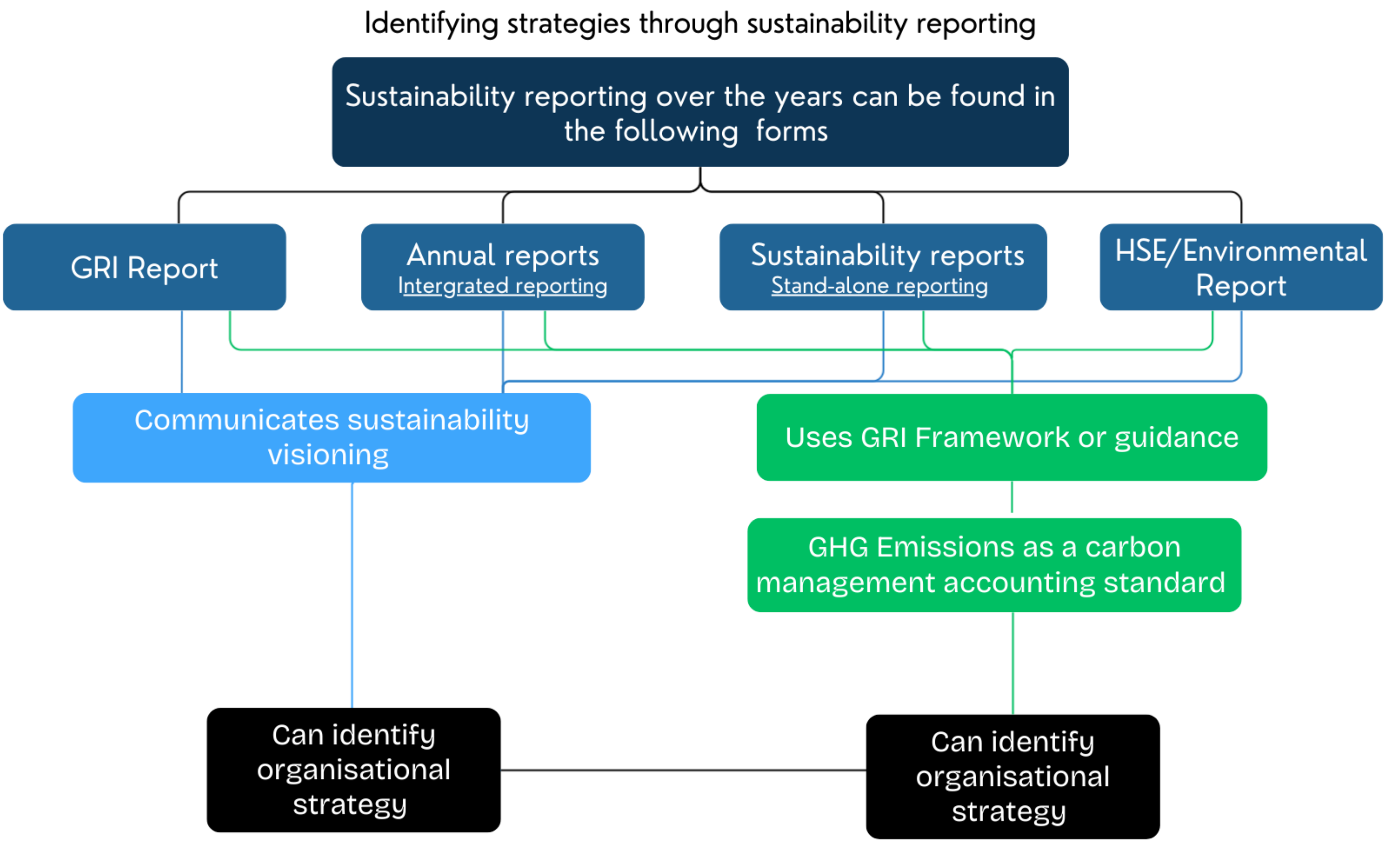

Figure I - Visual mapping of the key areas of sustainability reports for data collection

4.5. Research Evaluation

The concept of trustworthiness is used to asses the quality of qualitative research and is made up of four criteria which has their equivalent criteria in quantitative research(Bell et al., 2021). Bell and Bryman (2021) also states that whilst one evaluates the quality of the study's qualitative research, it is crucial to consider criteria that are distinct from those that are typically used in quantitative research. This is further explained in this section.

4.5.1. Credibility

Within qualitative research, credibility considers the extent to which the findings and interpretations are considered believable and trustworthy by both the researcher and external stakeholders (Bryman & Bell, 2021). This entails that the research process follows an established method and that the findings will in an accurate manner reflect the social reality under investigation. Credibility is further reinforced through this study through the use of detailed and comprehensive data analysis to ensure that the that results are grounded in the data and supported by evidence.

A coding framework is presented within in the results chapter and has proved useful in transparency and exploring results among certain parameters. With the coding framework, guiding questions are explicitly linked to GRI standards and the conceptual framework. The aim of the coding framework was not to eliminate the interpretation of the content but to make it systematic and thereby the coding label and guiding questions became crucial in this process. As this research utilised a qualitative approach transparency was crucial and this is delivered through the coding framework.

4.5.2. Transferability

Since qualitative research studies a small group sharing similar characteristics and goes quite in depth, this type of research tends to consist of contextual uniqueness (Bell et al., 2021). Transferability put is simple terms refers to apply findings and/concepts from one research to another whether it be persons, contexts, and times (Drisko, 2025). To reinforce transferability, researchers are encouraged to produce thick description i.e. rich accounts of culture and in the case of the present research, details (Bell et al., 2021). For the purposes of transferability this research ensures that the context of the study and the findings are clearly described in depth, enabling future researchers to apply the context in other setting's.

4.5.3. Dependability & Confirmability

Dependability is proposed as a way of demonstrating that the qualitative research is trustworthy and involves and auditing approach that ensures all record of each phase of the study is kept in an accessible manner (Bell et al., 2021). A peer review process is also suggested for this (Ibid.). While the study was conduct together with a peer review process, the study also presents a clear and well documented research process. In order to, comprehensively analyse the energy producer's reports it was deemed necessary to also refer to the GRI's sector standard for the Oil and Gas sector. This is as the GRI sector standard describes in detail what is expected of organizations within the sector to provide a standardized reporting of the organizations sustainability activities. In order to ensure that a clear demarcation was maintained to stay within this chosen analytical lens the materiality topics '11.1 -GHG emissions' and '11.2 Climate adaptation, resilience, and transition' were the only sector standard materiality topics chosen.

As for confirmability, this ensures that the researcher has acted in good faith while it is understood that at complete objectivity is impossible in business research (Bell et al., 2021). Meaning that the researcher has not allowed personal values or theoretical inclinations to influence the conduct of the research and findings of the research (Ibid.) To this end for the purposes of the research and content analysis, secondary sources from publicly accessible sustainability report were used eliminating any bias or subjective input

5. Empirical Findings

The following section presents the empirical findings upon the conclusion of the content analysis. As this study is a a qualitative content analysis a coding framework will be firstly presented as the study was partly inductive, driven by both previous literature and data. This will be followed general observations pertaining to the two prongs of the analytical framework. Thereafter the results of the analysis will be presented as a thick description based on the inductive guiding questions.

5.1 Coding Framework

Early in the process a pilot study was performed, and a coding scheme was developed based on the three key areas of the GRI, GHG & Sustainability visioning. The coding scheme had to be approached in iterations, which meant that there was a cycling back and forth between previous literature and concepts that emerged during the examination of data. There were concepts of coding and using documents as a text that arose in previous scholarly articles. Iterating back towards the concept of historical analysis of documents and Rowlinson (2004) reaffirmed that to achieve the aim of identifying strategies through reporting, it was more constructive to not engage in methods used in organisational theory. The analysis then had to be tailored according to both the research question and the select content areas of the chosen sustainability reports. This meant that the that there were multiple analytical processes going back to previous literature and within the reports' Sustainability Visioning, use of GRI and reporting of GHG emissions. Thereafter a set of guiding questions as depicted in table were chosen to help filter through the content and to code the content presented in the report. During the process of developing these guiding questions and whilst referring to the GRI sector standard 11 it was visible that there was an overlap between the calculation of GHG emissions and requirements from the sector standard reference 11.2.1. Subsequently the GRI standard 11.2.1 had requirements which can be seen in the CEO statement on the report. The guiding questions are organised for the reader to also grasp this overlap of data between each chosen area of sustainability reporting. Due to its inductive nature the guiding questions could be separated to the themes of GHG reporting, Climate Change Adaptation and Sustainability visioning. These themes seta clear demarcation to the study of the selected reports. The overlapping guiding questions can be seen in the clear cells.

Chosen Empirical Reference	Guiding questions	Code Label	Theoretical *Argument*	Theme
GHG reporting as per sector standard reference	1. Has the OGM reported Scope 1 GHG emissions is flaring and venting, which aim to	1. Scope 1 emissions- with flaring & venting	GHG reporting (Comyns, 2014)	Communication on GHG emissions

no 11.1	dispose of gas that cannot be contained or handled otherwise for safety, technical, or economic reasons? **2.** Has the OGM reported on (Scope 2) GHG emissions originating from stationary and mobile sources (e.g., transportation of materials, products, or waste); and the activities of extraction; oil refining; liquefaction and regasification of natural gas; and operation of facilities and equipment? Has there been any indication of more complex extraction methods such as offshore deep-water drilling or oil sands mining?	**2.** Scope 2 emissions - with distribution & transportati on		
	3. Has there been actions taken to reduce emissions linked to the process of extracting and distributing oil and gas, (direct, Scope 1)? **4.** Has there been any actions taken to reduce emissions in energy usage (indirect Scope 2) GHG emissions? **5.** Does the OGM have any expectations to address other indirect Scope 3 emissions related to the use of oil and gas products?	**3.** Actions taken- reduce Scope 1 **4.** Actions taken – reduce Scope 2 **5.** Expectation s to address Scope 3 emissions	Strategies taken in response to Climate Change (Bui & De Villiers, 2017) The use of GRI in sustainability reporting (De Villiers et al., 2022; Safari &	Communication on GHG emissions and the use of GRI framework

			Areeb, 2020)	
Climate adaptations, resilience and transitions as per GRI sector standard reference no 11.2.1	**6.** Has the OGM described the climate change-related scenarios used to assess the resilience of the organization's strategy, including a 2°C or lower scenario. **7.** Has the OGM taken-on responsibilities to manage climate change-related impacts which is linked to performance assessments or incentive mechanisms, including in the remuneration policies for highest governance body members and senior executives? **8.** Has the OGM described the level and function within the organization that has been assigned the responsibility for managing risks and opportunities due to climate change. If so, how? **9.** Is there a description of policies, commitments, and actions the organization has conducted or will conduct to prevent or mitigate the impacts of the transition to a low-carbon economy on workers and local communities?	**6.** Description of climate change related Scenarios **7.** Governance performance incentive to CC **8.** CC Risk/Op Management level and functions **9.** Policies, commitments and actions to mitigate impacts of transition (workers & local communities)	Strategies taken in response to Climate Change (Bui & De Villiers, 2017) The use of GRI in sustainability reporting (De Villiers et al., 2022; Safari & Areeb, 2020)	
	10. How has the OGM described the board's oversight in managing	**10.** Oversight in managing Risks/Op	Sustainability Vision + Strategies	Sustainability Vision

	risks and opportunities due to climate change?			
	11. Is there growth in the business and investment portfolio, specific to renewable energy sources? **12.** Have they attracted or is the OGM attracting financing to increase their competitive position within the growing global ecosystem of sustainable development? **13.** Is there any indication within this topic to initiate innovation and develop technologies which lead to the substantial cost reduction in use of renewable sources?	**11.** Growth investments portfolio green energy **12.** Financing for growth in the sustainable developme nt ecosystem **13.** Innovation to reduce costs in green energy	Sustainability Vision (Madsen & Ulhøi, 2021)	

5.2. General Observations

What should be noted is that over this period all three of the OGM had changed their brand name with each OGM having a different purpose set behind this change in Organization name. In 20028 Equinor was called StatoilHydro and changed their name to Statoil in 2009 (*StatoilHydro Becomes Statoil - Equinor.Com*, n.d.) and then to Equinor (*Statoil to Change Name to Equinor - Statoil to Change Name to Equinor - Equinor.Com*, n.d.). Similarly Neste Oyj which was called Neste Oil (*Neste Oil Is Now Neste*, 2015) and Ørsted was called DONG Energy or the Danish Oil and Natural Gas (*DONG Energy to Change Company Name to Ørsted*, 2017). There has been a change in the actual reporting formats and standards too.

While most sustainability reporting within all three of the companies took place mostly as integrated reports in 2008, the reports then came out as standalone reports in 2016 and were then published again in 2024 as integrated to annual report. All OGM had supporting documents published on their green transition efforts and there was a similar change in industry guideline for reporting, even though, to which extent they were fully achieved can be seen further during this study.

5.3. Results

The results below will be categorised by the relevant energy producer and the year of report studied and will explore the available data in alignment to the coding framework and the guideline questions which arose from the coding framework.

5.3.1 Equinor

2008

For purposes of historic accuracy Equinor will be called StatoilHydro in this section of the paper. In 2008 StatoilHydro had published a document with Key Sustainability performance data which also contained a 'Factbook extract' which combined facts from the Annual Review and sustainability review. This concise document contained information based both on Health Safety and Environmental (HSE) Accounting, and data based on the GRI 3 which is the materiality assessment. Topics (here one does not refer to materiality topics) such as human rights violation, oil spills and to greenhouse gas emissions are covered within this 10-page document. HSE calculations and emissions both Carbon Dioxide (CO2) and Nitrogen Oxide (Nox) are reported annually. The document communicates more about fatalities, employee safety and safe work environments in comparison to the data on GHG emissions. Within the HSE performance section of the report it was stated that there was a decrease in CO2 emissions in comparison to 2007 i.e. from 14.6 million tonnes in 2007 to 14.4 million tonnes in 2008. Carbon dioxide emissions were indicated as emissions from all operational activities at Equinor. The report communicated that these emission were from energy and heat production in own plants, flaring, residual emissions from carbon dioxide capture and treatment plants, process emissions, emissions of carbon dioxide as a consequence of gross energy (electric power and heat) imported from a third party (indirect emission), emissions of carbon dioxide as a consequence of exported energy to a third party. The report also presents the total amount of Nitrogen oxide emissions from all business operational activities. Another stand-out calculation communicated within this report is the total energy consumption in terawatt hours for the business operations of Equinor. This is not presented terms of Scope 1 emissions as in present day data but in accordance to the HSE calculations. Statoil Hydro thereafter provides the reader with GRI G3 index indicators where indicators are used more as a checklist that referred to the specific topics within the OGM annual report.

This report had provided a limited overview into emissions data and climate change adaptation strategies in alignment to the GRI reporting standards but focused more on capturing data of the production of Oil & Gas at large. The environmental indicators specified here were oil spills, Carbon dioxide and Nitrogen emissions and the use of overall energy consumption and recovery of non-hazardous waste. The report does not indicate growth , investment or innovation in regards to sustainable development or transitions, neither does the report present a CEO statement but focuses more on pollution control When business activity focus is on production and even pollution control, Bui De Viller (2017) states that this is when an organisation has a stable strategy in response to climate change.

2016

In 2016 Equinor, which at this time is called Statoil and not Statoil Hydro has a standalone sustainability report which included more insight due to the higher availability of data that can be used within the qualitative content analysis of this study. In this report Equinor presents an awareness to adverse climate change and has a reactive strategy due to the regulatory frameworks and the changing business environment it operated in. Where there is an reactive strategy business activities focus on production and policy oversight (Bui & De Villiers, 2017) and this is explored further below.

One can begin with the CEO statement and other areas of the report to identify the data relevant to sustainability visioning that the report holds (Madsen & Ulhøi, 2021). The CEO begins by stating that they envision a transition towards low carbon energy. Further on in the report one can also read that the Chief Financial Officer also provides a statement that the future is low carbon efficient. There is also claims made within the by the OGM that declare Statoil one of the most carbon efficient oil and gas producers. Moving from the CEO message and the OGM has described the level and function within the organization assigned to manage risks and opportunities due to climate change.

‘*In 2016, the assessment of the reward for the CEO’s business delivery, within the health, safety and environment (HSE) perspective, was based on the KPIs for actual serious incident frequency (SIF), serious oil and gas leakages and upstream CO2 intensity. Overall performance was assessed against a broader set of strategic objectives from across five perspectives: people and organisation, HSE, operations, market and finance. It also took into account changes in assumptions and the sustainability of the delivered results’* (2016 Sustainability Report, 2017, p.7)

There is growth in the business and investment portfolio specific to renewable energy sources, with plans to direct 15-20% of investments towards new energy solutions by 2030. The report also states that StatOil has invested 200 million is venture capital to invest in renewable energy companies. In terms of the board’s oversight to manage risks and opportunities due to climate change, the report states that the corporate executive committee and board of directors had discussed risks, both upside and downside potential, associated with climate change including regulatory, market, technological and physical risk factors. On the flip side of this, the OGM conducted assessments of development of technologies and changes in regulations, including the introduction of stringent climate policies which they asses may impact the future oil price, the costs of developing new oil and gas assets, and the demand for oil and gas. While Statoil conducts various oil and gas price assumptions, they also took further steps to systematically incorporate climate aspects in all investment decisions. The OGM believed that the business needs to be resilient to a future environment that is likely to bring: higher carbon costs and stricter climate regulations across more jurisdictions, falling demand for some of our core products/markets and volatile prices and pressure on profit margins.

Similarly to the business risk assessment n 2015 responding to a shareholder request Statoil began to stress test the OGM's project portfolio against International Energy Agency (IEA) energy scenarios. The analysis covers all accessed physical space or average as Statoil states, from exploration licences to fields in production, over the lifetime of the projects. The OGM reports that there is no assurance that the assessment is a reliable indicator of the actual impact of climate change on Statoil as both the OGM and the IEA's assumption on oil and gas prices may be different to the actual oil and gas prices of future scenarios. In alignment to these tests the OGM can identify that their product portfolio is resilient to the IEA’s energy scenarios. Statoil states that their Oil and Gas projects within Norway have a relatively low carbon intensity and that their investments in the renewable energy will benefit from stricter climate, policies, subsidies and restrictions on emissions. Natural Gas production consists of 40% of their product portfolio and Statoil reports that natural gas will be essential in the transition from non-renewables (such as coal) to renewables. With the scenario testing Statoil reports that their shale oil and heavy oil products will be less robust to in the future when there are higher carbon prices and while it is cheaper to produce these products, the coast of carbon pricing would offset the advantage of cheaper production

Within the report Statoil also has stated that they train their staff to work to generate a higher value with low carbon emissions. While this learning and training opportunity is presented in the report it doesn't provide insights if the training is directly for a transition from Oil and Gas to to renewable energy sources The OGM at this point has initiated a cross-organizational process to develop a climate roadmap in response to the Paris agreement which came into play in the latter stages of the year. The OGM sustainability goals were defined strategic goal. Some of the business activities conducted to this end are reducing their carbon footprint through energy efficiency at their extraction and refinery plants, reducing methane emissions and also importantly by eliminating routine flaring. Routine flaring is when oil and gas producers burn excess natural gas that is produced alongside oil. However, it should be noted that there has not been a total elimination of routine flaring.

The OGM reported Scope 1 GHG emissions, which include flaring and venting. Statoil reported that a significant amount of greenhouse gases was emitted from the development, production, and transportation of oil and gas, and that the OGM made efforts to reduce routine flaring.

'In 2015, we conducted an extensive review of Statoil's offshore production emissions, in cooperation with the Norwegian Environmental Agency. This showed that direct methane emissions from our North Sea operations are extremely low at just 0.015 % of gas production'(2016 Sustainability Report, 2017, p.21)

The OGM reported actions taken to reduce Scope 1 through their investment in carbon capture and storage (CCS) which eliminates the dispersion of Carbon Dioxide into the atmosphere. However, in referring back to the CEO message one can also read how Statoil contradicts themselves as they continue to conduct deep sea exploration around the Americas specifically Brazil.

"In our international upstream business, we will focus, deepen and explore further. Brazil is a core area for us, together with our position in the highly flexible US onshore business."(2016

Sustainability Report, 2017, p.0)

When focusing on Scope 2 emissions the OGM disclosed the amount of tonnes CO2 equivalents in were produced by the OGM in 2016. The report indicates that the OGM is aware of the need to address indirect Scope 3 emissions related to the use of oil and gas products, as over 90% of total emissions are now created by the end users of the product rather than within production unlike during earlier stages of this study. Some guiding questions could not be answered , specifically expectations to address Scope 3 emissions, financing for growth in the sustainable development ecosystem and innovation to reduce costs in green energy. Data for these code labels were not published within the 2016 Sustainability Report of Statoil.

2024

By this time there has been a name change in the business and Statoil in now called Equinor. The report which was studied for 2024 is the annual report as sustainability reporting during this stage is conducted as integrated reporting. In this report Equinor states their ambitious goal to transition completely away from Oil and Gas and to reduce Net Carbon Intensity (NCI) by 15-20% by 2030 and by 30-40% by 2035, on a pathway towards a 100% reduction by 2050. NCI is a tool used by Equinor in their transition towards net zero emissions. This metric tool as explained further in the report, is calculated by dividing the net emissions of Equinor by the total amount of energy produced. Therefore, it does not necessarily indicate net zero but is used as tool by the OGM to guide themselves to towards the prioritization of business activities and also helps measure their progress towards their set goals. The reduction of NCI – and net emissions – to zero is Equinor's definition of "net zero" at a corporate level. It is mostly for the purpose of the European Sustainability Reporting Standard's (ESRS) reporting, this ambition constitutes Equinor's value chain target, including scope 1, 2 and 3 emissions. The NCI in 2024 is 2% below the 2019 baseline. The Oil & Gas major transparently states that their ambition for net zero/net carbon intensity is not fully aligned with the ESRS definition or boundaries.

As climate change is a major concern for the future of this OGM they have taken a creative approach towards carbon management and this as per Bui and De Villers (2017) is a creative strategy where Equinor sees both high risks and big opportunities from climate policies and are investing in new technologies or replace old equipment even with partners. For example, it is reiterated throughout the report that the OGM is now working on producing low emission maritime fuel. Equinor made investments into Ørsted A/S, a global market leader in offshore wind and Equinor had also secured a offshore wind pipeline at low cost and positioned themselves as a leading developer in parts of Europe and the US. This pipeline has provided Equinor with the option to pursue the most attractive projects and execute their strategy with high flexibility. Equinor has an ambition to install 10-12 GW of renewable power capacity by 2030. In terms of capital allocation for the capital allocation is designed to provide flexibility to reoptimize their product portfolio which they anticipate will ensure to generate high value through different economic cycles.

'Our strategy and Energy transition plan describe our strategic pillars (Always safe; High value; Low carbon) and our strategic beliefs. Our strategy, values and governance guide our actions and support the effective management of material sustainability impacts, risks and opportunities (IROs). This approach applies to all identified material topics disclosed in the This approach applies to all identified material topics disclosed in the Sustainability statement.'(Annual Report 2024 Equinor, 2025, p.90)

Following the above, Equinor reports that thoroughly assess climate related risks and robustness of all investment proposals, incorporating a CO_2 cost and evaluating CO_2 intensity. However, this is no indication that Equinor has conducted climate change-related scenarios and if they have done so, the climate change scenarios are not mentioned on the report. However, climate change itself is considered to be a material topic and an assessment of climate change impacts on their portfolio was conducted. Equinor acknowledges the importance of adaptation to climate change but from this assessment they did not identify any relevant impacts. Financial materiality of adaptation is being considered based on potential change in parameters across assets Equinor states that they continue to refine their physical climate risk methodology.

Equinor also reports on their overarching activities conducted for climate change and energy transition where they reviewed ambitions, risks and performance with regards to progress in their energy transition plan which they produced in 2022 and updated ambitions in the 2025 Energy transition plan. This includes GHG and methane emissions reduction, alongside investments in low-carbon solutions like renewable energy and carbon capture and storage (CCS). At this point Equinor is communication their sustainability disclosure both within their integrated report and their the OGM has reported Scope 1 GHG emissions, which include emissions from flaring and venting. These practices are used to dispose of gas that cannot be contained or handled for safety, technical, or economic reasons.

"We have significant direct greenhouse gas emissions from our up- and midstream operations (scope 1) and indirect greenhouse gas emissions from our value chain (scope 2 and 3). The indirect emissions associated with the use of the oil and gas products we sell are significantly higher than those under our operational control.”(Annual Report 2024 Equinor, 2025, p.101)

The OGM also speaks about materiality in this same context and about material impact.

“Material impact: Development of renewable energy Deployment of renewable energy is needed to decarbonise global energy systems."(Annual Report 2024 Equinor, 2025, p.101)

Actions have been taken to reduce emissions linked to the extraction and distribution of oil and gas (Scope 1). The report mentions a 34% reduction in GHG emissions with ongoing efforts in electrification and energy efficiency. In the reduction of Scope 1 emissions the OGM still reports about Carbon capture and storage. Equinor is the operator for Technology Centre Mongstad, the world’s largest test facilities for CO_2 capture technologies through which Equinor has facilitated development of what they claim the world’s leading capture solutions. They report that building commercial markets for CCS will highly depend on policy frameworks that incentivise decarbonisation of industries. Equinor further reports that they are 'maturing transport solutions based on both ships and a large pipeline to connect industrial emitters in Europe with CO_2 storage opportunities on the Norwegian continental shelf. However, they also state that building commercial markets for CCS will highly depend on policy frameworks that incentivise decarbonisation of industries. Equinor is also switching to electricity within their long-lifespan installations to reduce both cost effectively and efficiently operational emissions. This is completed partially as for some facilities electrification is deemed optimal, while for others, partial electrification has been considered more appropriate and therefore turbine generated gas power will still be used at their production facilities. There is no specific mention of more complex extraction methods like offshore deep-sea mining.

The OGM has reported on Scope 2 GHG emissions originating from stationary and mobile sources, including transportation of materials and the activities of extraction, oil refining, and operation of facilities. Scope 2 emissions from Equinor’s operations amounted to 0.08 million tonnes CO2e (location-based) and 1.5 million tonnes CO2e (market-based) in 2024.The main source of scope 2 emissions is electricity purchased from the grid for Equinor’s onshore plants and offshore electrified assets in Norway. The OGM's operated location and market-based scope 2 emissions in 2024 were 7% lower and 42% higher compared to 2023, respectively. The change in scope 2 emissions from 2023 is mainly related to updated emissions factors, positively impacting location-based scope 2 emissions and negatively affecting marked-based scope 2 emissions. The OGM has indicated expectations to address indirect Scope 3 emissions related to the use of oil and gas products, although the specifics of these expectations are not explicitly disclosed within the same section of the report. Scope 3 emissions in the category of 'use of sold products' were 251 million tonnes in 2024, up 0.7% from 2023. Downstream scope 3 emissions account for 98% of total scope 3 emissions.

As per sustainability visioning one may read the Chair and CEO message and see a predominance placed on safe operation and also expansion in non-renewables. The message states that Equinor's strategic direction remains firm to be a leading company in the energy transition towards net zero in 2050 despite their reduction in the investment of renewable energy. The message also states that Equinor has reduced their CO2 emissions from production to improve the sustainability, profitability, longevity and competitiveness of their oil and gas production. Despite these contradictory statements responsibility towards sustainability has been at the crux of all employees. In 2024 the OGM has clear distinct responsibility assigned to each level of the hierarchy starting from first line employees to the Board of Directors. While the report states that there is a distinct responsibility in terms of ' sustainability, from collecting data at a first line employee to the Board of directors being responsible to align Equinor to the 17 SDGs. One code label could not be addressed with the data published in the report i.e. innovation to reduce cost in green energy and this can be seen as an insight to the lack of action from Equinor's behalf, rather than perceiving the data source to be insufficient to answer the guiding questions.

5.3.2. Neste Oyj (Neste Oil)

2008

Neste presents itself as an oil refining and marketing company with a focus on premium- quality low emission fuel. From the very begging of the coding process, it was evident that all guiding questions couldn't be answered as is due to the company's primary focus on drilling and marketing petroleum. From the on-set it was evident that Neste prioritised and highlighted the importance of climate change adaptation and the rise in temperatures to the extent where the report began with information on the 1- 6 °C increase in temperature within this century. While there were a few more products by the OGM, the product mix that the OGM offered at the time ranged from Diesel Gasoline 38%, Motor Fuel 28% and NExBTL 1% respectively. NExBTL is the renewable diesel that is unique to Neste based on their patented technology. NExBTL renewable diesel takes renewable fats and oils to a hydrocarbon product which has similar properties of diesel (*NEXBTL Technology Turns Renewable Oils and Fats into High-Quality Products*, n.d.). Whule the proprietory technology is NExBTL , the raw materials for the fuel produced are rapeseed oil, animal fat and palm oils.

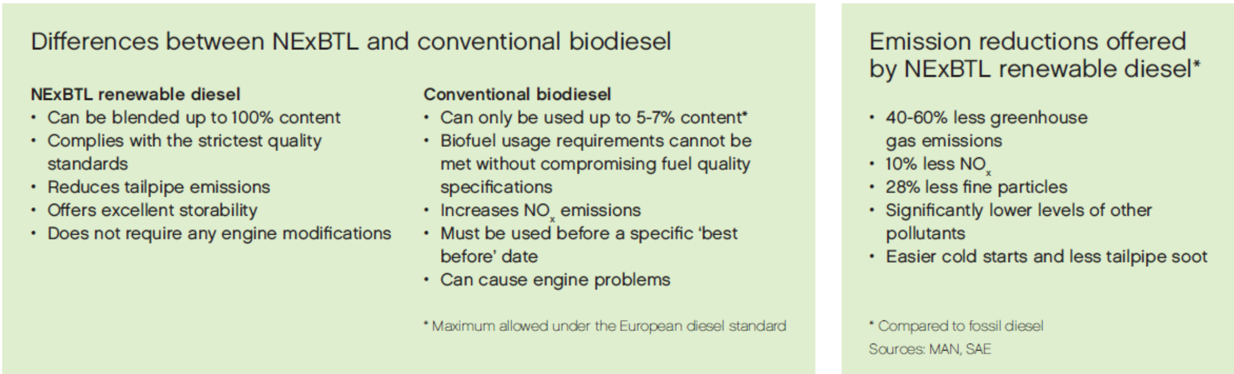

Image 2: A comparison of Neste Oil's NExBTL and conventional biodiesel Source (Neste Oil 2008 Annual Report, 2008)

Furthermore, the annual report had a dedicated section for strategy. The Strategy section begins with Neste's vision to be the leader in lower- emission traffic fuels. Investments in NExBTL was seen as the OGM invested in developing a treatment plant in Rotterdam and Singapore towards expanding the Neste Renewable products and their proprietary renewable diesel. Neste also had the vision of becoming a leading biofuel supplier. A highlight in regard to this within the select content is the reiteration on the OGM's embracement of the growing global demand for biofuels to reduce greenhouse gas emissions and to promote sustainable development.

Within the OGM's annual achievements and targets for 2008, the report states that the OGM took on the challenge to promote European legislation on renewable fuels and to create acceptance of the sustainably produced raw materials to produce the renewable fuels. To this end the OGM had presented to a wide range of European policy makers and nonprofits, their views and their pioneering work. The target for the following year was to ensure that new legislation was completely considered within the operations and reporting of the company.

Simultaneously Neste Oil wanted to continue in leading responsible operations and advanced technology within the industry. At this point Neste also acknowledges the EU's work towards setting regulatory measures towards the sustainable production and usage of biofuels where Neste specialises in and produces from their sourcing of palm oil.

GHG emissions were not published specifically in terms of Scope 1 or Scope 2 emissions. Instead, the first mention of Greenhouse Gas emissions in terms of capacity emitted, is mentioned in a responsibility lead initiative achievement where the OGM had reduced CO2 emissions by 160,000 tons. Thereafter the OGM presents a comparison graph where the CO2 emissions per each fuel produced by the OGM were represented. A complete calculation of all business operational emissions were also included later in on the report.

Neste presented a drive to be a market leader in the distribution of renewable fuels in 2008 which can be identified as proactive strategy due to business activities like developing and market low carbon products and buying voluntary carbon offsets as Bui and De Villers (2017) state in their study of carbon management accounting practices and business activities taken when implementing these strategies. The energy producer was also seen working together with regulators and setting a roadmap that would keep them a breast among competitors when it came to biofuel products. Marketing plays a key role in expanding their market share within the biofuel markets.

2016

In 2016 Neste has published a comprehensive sustainability report. The CEO's statement communicates Neste's vision of a cleaner future. To this end they have a two-pronged strategy that they become the leading providers for a low-carbon solutions within the Baltic Sea markets and expand their presence globally. They have in addition to their renewable Aviation fuel now developed a low sulphur marine fuel. As part of their vision in a changing global context for renewables, Neste communicates that they want to be a proactive player in creating the changing market conditions for a environmentally sound future. They have a specific target for 2017 to ensure that 25% of their renewable diesel sales consists of 100% renewable diesel. They have further reported on key steps that they would take to achieve their main two strategic targets of being a Baltic Sea leader and creating growth in Global Renewable energy. For

Global Renewable Growth Neste focuses outside being a competitive leader and expanding their product portfolio between products for road traffic and products outside of road traffic. Neste also communicates on the requirement to expand their sourcing of residue waste material for their renewable diesel globally. Neste has published the role at each level of the company hierarchy in achieving sustainability functions and targets throughout the business.

Whilst no explicit climate change scenario is tested the report indicates that responsibilities for managing climate change-related impacts are linked to performance assessments and incentive mechanisms, including remuneration policies for senior executives. The report describes that specific levels and functions within the organization are assigned to manage risks of climate change, although detailed descriptions are not provided. The report outlines how the board oversees the management of risks and opportunities related mechanisms are not detailed There are indications that the organization is attracting financing to enhance its competitive position within the sustainable development ecosystem. The report mentions initiatives aimed at innovation and the development of technologies that lead to substantial cost reductions in the use of renewable sources.

By 2016 Neste has taken a creative approach in its operations as the energy producer now has diversified and taken lead in a sustainability approach unique to their product mix. Neste has now included circularity as part of their then ongoing efforts to continue the production of their biofuels.

By 2016 Neste Oil The report follows GRI reporting standard and guidelines and reports of Scope 1, 2 and 3 emissions. Among the Scope 2 GHG emissions reported, Neste includes emissions from stationary and mobile sources related to extraction, oil refining, liquefaction, and regasification of natural gas. Neste for the first time mentions 'carbon handprint' which the energy producer was exploring with the Finland's innovation lab Sitra. The energy producer also has more robust sustainability vision and one that also now includes circularity due to the use of natural resources that can be reused in order to ascertain continuity of their biofuel products.

The report highlights actions taken to reduce emissions linked to the extraction and distribution of oil and gas, including the use of renewable fuels There are mentions of energy efficiency improvements and the use of renewable raw materials within Scope 2 emissions. The report provides insights regarding the management of indirect Scope 3 emissions related to the use of oil and gas products.

2024

In 2024 we are reading a review of the integrated report which highlights all of the sustainability related initiatives and how sustainability is present throughout the company's ethos and operations. The renewable fuels by Neste, both the jet fuel and renewable diesel is now presented as that being made of waste products instead of being derived from the extraction of palm oil as in 2008.

At this point Neste reports on report direct operational process emissions and fuel combustion under Scope 1, totalling 2.3 Metric Tonnes of CO_2e. The document indicates that Scope 2 emissions, which are indirect emissions from purchased energy. Neste goes onto emphasising their impact on Scope 3 emissions and describes this as their carbon handprint which consists of CO_2 emissions produced downstream by the users of their biofuel. Neste has committed to halving its Scope 1 and 2 emissions by 2030 and achieving carbon neutrality in its production by 2035. Neste recognizes the need for comprehensive Scope 3 emissions management and is committed to working with suppliers and partners to reduce these emissions. The sustainability visioning of Neste reads as follows

"Global greenhouse gas emissions continue to rise, making the path to limiting warming to 1.5°C increasingly narrow. The urgency of climate action is undeniable. Our direction is clear: Neste wants to be at the forefront of accelerating the green transition with its renewable and circular solutions and to create value for its customers, partners and the society. We create solutions for mitigating climate change and shifting toward the circular economy by refining waste, residues, and innovative raw materials into renewable fuels and sustainable feedstock for polymers and chemicals. We partner widely across industries, for example with the aviation and road transportation sectors, to help them reduce their greenhouse gas emissions, and we pro- vide the polymers and chemicals industries with viable pathways to transition away from fossil resources."(Neste Annual Report 2024 Annual Review, 2025, p.17)

The year is 2024 and Neste is providing renewable jet fuel to some of the worlds leading airlines at varied locations across the globe. They are stable in their vision and their expansion of market presence even geographically. They have more phase-out plans set in place and now have a creative strategy

5.3.3. Ørsted (DONG Energy)

2008

For the purposes of historical accuracy Ørsted will be called DONG Energy within this section. In 2008 DONG Energy published a report called 'Responsibility 2008' to communicate on their sustainability initiatives as per the GRI guidelines. The report then begins with the products offered by DONG in 2008 which were the exploration & production of oil & gas, generation of power & heat, sales & distribution, and energy markets.

The report then continues with a preface by then CEO Anders Eldrup, introducing the OGMs' alignment towards corporate responsibility. The central idea which the OGM has aligned with corporate responsibility is a responsible and healthy business. Elder's preface states that responsibility is part of the thought concept of the entire 'DONG Energy world' where the OGM has a responsibility towards the Climate, Environment, Customers, Human Resources and Business Ethics. Eldrup's in the preface states that it is the OGM's responsibility towards the company owners to operate in a robust value-adding business, the OGM's responsibility towards the country (Denmark) as its a major CO2 emitter to contribute to solving their climate problems and responsibility of the OGM to reduce the overall impact towards the environment. This part of the preface ends with the fact that the OGM had joined the United Nations Global Compact and that the OGM supports the use of principals of the UN Global compact. The preface, overall, ends with why responsibility is at the crux of DONG Energy's business. Specifically at the very end Eldrup's states that responsibility drives business development and proceeds to provide the following specific example.

"For example, we wish to contribute to solving the climate problem and simultaneously provide our customers with a stabile energy supply, develop new technologies and methods paving the way for CO2-neutral energy supply to the world, and create growth and development at DONG Energy."(Responsibility, 2008, p.0)

The pages that proceed after the preface are an insight to the OGM's transparency, at that given time and offers more transparency to the afore mentioned preface, or CEO statement. From page 6 to page 9 of the report is a correspondence between the Secretary General of the World Wildlife Fund and the CEO Ander's Eldrup after the Secretary General's perusal of the report. While commending the Secretary General states that they find it quite 'annoying' that the OGM wasn't changing its business model at its crux and stated that the green rhetoric of the OGM sounded hallow according to the draft of the report that was shared with the Secretary General. The ambitions that the wildlife conservation group (*About Us | WWF*, n.d.) had for DONG were more ambitious than what the draft report had presented . The Secretary General ends their letter with the following lines.

"The future belongs to the sun and the wind and all the other sustainable types of energy. But the question is whether DONG Energy wants to be part of the future?"(Responsibility, 2008, p.7)

The response of the CEO, in a gist, could be understood as one that was looking forward to the review by the WWF Secretary General. The response includes an internal acknowledgement towards the dwindling fossil fuel reserves and the necessity for the business to diversify to continue their commitment to the both the business and to provide a stable supply of energy to the OGM customers. This further indicates a top-down involvement in the transition. The CEO also acknowledges the global and regional infrastructure concerns in distributing green energy and also mentions carbon capture and storage. The proceeding section begins with the communication of climate related data. GHG emissions are reported and a road map is defined with the sustainability vision where significant investments in Wind turbines is indicated.

Ørsted in 2008 was preparing for a change and were open in their communication and disclosure of sustainability transition road map. The goals were ambitious and the OGM was open to criticism and feedback as they also saw the finiteness of their business operations continuity if they were to operate in a 'business as usual' manner i.e. considering their investments in both coal and gas production plants. It is also crucial to recognise the involvement of energy producer within the country's hosting of the COP 15 in Copenhagen. This shows an anticipatory strategy as Bui and De Villers (2017) suggest, where companies see good market opportunities or climate change risks and get involved in policymaking instead of just waiting for rules to be impose.

2016

Dong Energy as it is called in 2016 has a standalone report for sustainability. At this point the energy producer is well in their way from transitioning away from non renewables and from the very beginning within the CEO message one can read that 50% of energy generation was from green power and heat. CO2 emissions were reduced by 52% from 2006. The CEO's vision is that Ørsted should lead in the transformation towards green energy. Even though Ørsted was at this point still discontinuing their operations in Oil & Gas and was in the midst of transitioning towards green energy, the energy producer was reporting on the reduction of the cost of renewable energy.

Ørsted has conducted scenario testing where global temperatures rise more than 2 °C. In order to optimise their transition towards net zero the energy company also worked bilaterally with their household customers and business customers to save energy with the use of smart technology and parallelly modernising their distribution grid.

'Safety and Well-being of Employees' is the highest ranked material issues for Ørsted, which is closely followed by the 'Cost of Green Transition' and 'Climate Change'. The cost of green transformation was more important for the energy producer as they wanted to make green energy more affordable than black energy. Some other material topics included empowering 'Local Content' and 'Community Impact' where the energy producer wants to give back to local community and does this so by developing a local supply chain. Ørsted acknowledges the requirements of both the local community and policy makers. In terms of 'Community Impact' the energy producer engages with the local community and works towards minimising any inconvenience to residents and other stakeholders when Ørsted builds their infrastructure. Ørsted continues to believe in the vitality of enriching the communities surrounding their business operations. The energy producers even goes into the extent of educating their suppliers to implement similar policies within the supplier's surrounding communities.

The report does not explicitly communicate Scope 1 GHG emissions related to flaring and venting for gas disposal or Scope 2 GHG emissions. However, by this point in time the energy producer has begun and continued in shutting down it 'black' or coal energy plants. Investments in offshore wind energy have long since begun. The energy producer reiterates their commitment to reducing CO2 emissions together with households and even extensive partnerships with businesses. There is clear evidence in investments and growth in renewable energy. The energy producer still has all levels of the organisation involved in this transition to net-zero emissions and the organisations transformation itself. This change is spearheaded by the new CEO of the company.

In 2016 nearly a decade later and soon after the Paris agreement had come into realisation and the UN's sustainable development goals have been agreed upon. Ørsted was well ahead towards their ambitious and creative goals, that (green) energy producer had set for themselves in 2008. There is a certainty within the organisation towards the sustainable vision that was set in place and the energy producers was working with a proactive strategy having achieved an environmental efficiency in terms of investments in green energy and continuation of carbon disclosure.

2024

As of 2024 Ørsted has been reporting sustainability for two decades and now have had developed their sustainability reporting to comply to the ESRS. Data for 2024 was derived from the annual report both within the Sustainability Statement of the annual report an from the management review of the annual report as data for strategic visioning and in particular sustainability visioning can be explored within the management review. For the purpose of understanding sustainability visioning one begins the analysis of data from the CEO/ Chair-persons message with every other report explored within this study. The statement which was co-authored by both Ørsted's Chair-person and newly appointed CEO begins with anticipating the growing global demand of electricity and need to provide an increased accessibility for affordable renewable energy. These statement makes a broad claim where they envision to create a world that runs entirely on clean energy and the energy producer contributing their part in this but they also call for action by both governments and private sector to make this a possibility. The board's oversight towards can be explained by the following

"Our commitment to a sustainable build-out is at the core of our business. Our three strategic sustainability priorities – decarbonisation, biodiversity, and community impact – play an enabling role in our strategy and project delivery. They support that we mitigate risks and deliver more resilient energy projects that also drive a positive change for society and nature"(Ørsted Annual Report 2024, 2025, p.0)

The year is 2024 and the energy producer now no longer offers any fossil fuel products as part of their product mix. Within the strategic aspirations reported by Ørsted one can also identify the sustainability vision which the energy producer has. Firstly, they report that they want to be the worlds leading developers, generators and generators of renewable energy. Secondly., they want to be the leading talent platform in renewable energy and that employees globally experience Orsted as a great place to work. Thirdly in order to achieve their renewable energy ambitions is that Ørsted wants to construct i.e. develop infrastructure and facilities and operate in an environmentally and socially sustainable way. These are what they report as their strategic pillars. Madsen and Ulhøi (2021) identified that Ørsted used sustainability visioning for the three specific goals i.e. to initiate innovation and technologies leading to cost renewable investments, to grow the business and investment portfolio and to attract financing and increase their competitive position within the global ecosystem of sustainable development. While some of these activities can be identified within their strategic pillars even in 2024 one can read further about these business activities within their execution of their strategy and further within the climate sustainability reporting.

There is a description of policies and actions aimed at preventing or mitigating the impacts of the transition to a low-carbon economy on workers and local communities and this has been evident since the start of Ørsted's transition towards green energy. The board's oversight in managing climate risks and opportunities is integrated into the sustainability report though specific details are not included. The report suggests ongoing innovation and development of technologies aimed at reducing costs associated with renewable sources, particularly through strategic partnerships and supplier engagement.

Further on the report also shows a materials impact risk and opportunity analysis among their upstream and downstream business activities. They have also communicated on their transition plan towards 2040 with two phases. The first phase or Transition Wave, as they call it, was to shift from fossil fuels to renewable energy which they have been working on for the past 15 years beginning from 2008. They have increased their capacity in renewable energy, phased out of coal generation and aligned their capital with climate goals. These transition activities are explained in detail within the report. Ørsted also reports on the interim targets they had made in the decarbonisation process and the tracking and measuring the progress of their renewable energy portfolio. Ørsted also conducts climate advocacy to advance policies. What needs to be highlighted is that Ørsted proactively is addressing future emissions from existing or planned infrastructure which they call ‘locked-in emissions’ which take place due to their contact to offtake natural gas. However, they hey have set an absolute emissions reduction target for Scope 3 emissions from gas sales. The second phase of their transition plan or as they call it , Second Transition Wave, includes decarbonising their supply chains. This not only pertains measurement and tracking through Life Cycle Analysis (LCA) , establishing partnerships with suppliers of assets but also actively implanting decarbonisation throughout their value chain. These strategic partnerships with supply chain partners, development and continue marketing of low carbon products indicate a creative strategy continuing to take place within Ørsted.

Ørsted now produces only clean energy and has communicated about the elimination of Scope 1 emissions and completely eliminating GHG emissions as of 2030. Ørsted reports that greenhouse gas emissions intensity for scope 1 and 2 is expected to decrease in 2025 and meet their science-based target of 10 g CO2e/kWh and is in lieu of higher expected renewable energy generation after the shutdown of the coal-based heat and power generation in 2024. The report reiterates this milestone in transforming Ørsted’s energy production to renewable energy by shutting down t last coal-fired power station. Through this they are on track to reach the industry-leading science-based target to reduce our scope 1 and 2 emissions intensity by 93 % since 2018 and to reach our target of a 99 % renewable share of energy generation by 2025. In terms of decarbonisation, they also report about using low carbon emission steel in their production facilities and also recycling blades from their wind power stations.

The OGM has reported on Scope 2 GHG emissions originating from stationary and mobile sources. It mentions a decrease in location-based Scope 2 emissions by 37% from 2023 to 2024, actions have been taken to reduce emissions linked to the extraction and distribution of oil and gas. The report highlights a significant milestone with the shutdown of the last coal-fired combined and now the energy producer is operating with a small and not so indicative percentage fossil fuel backed-up generators to continue the storage of energy produced by their wind turbines.

6. Discussion

This section discusses the results in relation to the study’s literature review highlighting the conceptual framework along with further elaborated themes and patterns.

6.1. Strategies to transition

Each OGM over the given years took different strategies in alignment to policy, anticipation of customer needs, sustainability visioning set by the OGM or other requirements that arose during the given time. It is evident through the results that there is no, one strategy, towards the transition to net-zero. Fattouh et al. (2018) suggests that Oil & Gas Majors should extend their product portfolio without having a wait-and-watch strategy or by simply divesting and transitioning to renewable energy completely. The wait-and-watch approach is a visible among Equinor as the producer reports that there is still a requirement for black energy and a sudden reduction in this would be detrimental towards meeting the needs of their customers. There is evidence to Equinor having made investments and continued to expand their investments in non-renewables which indicate the OGM was operating according to one of the key features through which OGM and energy producers operate. Other common features that were evident among all three OGM was the wait on information and thereby delaying decision making and also entertaining uncertainty in which decisions had higher reward which would manifest through profits (Fattouh et al., 2019)

Expansion of product portfolio can be seen as first step towards the transition goals set by the Nordic OGM explored within the study. However, as in the case of Ørsted the company thereafter took on complete transition and divestment from Oil and Gas to achieve their net-zero ambition. In terms of decisions that would manifest through profits, the results revealed that Ørsted at the beginning of their transition to offshore wind power was operating at loss. The results also revealed that there was no 'one-size-fits' strategy that works for all of the Oil and Gas Majors. As a successful response to both rising global temperature and now dwindling reserves of non-renewables the OGM have had to ascertain which models of their business was at risk and have gone beyond the scope of the question to integrate or not to integrate new energy sources. In fact, it is proven among some large scale OGM that integration comes in as a solution for declining and uncertain oil reserves. The results revealed that while investing in natural gas and supporting carbon taxes, that oil & gas companies need to evaluate which part of their business model is at risk with this energy transition and within what time frame. Fattouh et al (2019) identifies these activities with adaptation strategies unlocking new sources of demand, improving efficiency, and deflating costs.

6.2. Sustainability reporting and the communication of strategies

During this longitudinal study, identifying transition strategies was not linear process as sustainability reporting evolved alongside the reporting standards, policy influence and legitimacy seeking behaviours. During 2008 the communication HSE activities were more predominant among all OGM. Data would often be duplicated across the report and would provide a different meaning according to the materiality topic at hand. This was especially evident when it came to diversification and the introduction of new energy sources specifically in the early stages such a Neste Oyj's NextBTL in 2008 alligning with the findings of Kwarto et.al (2022) that states that sustainability reporting among OGM can be unfocused and disoriented.

Kwarto et al. (2022) also speak about aversion techniques and the results revealed that in some instances there was not sufficient data reported as an aversion technique by the Oil & Gas Major as at that particular time they were not addressing climate change and their role in contributing to this . This was more evident in Statoil Hydro's sustainability fact book where there was more focus on HSE issues than business activities in response to climate change. However, it must be noted that the transition to net zero is considered as a core business activity and not as CSR activities and despite this the result revealed that the communication of transition strategies where unfocused and disoriented similar to the reporting of CSR activities. The reports studied during the early years revealed significant differences in sustainability strategy and reporting within the OGM that were operating in the same industry (Bui and De Villiers, 2017; Hourneaux Junior et al., 2017) and through the years reporting became more standardised and mimicked each other even though the energy producers operated a different product mix (Comyns, 2014). The result also revealed ad that sustainability reporting overall changed with time and presented strategies, both present and future for climate change risk management within the OGM . The definition of sustainability and the urgency to respond to adverse climate change differed among the OGM and also how they could adapt sustainability to their strategies. Hourneaux Junior et al. (2017) states that how companies may adapt this to strategies will depend on a range of organizational and contextual factors which is broad and is still complex and yet to be determined and comprehended.

All sustainability reporting followed a similar trend of increasing transparency , specifically in terms of Scope 1 & Scope 2 emissions (Matisoff et al., 2013). The results did reveal legitimacy seeking behaviours and also in some cases the OGM contradicted themselves as with the case of Equinor in 2024 where they wanted to be a leader in low carbon emission fuel but continued to invest in on shore refinery in Brazil. As Higgins et al.2020 states, sustainability reporting when studied over-time can be a tool for transparency in regard to a mismatch between the expectations of the business and the businesses actual actions to this end and can indicate where companies either conduct greenwashing or legitimacy seeking behaviours . Due to regional pressures i.e. as the OGM operate operated within Europe the results did reveal that the OGM , "participated in industry climate- change frameworks, adopted internal carbon pricing, spent and pledged more on clean energy, and recently set net-zero transition and energy product decarbonization goals" as stated Li et.al (2022).

6.3. Sustainability visioning to reframe strategic vision

In terms of sustainability visioning there were three questions that were pertinent towards understanding the strategies to transition towards net zero. While all three energy producers reported on two of the questions at one point or the other during 2008, 2016 or 2024 there was only singular report that communicated on the reduction of costs of renewable energy. The findings reveal that all OGM reported on how they had grown the business and investment portfolio towards green energy production and distribution and attracting financing and increase their competitive position within the growing global ecosystem of sustainable development. The results indicate that there are claims of increasing CAPEX capabilities and investments towards green energy. However, the data communicated through the reports do not go into the extent of how the OGM had increased their investments towards green energy. The results indicate that only Ørsted in their integrated report of 2024 have communicated about innovation and development of technologies which have lead to the substantial cost reduction of their renewable investments which they consider as an advantage in making the renewable products more accessible for customers. The results revealed that there can be insufficient organisational insights regarding transitions as energy producer's may not engage or envision strategies towards a complete phase out of black energy but is expanding their product mix.

6.4. The use of Carbon Management Accounting in identifying strategies to transition

6.4.1 The role of GRI

The results revealed that the GRI frameworks and indicators have evolved from providing guidelines to creating the first global standards in sustainability reporting in 2016 (GRI - Mission & History, 2025) and GRI reporting became more thorough and robust with the introduction of 'Sector Standards' which is their standards for industries (GRI - Sector Standard for Oil and Gas, n.d.). These topics, through the intervention of policy makers and specifically through the principal of materiality have evolved to be called materiality topics (De Villiers et al., 2022; Torelli et al., 2020) . As with Alazzani et.al (2013) GRI was utilised within the coding framework to identify the strategies to transition as this provide the most comprehensive reporting framework principles , standard disclosures, indicators and reporting protocols, augmented by a series of sector-specific supplements and resource documents. The GRI guidelines used for the study were from the latest updated sector guideline which was updated as of 2021. While this provided comprehensive reporting guidelines for GHG reporting as per sector standard reference no 11.1 and Climate adaptations, resilience and transitions as per GRI sector standard reference no 11.2.1, the reports that were studied were selected from far back as 2008 where such data was not deemed obligatory to report. However, these GRI sector standards increased the traceability of data among the different sustainability reports both integrated and stand-alone reports. With the adaption of ESRS coming into place in 2024, the results revealed that the implementation of GRI framework within reporting (even prior to the sector update) delivered a high quality of reporting (Alazzani and Wan-Hussin, 2013; Comyns and Figge, 2015) and the economic, environmental, and social aspects of sustainability performance (Orazalin & Mahmood, 2018) . The GRI sector standard for climate adaptation also crossed over with Madsen and Ulhøi 2021 questions to identify sustainability visioning and this could be identified within the sustainability reports. Lastly the results revealed that data that wasn't published among the earlier sustainability reports were due to the evolving nature of reporting standardisation

6.4.2. GHG emissions reporting

GHG emissions reporting played a as a key element within sustainability reporting and has been part of sustainability accounting that is designed to support organizational managers and leadership to make decisions about the organization's carbon emissions (Burritt et al., 2011) . The results revealed that oil and gas industry had over the years shown increasing interest in GHG reporting sometimes even before institutional pressures contradictory to Comyn and Figge (2015). For example, this was evident with Ørsted who took feedback from the WWF regarding their strategies and action to transition to Net-Zero which they communicated within their 2008 sustainability report. However, this contradiction is not completely true among all OGM studied as some of the energy producers were influenced through institutional pressures to report similarly specifically as they are within the EU (Comyns, 2014; Comyns & Figge, 2015) The results revealed that even with proactive climate change strategies such as in the case of both Ørsted and Neste, these OGM had better quality or more extensive GHG reporting (Comyns, 2014). This is as the OGM had no ability to gather data, the likes of Scope 3 emissions in the years of 2008 and 2016. GHG reporting in terms of Scope 1, Scope 2 and Scope 3 did simplify the search for decarbonisation strategies as the information provided by the sustainability reports could be easily verified with this measurement of GHG emissions. In a previous study Comyns et al. (2013) presented the role of 'search', 'experience' and 'credence' in sustainability reporting. In terms of experience, it meant that a particular set of information could be verified in the long term once the reader has experienced this information. Finally 'credence' was associated with information which could not be verified by the report reader (Comyns et al., 2013). As this was a longitudinal study the results did reveal experience when proceeding from one year to another, but credence could not be verified as the study focused on sustainability reports as sources of data.

7. Conclusion

The aim of this study was to explore the transition strategies to net-zero as communicated through the sustainability reporting of Oil and Gas Majors in the Nordic region. The research question that guided the study was, how have Nordic Oil and Gas Majors reported their strategies (or lack thereof), to transition to net-zero? Developing on existing literature and through a content analysis of sustainability reporting over a given period of time among three

OGM the study has been able to answer this question.

The findings revealed four crucial insights which arose during the content analysis of sustainability reports that indicated drawbacks in sufficient communication of data as per the parameters of the content analysis. As per the guiding parameters for the content analysis availability of such strategy data should be reported during the transition of OGM business activities and product portfolio towards net-zero. The insufficient communication of transition strategies among sustainability reports can be summed down to four drawbacks. Firstly, there is a lack of reporting either in sustainability visioning or CMA responses to climate change due to the evolving nature of reporting standardisation. Secondly there can be insufficient data reported as an aversion technique by the Oil & Gas Major as they do not wish to address climate change and their role in contributing to this. Thirdly there can be insufficient organisational insights regarding transitions as the energy producer is not engaging or envisioning strategies towards a complete phase out of black energy but is expanding their product mix. Lastly some of the guiding questions could not be answered due to the lack of data collection and reporting from the businesses themselves as indicated with the lack of Scope 3 data which were not prevalent in earlier reports. Other key findings included that expansion of product portfolio could be seen as first step towards the transition goals set by the Nordic energy producers explored within the study whereas Ørsted then went into divestment. As reporting became more standardised sustainability visioning took precedence and, in most cases, reframed strategic vision. Reporting quality also increased over time whilst net-zero became a goal among the energy producers either eminently or futuristically.

Much can still be learnt from the Nordic region and from the sustainability reporting conducted within the region with industry leaders the likes of Ørsted, among a few others, that have phased out and are working towards net-zero with very little friction from all stakeholders involved. OGM that have transitioned successfully have changed the narrative that is held against the energy sector and a more technically challenging systems and regimes they operate in. The results revealed that these OGM have been ahead of the curve in terms of transparency and accountability where they involved policy makers and other stakeholders to provide feedback on their operations and strategic ambitions towards a net-zero phaseout. The results also reveal that the OGM have used their sustainability reporting towards communicating future ambitions and their sustainability visioning which can be studied towards implementing a streamlined roadmap towards net-zero.

While business activities have taken place towards a transition, sustainability transitions are not linear and as this research has also shown cannot be one-size fits all due to socio-economic factors, local policies and climate change itself. The strategies towards net-zero emission are those that adapt to the climate crisis at hand, regulatory pressure and business continuity. Sustainability reporting itself continues to change in tandem with policy and reporting standards which have updated over the years. Sector standards for reporting have changed focus from HSE to Environment, Social and Governance with more predominance now focusing on climate change response activities. The future, presented many times in this study, is here. And though the word 'sustainable' is an oxymoron in the present tense, being sustainable or otherwise is a need of today.

8. Suggestions for future research

Rowlison and Clark (2004) has conducted much qualitative research through an historical analysis using documents as a text it was evident that the authors had used this research method for organisational studies (Clark & Rowlinson, 2004). Whereas this study aims to identify and define strategies in a transition as a response to climate change adaptation. Other than strategies to transition, the empirical documents i.e. the sustainability reports can be used to conduct a historical analysis to understand an organisational transformation as the organisational structures and operational functions continued to change alongside the strategies that were put into play. During the initial study phase an historical content analysis was considered to show the longitudinal nature of the research. As Fattouh et al. (2019) state there are significant risks that pertain to the misallocation of resources and similar other results which can be detrimental in the decision making and transition process. While a few of the reports communicated the potential risks in climate change response action and decarbonisation, one can also further explore and study the risks of transition, and, the strategies that were taken to averse these risks or overcome threats .

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11. Annex

Table 3 : Empirical documents – reports studies

Document name	No of Pages	Organisation	Link to document
Statoil 2008 sustainability report	24	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/aa6c5146ac92e4a9c98fa3a73fcc6ff2e609366f.pdf?sustainability-report-2008-equinor.pdf
Neste Oil 2008 Annual Report	154	Neste	https://www.neste.com/news/neste-oil-publishes-its-annual-report-for-2008
Responsibility 2008	48	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-ratings-and-reporting#our-sustainability-reports-2008
2016 Sustainability Report	62	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/514d634e9d374f377762386b4d0262d0cf301989.pdf?sustainability-report-2016-equinor.pdf
Neste Annual Report 2016	202	Neste	https://ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchsLEg5GaWxlQXR0YWNobWVudBiAgOD_mtDqCAw?language_no=0
Sustainability Report 2016	38	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-ratings-and-reporting#our-sustainability-reports-2016
Annual Report 2024 Equinor	336	Equinor	https://cdn.equinor.com/files/h61q9gi9/global/16ccbc5a098c3b971979118420c4f83ddee18fb4.pdf?annual-report-2024-equinor.pdf

Neste Annual Report 2024 Annual Review	62	Neste	https://ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchsLEg5GaWxlQXR0YWNobWVudBiAgLC3l-bxCAw?language_no=0
Ørsted Annual Report 2024	258	Ørsted	https://orsted.com/en/who-we-are/sustainability/sustainability-report/esg-ratings-and-reporting#our-sustainability-reports-2024