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Master in Energy, Environment and Society

Master Thesis

Greenwashing in carbon accounting from electricity consumption

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Summary:

The topic for this study is climate change and sustainable development, with focus on carbon accounting and its role in securing a sustainable future. The study is conducted through a literature review and case study of the company Skretting and have given a broad context on the carbon accounting standards, landscape, and problematics. The study addresses the methods for calculating emissions associated with electricity usage, and more specific gives a critique of the market-based method, in collaboration with contractual emission factors, and dual reporting from the GHG Protocol. The study revealed that two companies that compare emissions with each other, will in many cases have totally different results, just based on what calculation methods that is used. In the example with Skretting, we saw that the calculated emissions could multiply by over 7 times just by switching calculation methods. The method also makes some fossil fuels twice as climate friendly as electricity. Based on this and some other reasons, the study concludes that the market-based method, dual reporting and contractual emission factors in fact makes it possible for companies to greenwash their business. The study suggests that the market-based methods is abandoned, the dual reporting practice should change, and more companies with significant energy use, are implemented in the EU Emissions Trading System to ensure guaranteed results on cutting companies emissions.

Abstract:

The necessary actions to fight climate change is becoming more and more urgent year by year. To reach the ambitions set in the Paris Agreement, all stones must be turned. The GHG Protocol is the most recognized framework for businesses to account for their emissions use a methodology for calculating emissions from electricity that are questioned by some scholars. The “market-based methods” and the dual reporting from the GHG Protocol give room for companies to use fossil fuels, and still report lower emissions than what they can with electricity. Purchases of contractual emission factors like a Guarantee of Origin even further contribute to the possibility of companies greenwashing their business. In this study the framework is examined through a literature review and case research from the Norwegian company Skretting. The results clearly point towards the need for a new methodology and suggest that more companies that consume high levels of energy are implemented in the EU Emission Trading System.

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Contents:

Abbreviations:

ACER	Agency for the Cooperation of Energy Regulators
CBAM	Carbon Border Adjustment Mechanism
CSR	Corporate Social Responsibility
EEA	European Economic Area
EFTA	European Free Trade Association
ESRS	European Sustainability Reporting Standards
EU ETS	European Union Emission Trading System
GHGs	Greenhouse Gases
GO	Guarantee of Origin
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Assessment
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
NIMBY	Not In My BackYard
NRA	National Regulatory Authority
REC	Renewable Energy Certificate
SBT	Science Based Targets
SBTi	Science Based Targets initiative
SDGs	Sustainable Development Goals
SME	Small and medium-sized enterprises
T&D	Transmission and distribution
WRI	World Resources Institute
WWF	World Wide Fund for Nature

1 Introduction:

The Intergovernmental Panel on Climate Change (IPCC), have for many years reported that immediate climate actions are needed to avoid serious consequences of climate change. In the Paris Agreement, that was approved in December 2015, the nations of the world agreed on trying to limit global warming to well below 2°C and try their best to limit the warming to 1,5°C. (United Nations, 2015, p. 3). Still, in IPCC's latest Synthesis report from March 2023, they give clear warnings that the time is running out for us to reach the 1,5°C targets, and action needs to happen rapidly and at great scale in order to avoid (IPPC, 2023b, p.2). We have currently reached a warming of 1,1°C above pre-industrial levels (IPCC, 2023b, p. 2), and with the current pledges, and a continuation of that trend, emissions will reach as much as 2,1°C within the year 2100 (IEA, 2021, p. 13). This means that increased ambitions and actions needs to happen in order to reach the targets put down in the Paris Agreement.

In order to reach the targets, measures need to be taken in all different sectors, and it is important to use efficient methods for cutting emissions, and ensure that different actors cannot shirk their responsibilities, or that some give misleading information about their sustainability performance. Related to the latter, this study wil focus on carbon accounting, and the current regulations and frameworks. More specifically it will focus on the different methods of calculating emissions, and some on the disclosure of their emission numbers. The study will not embrace methods for emissions from all different scopes, but rather focus on scope 2 emissions, and even more specifically emissions from electricity. There are some issues possible with the methodology in the most recognized framework that is being addressed and evaluated in this study. It is related to the methodology, and whether it makes it possible for certain businesses to greenwash their business. If this is the case, transitioning to a more sustainable future becomes more difficult than it already is, because companies will have incentives to move in the other direction, or at least make a slow transition.

1.1 Sustainable development

Sustainable development has over the last decades become a very important concept and have guided scientific debates and public policies in persistent and complex problems. Its aim is to ensure economic welfare, ecologic quality and social equality in the society, now and for later generations (Frantzeskaki et al., 2012, p. 20). We live in an ever-changing society, with large numbers of networks and interconnections, so the nature of the problems we face are also changing rapidly. Within this new perspective, the society consist of complex systems, which organizations and individuals organize themselves within. These systems have limits set by physical, institutional, conscious, and

unconscious structures, that all affect the daily lives and routines. The interplay between social structures, technological innovations and individual actions, lead to changes in societal systems, that sometimes also lead to great radical transformations, that we call transitions (Frantzeskaki et al, 2012, p.20-21). Transitions are fundamental changes, that are meant to deal with persistent problems that is a kind of wicked problems. Wicked problems are especially hard problems to solve, that have no clear solutions, and a persistent one is a problem that are complex, and have a tendency to reappear, no matter the efforts get rid of it (Frantzeskaki et al., 2012, p. 21). When a transition happens, it can happen in different levels. Climate change for example is happening at a global level, the same with poverty and equality. Then we also have regional or national levels with for example energy provision, mobility, and agriculture. In this document we will look at something that arguably can fall under global and the national and regional level of a transition. The theme is climate change, and sustainable transition, but we are going to take a closer look at the structures of emission accounting, especially in the way emissions from electricity is being reported and disclosed. It is important that the systems and practices of the transition does not hinder it in any way. In this research we are going to evaluate a potential problem regarding one of the methods for reporting emissions from electricity usage, namely the market-based method.

Through international agreements like the Paris Agreement, numerous climate accords, through governments naming ambitious targets for reductions in emissions and collaboration efforts like power cables that crosses national borders, we still see that the transition to a more sustainable world is not going in the tempo that we need. According to the IEA (2021, p. 13) it will still be as much as 22 billion tons of CO_2 emissions in 2050 even if the pledges from the Paris Agreement is met.

Climate has become a problem that for every year that passes becomes more and more urgent to handle. Climate policies is being made all over the world, but reports show that the problem is growing. The Paris Agreement that was passed in December 2015, is perhaps the furthest step forward in the pursuit of fixing the problem, but even the targets agreed upon there, seems to be to little too late to avoid severe damages to the planet in terms of living conditions. The Paris Agreement seeks to limit global warming to a maximum of 2^{o}C, and try to limit it to 1,5^{o}C. With the reduction targets agreed upon today, it seems like we will get a heating of 2,1^{o}C (IEA, 2021, p. 13). Nevertheless, countries tend to not reach their targets, and if they are not met, the heating will be even worse (IEA, 2021, p. 13). There are numerous consequences for not reaching the targets in the Paris Agreement, and the scale of the climate related problems rise with more heating. Some estimates claim that with a heating of 2^{o}C, the ice on the north pole will melt, 400 million more people will experience water scarcity, and large cities around the equator will be uninhabitable. It might become 32 times more extreme heatwaves in India, and each of them will last 5 times as long

(Wallace-Wells, 2019, p. 20). This is a scenario that with today's pledges will not even be met, and limiting the heating to 1,5°C will be much better, even if it seems very unlikely that this will be achieved. With a heating of 3°C, will southern parts of Europe have drought periods that last 19 months longer at a time than today, and the region will have permanent droughts. Areas that burn down from yearly fires around the Mediterranean will cover twice as much land as today, and six times as much in the USA. With heating of 4°C, the damages from overflooded rivers will be 30 times as severe in Bangladesh, and 60 times in Great Britain, compared with today. Wars and conflicts might double, and the global damages from climate change will be as much as 600 trillion dollars, which is more than exist in todays economy (Wallace-Wells, 2019, p. 21). With this knowledge, it should be obvious that it is in everyone's interest to limit global warming as much as possible, but still it seems to be difficult to agree on ambitious enough targets, and even to live up the targets agreed on.

1.2 Objectives

The aim for this study is to receive more information about a theme that needs to be better studied. The carbon accounting practices for electricity and its frameworks to are not researched much. Only a few scholars have written on the subject. In this study it would be focused on greenwashing and if the companies deal with frameworks and standards that make this possible. We will especially look at businesses that is not a part of the EU ETS. This because they might have other incentives to cut emissions than the ones covered by the ETS.

1.2.1 Research question

In this study we want to find information related to the effects of the market-based method and dual reporting for calculating emissions from scope 2, and electricity more specifically. Other heating related emissions that scope 2 is covering will not be further investigated here. More specifically what we want to find out is whether or not the market-based method, dual reporting and the use of contractual emission factors; does make it easier for companies that is not covered by the EU ETS, to greenwash their business. For this study the following research question will be used:

"Does the market-based methods, dual reporting and contractual emission factors for emissions associated with electricity; make it easier for companies that is not covered by the EU ETS to greenwash their business?"

Later in the study we will evaluate the results from the study, discuss different viewpoints, and in the end try to answer this question based on the results we find.

1.3 Background and motivation:

The background for choosing this exact theme is a collaboration between the University of Stavanger, and a small number of businesses located in Stavanger. Through a project called the "Ingenious Challenge", master students could apply for the possibility to help the businesses. Skretting was one of the businesses and was the one who got the largest number of students working with their problem. They wanted help with ideas of cutting their emissions from their operations in Norway (scope 1 and 2). It was through this work, the potential problem with the different methods of reporting emissions from electricity became intriguing. Skretting informed that they had moved from a location-based method of calculating emissions, to a market-based method, and therefore suddenly had much higher emissions than they used to have. This raised a few questions, that just could not go unchecked: Could a company really go from having a certain level of emission to a much higher one, just by changing the methods? Is this right, and is it something every business must do, or are they free to choose? Continuous work with that project showed that Skretting could reach their emission targets, and even more than that, if they just bought contractual emission factors that guaranteed that their electricity came from renewable sources. This gave motivation to find more information about how this system of accounting works, when it seemed like one could only pay a fairly low price, and then be rid of own emissions connected to electricity. It was even more motivating to really understand carbon accounting, when the emission factors from the market-based approach without contractual emission factors were disclosed. If a company did not buy contractual emission factors, the emissions from electricity had about twice as high emissions as diesel and natural gas. This seemed to be something that potentially could damage the progress towards a sustainable future and is the main motivation for pursuing this theme for the master thesis.

1.4 Structure of thesis

This thesis is structured in 8 chapters including the introduction. The chapters are organized as follows:

Chapter 2: Gives the background information needed to examine the subject further. It explains the main standards, and organizations that receive carbon data. Also the European landscape are introduced, explaining different targets, legislation and boundaries that exist within the EEA.

Chapter 3: Introduce the theory that is relevant to this study, and give a better understanding of how the electricity markets are working. It also touch upon the relationship between state and companies, explained through the Agency theory, before lastly, greenwashing is explained.

Chapter 4: Is the methodology chapters, where it is explained how the study is conducted, and what tools that are used. Further the case of Skretting is introduced, giving some useful information that will be discussed later.

Chapter 5: Here we find our study area, and we use the information about carbon accounting, and our case to highlight some interesting characteristics with the way the carbon accounting works today.

Chapter 6: In this chapter we see our results from the Skretting case and highlights some interesting findings. Also results from the emission trading system is highlighted.

Chapter 7: Is the discussion of the study. The results are discussed, and other interesting characteristics about the methods are discussed and evaluated.

Chapter 8: The last chapter is the conclusion, where the work that is made is concluded. Some final recommendations are made, and suggestions for future work.

2. Carbon Accounting Practices:

To be able to understand the complex reality of carbon accounting, and the strengths and weaknesses with the different methodology we need to get have some knowledge about the field, how the electricity market works, the different methodologies for calculating emissions, different practices, and what landscape the businesses have to manage in.

The carbon accounting practice and research emerged after the Kyoto Protocol and the establishment of the EU ETS. Tang (2017, p. 2) defines carbon accounting as "a system that uses accounting methods to record and analyse climate-change information as well as account for and report carbon-related assets, liabilities, expenses, and income for decision-making purposes". The increased importance and attention of climate change and the adoption of accounting by companies and organizations to address carbon issues, seems to be the main drivers towards the increased research on carbon accounting (He et al., 2022, p. 285). Earlier, carbon accounting was treated only as a part of Corporate Social Responsibility (CSR), but the resent literature suggest that it is starting to evolve into an independent field of research (He et al., 2017, p. 285). Carbon accounting has developed into four different categories, where we have carbon- disclosure, management, assurance, and performance. Carbon disclosure is like the name might reveal about how companies disclose or present their information about GHGs. This might happen in different channels, like numbers reported to government agencies, in standalone sustainability reports, corporate social responsibility (CSR) reports, or in voluntary disclosure through disclosure systems like the CDP runs (He et al., 2022, p. 273). Carbon management can narrowly be defined as "the practices a company undertakes to mitigate its operational GHG emissions". Nevertheless, this definition could also be extended to the management of all carbon related issues of the company (He et al., 2022, p. 281). Carbon assurance is different from financial auditing by its distinctive legal and regulatory framework, organizational involvement, the materiality threshold, accounting methods, competencies required and the users of the assurance reports. Because carbon assurance needs expertise related to GHG emissions in addition to auditing expertise, two main types of assurance providers exist: consulting firms, and accounting firms (He et al., 2022, p. 279). Lastly, carbon performance mainly focusses on how well companies perform in managing and controlling their carbon emissions. In this document we will focus mostly on the disclosure, secondly performance, touch on management, but not so much assurance.

Matthew Brander (2022, p. 337) claims that we have two major methods for using GHG/carbon accounting. This is attributional methods and consequential methods. Nevertheless, policymakers, professionals and standard setters fail to separate the two, and use inappropriate method for a given

purpose (Brander, 2022, p. 337). Brander (2022, p.337) explains attributional methods like this: "Attributional methods are inventories of emissions and removals within a defined inventory boundary and are appropriate for allocating carbon budgets and setting reduction targets". Nevertheless, attributional methods may lead to measures that without intention increase the emissions, because they only provide information om emissions and removals within the inventory boundary (Brander, 2022, p. 337). Consequential methods are aiming to provide information about the "system-wide" or global change that are caused by the decisions made. It is the appropriate method for informing decisions that aims to reduce emissions (Brander, 2022, p. 337).

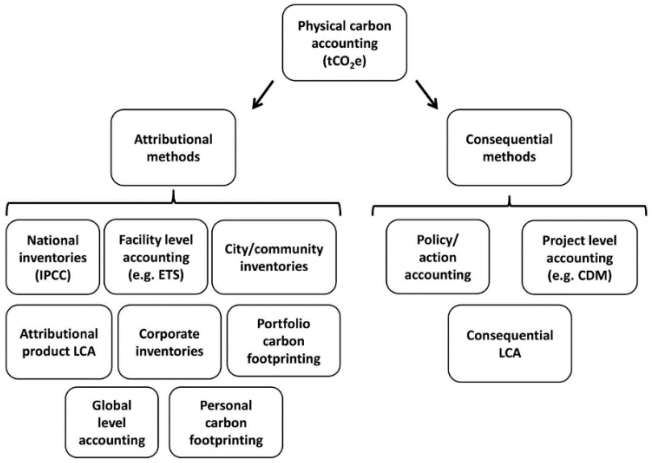

Figure 1 Brander, 2022, p. 338)

In carbon accounting, there are so many different ways to go about. There are different rules in different countries, to who is reporting what, and how. For example, in Norway, large businesses report their emissions to the Directorate for the Environment (Miljødirektoratet). There they only report their scope 1 emissions, and the scope 2 emissions are counted as the power generators scope 1 emissions (this will be further explained below). In this way they make sure that there is no double counting. Additionally, some companies are member of the EU ETS, and have additional regulations to adjust to. They buy and sell permits to emit GHGs, and report in more or less the same way to the EU ETS as to the Norwegian Government. Nevertheless, they will get economic sanctions if they emit more than they are allowed to. This is the way some companies of certain size and in certain sectors are regulated to report emissions.

Then we have companies that calculate and disclose their emissions on voluntary basis. Some companies might believe that it is a good idea to do so for several reasons. For example, it might increase the reputation and trust of the company to do so, especially if what they disclose makes a

good impression. Another reason is that it might give the company competitive advantages, especially if they have lower emissions than their competitors. It might be something that potential investors cares about, and if a company does not disclose their emissions, it might look like they are hiding something. These are some of the reasons that companies disclose their emissions voluntarily.

For the companies that disclose their emissions on voluntary basis, there are many different ways they could do so. Some companies report their emissions to companies like the CDP, or use targets from the Paris Agreement, called the science-based targets, when they disclose their emissions. Some have annual reports on sustainability, where they often also report on other aspects of sustainability. ESG reports have become very common, and a nice way for companies to show that they care for others than themselves. However, these reports use more than environmental criteria for sustainability, and usually refers to the Sustainable Development Goals (SDGs) formed by the United Nations. That involves 17 different goals, related to either social, economic, or environmental challenges (United Nations, 2023). Companies then lists different measures they have done, and plan to do to show how "good" their company is.

The frameworks that the companies use, can also vary, but the most used one is the GHG Protocol. This is a framework that is recognized with many organizations that receives emission data from companies. In the sections below, we will take a closer look at the different standards and frameworks.

2.1 Standards and frameworks:

As mentioned, there are a multitude of different standards and frameworks for accounting, and also many different organizations that companies can report their emission data to. In this section we will look at the most used and recognized versions, at least in Europe.

2.1.1 GHG Protocol:

The Greenhouse Gas Protocol Initiative is a multi-stakeholder collaboration, where NGO's, governments, businesses and others were convened by the World Resource Institute (WRI), and the World Business Council for Sustainable Development (WBCSD). The initiative was launched in 1998, to develop an international accepted framework for accounting and reporting emissions from greenhouse gases (GHGs) (GHG Protocol, 2015, p. 2). The GHG Protocol cover two separate- but linked standards. The first one is the GHG Protocol Corporate Accounting and Reporting standard which gives a step-by-step guidance for businesses to use for quantifying and reporting their emissions. The second is the GHG Protocol Project Quantification Standard, that is a guide for quantifying reductions from projects that is mitigating GHG emissions (GHG Protocol, 2015, p. 2).

For accounting and reporting purposes, three scopes are introduced by the GHG Protocol. This helps to separate between indirect and direct sources of emissions, creates utility for different climate policies, business goals and for different types of organizations (GHG Protocol, 2015, p. 25). Direct emissions are emissions that comes from sources that the company owns or control. Indirect emissions on the other hand are emissions that occur because of the company's activities, but the source of the emissions is owned or controlled by another company (GHG Protocol, 2015, p. 25).

Scope 1 is the direct emissions that is owned and controlled by the company. This could be several sources like, steam boilers, dryers, chemical production, vehicles etc. It is worth noting that only the GHGs covered by the Kyoto Protocol is included in Scope 1. That is carbon dioxide (CO_2), methane (CH_4), nitrus oxide (N_2O), Hydroflourcarbons (HFCs), Perflourcarbons (PFCs) and Sulphur hexafluoride (SF6) (United Nations, 2023a).

Scope 2 is emissions associated with the production of electricity, that a company purchase from a power generator, and should be accounted by the end-user (GHG Protocol, 2015, p. 25).

Scope 3 is also indirect emissions like scope 2 but are those indirect emissions that is not related to electricity production. It is through the CDP optional to report these emissions. Nevertheless, these emissions are emissions that are caused by the company's activities but is not owned or controlled by the company. This might be emissions from sold products that the company produce, extraction of materials for a product that the company is selling, transport of goods to the company and so on (GHG Protocol, 2015, p. 25).

In this document we will focus on the emissions from electricity, that is a part of scope 2, and the different calculation and reporting methods that exists in the GHG Protocol and the CDP.

2.1.2 CDP:

The CDP, previously known as the Carbon Disclosure Project, is a non-profit organization that runs a global disclosure system for companies, investors, states, cities and regions to report and manage their environmental impact (CDP, 2023). The CDP uses the framework of the GHG Protocol for accounting businesses' emissions through the different scopes (CDP, 2023$_b$)

2.1.3 Science based targets:

The Science Based Targets initiative (SBTi) is a partnership between CDP, World Resources Institute (WRI), the United Nations Global Compact and the World Wide Fund for Nature (WWF). The SBTi is using the Paris Agreement's targets as a guideline and give companies and financial institutions the information they need for them to know how much they need to reduce their emissions to be in line with the ambitions (SBTi, 2023a). According to themselves, they focus on helping companies from all over the world to cut their emissions by 50% within 2030, and reach net zero emissions by 2050 (SBTi, 2023b, p. 5). They define and promote what they believe is the best practices in science-based target (SBT) setting, give guidance to reduce barriers on adoption, and assesses and approves different companies' targets (SBTi, 2023b, p. 5). The SBTi has developed their own Net-Zero Standard, that supports companies with guidance, criteria, and recommendations, for them to be validated by the SBTi (SBTi, 2023c, p. 15). Although the SBTi have some additional guidance to GHG accounting, the companies are supposed to use the standard from GHG Protocol to calculate their emissions (SBTi, 2023c, p. 15). Through the GHG Protocol's framework, companies are required to use dual reporting, meaning that they calculate and report emissions using both the market-based method and the location-based methods for accounting scope 2 emissions. As in the GHG Protocol, the companies reporting their emissions in line with the SBT, should disclose if they are using the market-based method or the location-based method when they are tracking their carbon performance, and progress towards reaching their set SBT (SBTi, 2023c, p. 15).

This standard is used for businesses that have 500 employees or more and does not include small and medium-sized enterprises (SMEs), nevertheless they have a simplified route for such businesses (SBTi, 2023c, p. 15).

2.1.4 Location-based vs market-based methods for accounting scope 2 emissions:

There are two ways of reporting emissions from scope 2. The first one is through a location-based calculation method, where the calculated emissions from a regional/national grid is used. "A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data)" (GHG Protocol, 2015_b).

A market-based method is different in the way that it reflects what electricity a business has chosen (or not chosen) to purchase. It is done in a contractual manner, where a company either can buy energy from an energy producer or chose to just buy from the markets residual mix. Such contracts can be a Renewable energy Certificate (RECs), a Guarantee of Origin (GOs) or similar contracts. These contracts can be bought from a renewable energy producer, or from fossil fuel generators (GHG

Protocol, 2015$_b$). The energy that is not "claimed" by anyone, makes up what is called the residual mix, and is what companies that has not bought any certificate or guarantee has to use for calculating their emissions from electricity. This has much higher emission factors than if one buys GOs for their electricity. Because most companies that buys a certificate, buys renewable energy, it removes much renewable energy from the residual mix. In other words, if more businesses buy GOs, the dirtier the residual mix becomes. This again can lead to vastly different calculated emissions based just on what calculation method is being used, and whether a company buys electricity from the residual mix or from a renewable energy producer. This becomes even more relevant if the local grid is made up by mostly renewable energy like in Norway, where in 2021, the power used that year was from 97% renewable energy. In 2021, the calculated emission from the Norwegian grid was 11g/kwh (NVE, 2022$_a$), but if someone buys from the residual mix, it would be 405g/kwh (NVE, 2022$_b$). As we will look closer at later, this might be problematic in some ways.

2.1.5 Contractual emission factors:

Guarantee of origin was implemented and made possible to buy already from 2001 as a part of EU and the European Economic Area (EEA) (Norwegian Government, 2007). The way it works is not that the power that the end-user is consuming is with all certainty from a renewable source. The power that ends up in the socket is the same whether you have a guarantee of origin or not. The real difference is rather in a financial manner. The electricity supplier buys a guarantee of origin from the power generator, and then the end-users can buy the certificate from the electricity suppliers. Then the end-user can calculate their emissions from electricity as the amount of emission the source from the power generator, generates (NVE, 2023). If this is a renewable source, it gives a very low number, but if it is from a fossil fuel it gives the business high emissions form their electricity. A guarantee of origin from a renewable source that is bought, tells us that the power generator, promises to produce at least the amount of renewable energy as is purchased. This will give the power generators incentives, motivation, and the capital to invest further in renewable energy. One reason for these certificates or guarantees to be introduced, was the information asymmetry in energy markets (Hulshof et al., 2019, p. 697). The asymmetry arises because the consumers of the electricity cannot distinguish between renewable energy and fossil energy. Consequently, consumers that originally want to be involved with renewable energy, might end up with buying less or no renewable energy at all (Hulshof et al., 2019, p. 697). With the customers paying for renewable energy as a certified good, it might make it easier for companies to invest more in renewable energy projects, and ensure that a project becomes profitable, even be a tipping point for a specific project being

realized or not. This will make sure that the emissions from electricity production will be easier- and faster to get rid of.

2.2 European landscape

The European Union is a very central actor in the European region, and the policies and directives adopted in the Union is usually also implemented in Norway. Norway's most important trading partners are the European countries, and what the EU decides affects Norway in many ways (Statistisk Sentralbyrå, 2023). In the sections below we will look at the most relevant targets that the EU has set for themselves, and we will also look at their most important tool for reducing climate gases, the EU Emissions Trading System.

2.2.1 Renewable energy directive, European Green Deal, and REPowerEU

The EU have since 2009 worked for their goals in a renewable energy directive. It is a legal framework, that is pushes for development within all sectors of the EU economy and supports collaboration between the different EU countries (European Commission, 2023c). In 2021 they had reached 21,8% renewable energy in the energy mix. The directive was revised in December 2018, and later became legally binding in June 2021. This document stated that the amount of renewable energy should be at least 32% by 2030 (European Commission, 2023c).

The European Green Deal is EU's comprehensive policy framework, and EU's strategy for reaching net zero emissions by 2050 (European Council & Council of the European Union, 2022). The fit for 55 package, is a part of the European Green Deal and is a set of revised legislations related to climate, energy and transport (European Council & Council of the European Union, 2022) This package increased that targets from the Renewable energy Directive to 40%, and wanted to cut EU's emissions with at least 55% by 2030 (Council of the European Union, 2023). There are several plans and strategies that co-exist with the European Green Deal and gives additional guidance for reaching the net zero targets.

Russia's invasion of Ukraine caused serious geopolitical effects and energy problems inside the EEA. The aftermath of this crisis is that Europe wanted to become less reliant on Russia, as they amongst other reasons are not seen as a reliable and safe partner for supplying the energy the EU needs. This resulted in that EU started a plan called REPowerEU, that intends to reduce their energy, produce even more clean energy and to diversify their energy supplies. This is supported by financial and legal measures for building a new energy infrastructure and system that Europe is needing (European Commission, 2023f). The EU wish to be independent of Russian fossil fuels by 2030.

These goals that are set by the EU are very ambitious, and needs serious measures to reach their goals.

2.2.2 Climate taxes on emissions

The European Union is a key driver in the transition to a sustainable Europe, and a sustainable world. Nevertheless, the union is not the only driving force to making the emitters pay for their emissions. The different European states can also impose legislation that puts an extra price on the carbon emitted inside that given state. In Norway, national authorities have imposed a tax on emissions from certain fossil fuels. They introduced the tax in 1991 in order to cut emissions in a cost-effective way. The tax is on mineral products like mineral oil, natural gas, LPG and gasoline. The tax is also applying for petroleum activities (Norwegian Ministry of Finance, 2020).

The EU is also implementing a new taxation system called the Carbon Border Adjustment Mechanism (CBAM). This is a tool that is going to start a transition period in October 2023, and be fully implemented from 1 January 2026. It is a tool that according to the EU, aims to put a fair price on carbon that are emitted from producing goods that are carbon intensive, and are entering the EU (European Commission, 2023h). By confirming that such a price on carbon is paid, the EU ensures that the carbon price from imported goods is the same as for the domestically produced goods, and EU's climate objectives are kept. Initially the tax will imply for the sectors who emit a lot of carbon, and where the risk of carbon leakage is significant. They will start with cement, steel, iron, fertilizers, aluminum, hydrogen and electricity, but in the end, it will cover more than 50% of the emissions covered in the EU ETS sectors (European Commission, 2023h).

2.2.3 EU ETS:

The EEA is made up by the members of the European Union, and three of the states from the European Free Trade Association (EFTA): Norway, Liechtenstein, and Iceland. Together in order to cut their joint emissions, they have made a trading system for carbon emissions called EU ETS which is short for: European Union Emissions Trading System (European Commission, 2023a). The way the trading system works, is that EU decides a cap of the total emissions that is allowed to be emitted during a year across the whole system. Each company needs a set number of allowances, that matches their emissions of GHGs. Some allowances are given out for free, and the rest is auctioned out for the businesses to buy (European Commission, 2023b). If a company emits less GHGs than they have been given, they can sell their surplus of allowed emissions to someone else that needs

more or keep them for the next year. With companies being able to sell allowances, it makes sure that emissions are cut, where it costs the least. Because the number of allowances is limited, it gives the allowances value, and the price for allowances gives incentives for businesses to cut their emissions in order to save money. They will also face significant fines, if they do not have enough allowances to cover their emissions. The cap is after time reduced, so that the emissions actually go down and do not stagnate (European Commission, 2023a).

The emission trading system is the "cornerstone" of EUs strategy to fight climate change. Around 40% of all their emissions is covered by the trading system, making it a powerful tool for cutting GHGs (European Commission, 2023a).

The EU ETS does not cover all businesses within the EEA. It covers the following gases and sectors: CO_2 emissions from electricity and heat generation, aviation, and energy intensive industry, that is steel works, oil refineries and production of aluminum, steel, cement, lime, metals, glass, pulp, paper, ceramics, carboard, acids and bulk organic chemicals (European Commission, 2023_a). The CO_2-emissions from aviation are restricted to flights within the EEA. In addition to the CO_2 emissions, N_2O emissions from production of nitric, adipic and glyoxylic acids and glyoxal are covered by the EU ETS. So is PFCs from the production of aluminum (European Commission, 2023_a).

The basic principles of the EU ETS are that the emitter pays for the GHGs they emit. It is a cost-driven incentive to reduce their emissions. Since 2012, the penalty for each ton of $CO_{2\text{-eq}}$ without any allowance are 100 EUR. This comes on top of the price of surrendering allowances due (European Commission, 2023e).

Inside the emission trading system, incentives are made to cut emissions is it the same outside?

3 Theory:

In this section, we will look at the different theories that are relevant to the study.

3.1 Commodification of electricity:

In this section we will look at the historical change of the electricity market, from when it went from being a common good, that the government controlled and distributed, to being turned into a commodity.

Electricity was introduced in the 1880s in USA and Europe, and spread like wildfire through the world, dramatically changing the daily lives of people. It is now essential to operate most of modern technology and has therefore gained the status of a "meta technology" (Byrne & Mun, 2001, p. 48). This meta technology has shaped modern development patterns. All from grid expansions that go hand in hand with urbanization, it shapes national and local politics, and to be a modern society today, means electrification. Much of connection with people around the world is because of electricity, through for example our phones and television. It is therefore not surprising that electricity supply is viewed as an essential good in the modern society (Byrne & Mun, 2001, p. 48).

The European liberalization of the electricity markets started with the Thatcher government in the UK, first passing the Gas Act in 1986 (Gas Act, 1986), liberating the gas market- making way for the electricity-market to follow three years later with the Electricity Act of 1989 (Electricity Act, 1989). Norway soon followed the same pathway in 1991 (Bye & Hope, 2007, p. 17). Most of EU's member states started their liberalization not long after in 1996, when the first part European Directive concerning the liberalization of the electricity market was adopted. This was the first part of the First Energy Package, with another directive, this one concerning the European Gas markets (Pepermans, 2019.

Before the liberalization, most member states had a system where there were one "vertically integrated" company that generated the electricity, took care of the transmission and the distribution to the end-user (Pepermans, 2019, p. 4). The consumers had no choice but to use this company for buying their electricity. The aim for the liberalization was to move to a market structure as seen in the right part of [FIGURE 2]. It was allowed to compete about electricity generation and retail, while the transmission and distribution (T&D) activities were kept under regulation (Pepermans, 2019, p. 4).

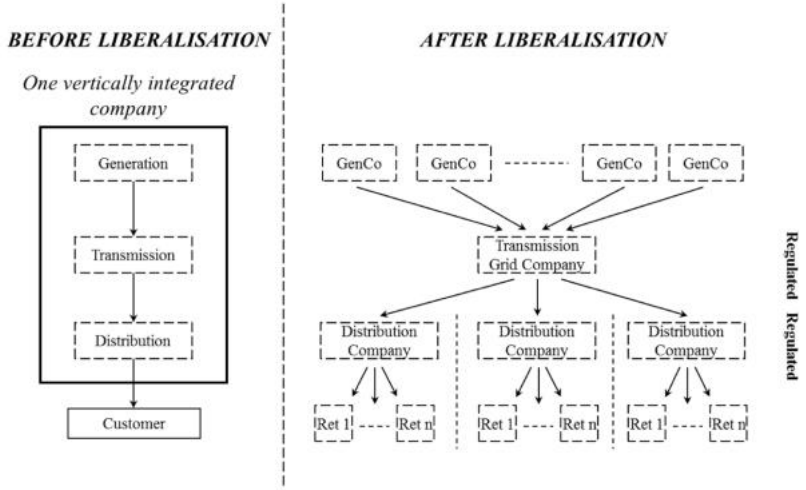

Figure 2: Pepermans (2019)

The second Energy Package was adopted in 2003 and included a second directive on the electricity and gas market. This directive allows suppliers enter markets in other member states, and also for consumers to select their supplier. In the 2000s several legislative initiatives were put in place, the Energy Action Plan from 2007 being one of the most important ones. The Energy Action Plan identifies three large challenges and puts them in the center of EUs energy policy: sustainability, security of supply and competitiveness (Pepermans, 2019, p. 8-9). These are still today the core of EU's energy policy. In 2009 the third in line of Energy packages was adopted. It made room for something called ownership unbundling, that in reality was a separation of generation and retail activities from the transmission activities. Additionally, every member state needed to establish a National Regulatory Authority (NRA), and a forum for National Regulators to cooperate at the EU was put in place. The forum is called Agency for the Cooperation of Energy Regulators (ACER).

The EU claims that an integrated EU energy market "most cost-effective way to ensure secure, sustainable and affordable energy supplies to EU citizens" (European Commission, 2023g). When they have the same market rules, and cross-country infrastructure, energy can be produced in one country, and delivered to a customer in another country. This competition, where the customer can choose the energy supplier is intended to keep the prices in check (European Commission, 2023g).

With the liberalization of the energy markets, countries went from treating electricity as a common good, into a commodity that can be traded. From the early 1990s several institutional reforms began, including privatization of ownership, unbundling and competition in the generation sector. This was promoted as a global solution to the electricity industry's problems (Byrne & Mun, 2001, p. 49). This liberalization aimed to rationalize the sectors development by treating the electricity as a commodity, so that they would have optimal allocation. The liberalization grew out of some serious

problems with the old system. For example, some mega projects like hydroelectric dams and coal fired power plants, became sources of ecological degradation, and occupied large parts of the public spendings. This did limit the amount of money left for other social projects, and especially in developing countries (Byrne & Mun, 2001, p. 50). It was even more problematic in the developing countries, where the elites could enjoy the benefits of the electricity, but the poor were un- or underserved. Adding to this, undemocratic governance and decision-making on electricity matters was made by a closed circle of technical experts, bureaucrats, and clients from large companies (Byrne & Mun, 2001, p. 50). With a governance structure like that and monopoly status on utilities, resulted in electricity industries turning into powerful organizations, with own economic and political agendas. Because of the lack of effective public supervision, electric utilities became a source of corruption (Byrne & Mun, 2001, p. 50-51). Nevertheless, in the later parts of the 20th century, a number of policies were put in place to address such problems like described above. There were national differences of course, but they had according to Byrne & Mun (2001, p. 51) the following in common:

- Markets were created, where generating companies could sell electricity, and others could buy.
- Vertically integrated utilities were broken up by either placing generation assets into unregulated generating companies that kept utility subsidiaries, or by the sale of generating plants.
- Capital investment in the sector were in greater scale decided by market actors and forces.

This liberalization was justified with that the benefits of a monopoly in the production of electricity has vanished because the economies of scale linked with centralized power plants are gone. Under such conditions, a monopoly would be of hinderance for new technologies. Also, governments in many countries experienced financial strain in getting the money for electricity infrastructure investments (Byrne & Mun, 2001, p. 51).

So, after the liberalization, what the Europeans ended up with, was a system where the price would reflect supply and demand, and the electricity was sold like a commodity. In [Figure 2] we see how the power market is organized. The way the electricity gets to the end consumer, happens in four different ways. The first option is for the power generator to sell its electricity directly to a company. The second option is that they sell the energy to a power supplier, that further sells the electricity to a company. The third option is that they sell it trough a power exchange, that sell it to a company. And the final option is when the end user are private households, then the power generator sells it to

the power exchange, that again sells it to the power supplier, that in the end they sell to private households (Norwegian Ministry of Oil and Energy).

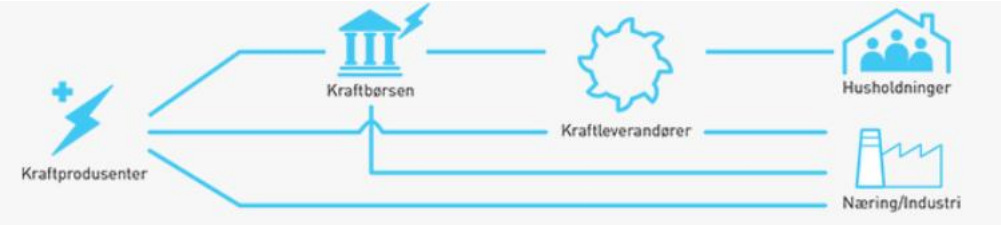

Figure 3: Norwegian Ministry of Oil and Energy

The Norwegian Ministry of Oil and energy (2023) claims that electricity is suited being competition, rather than monopoly. One of the reasons is because of electricity is not very well suited for storage and needs to great extent to be used when the power is produced. There are some storage possibilities like batteries, pumped hydro, hydrogen and different heat storage methods, but they are not very widespread and at large scale yet.

Before the liberalization of the market, electricity was more wasted when there was surplus electricity production, and in the late 1980s in Norway, much possible electricity through hydropower, were instead of being used, spilled to the sea. In these years, there were an overflow past ready-to-use machines of about 5-6%, meaning this possible energy was lost (Bye & Hope, 2007, p. 8). When there is surplus energy today, the prices will fall, and sometimes even go to negative prices. This helps to avoid that electricity is being wasted.

Norway was in the late 1990s and early 2000s step by step getting a cross country-integrated power market, with the Nordic Power Market, being the first of its kind (Bye & Hope, 2007, p. 17). Nord Pool is the power exchange that sells electricity in the Nordic countries. The price is different for each hour of the day and is based on the demand and supply. The mechanism that controls the price is called merit order principle. Each power plant offers its electricity to the energy exchange at an individual price, in a way that covers the power plants cost. The cheapest electricity is sold first, which typically comes from renewable energy like solar and wind. If there is more demand, the next power plant is used, and so on. What finally decides the price, is the price of the most expensive power plant that is put into the grid (European Council & Council of the European Union, 2023). This system is the main reason that the gas price is so connected to the electricity price, which again is one of the main reasons that we saw a very large increase in electricity price, after Russia invaded Ukraine in 2022, and gas became a scarcity in Europe (Mandl, 2023). When the gas price rice it highly effected the electricity price, because this affects what is the price of the electricity in most expensive power plants that is put into the grid, which then might be gas.

By treating electricity as a commodity rather than something the state is supposed to supply everyone at a certain price, the mechanisms to supply electricity changed a lot. Times with high demand gives high prices at that time, which again give incentives not to use unnecessary electricity at those specific hours of the day. In that way, the commodification of electricity has served the environment well because times with high demand, usually gives higher emissions, when fossil fuels are what's entering the grid at the latest, most energy demanding hours.

Governments wants to give their inhabitants reasonable prices for electricity, but also a system that incentivizes to use less energy at peak demand, and to shift the usage to times with low demand. In this way there will be a more stable grid, with lower emissions, lower cost of electricity, and avoid wasting energy. With treating electricity as a commodity there is no longer governments that control the price of the electricity, which no is controlled by the market. Price is possible to use as a tool for behavior-change, and the results show that the market work better than government control when it comes to reduce wasted power, and having smaller peaks of demand, resulting in lower emissions. Nevertheless, the price has been higher after the liberalization if we compare the average price from every year (Delebekk, 2021). There might however be different reasons for that, for example right after the liberalization, the prices went down, and in 2007, Bye & Hope (p.21) concluded with that the decentralization has helped keeping the prices down. What we saw in the early 1990s were a country with much more capacity than actually were needed, which could defend a lower price, but at the same time there were built some uneconomical projects, that the customers in the end had to pay for. Today, only projects that can produce revenues gets realized unless it is subsidized, and that keeps the prices down as well. If we had a power surplus like in the 1980s and 90s with today's model, the prices would probably have much lower prices.

The commodification is central in this study because it is what introduced market thinking in the electricity sector. Previously, governments controlled what projects to go for, and who were to build it. The way of treating electricity as a commodity changed the whole way of looking at electricity, and what actors that could be part of the sector. It is also the reason for market mechanisms being able to decide what type of energy is being built. Governments can subsidize what they want more of, but in its purest form, the markets decide. When markets are introduced into the electricity sector, it might also be seen as natural to let market mechanisms as contractual emission factors be introduced into the emission accounting from electricity as well, never mind the problems in brings with it. If governments let this be possible, it is also natural that it develops this way, because this benefits many companies, and is something they can buy.

3.2 Agency theory:

Agency theory is an important, but controversial theory. It has been used by different scholars in several fields like, economics, political science, accounting, organizational behavior studies, sociology, and marketing. During the 1960s and early 70s, economists researched risk-sharing with individuals or with groups. The literature pictured a problem that evolved when the different parts that cooperate have different attitudes towards risk. Agency theory widened the risk-sharing literature so that it included the so-called agency problem that originates when collaborating parties have different division of labor, and different goals (Eisenhardt, 1989, p. 57 & 58). Especially agency theory focuses on the relationship between one party that is the principle that delegates work to the other party that is the agent and does the work. It is described like a contractual partnership. The theory tries to solve two problems that might occur in this relationship. The first is the problem that arise if the goals or desires of the agent and the principle conflicts each other, and it is not easy for the principle to verify that the agent does what the principle actually does. The other problem is a problem with risk-sharing when the agent and the principle have different attitudes towards risk. It might end up with that the agent and the principle prefer different actions because the risk preferences are not the same. The focus from the theory is finding the most efficient contract between the two parties. There are some underlying assumptions about people, organizations, and information that the theory builds on. Firstly, it is that humans have self-interest, bounded rationality, and risk aversion. Secondly, companies have conflicting goals amongst its members, and there is an asymmetry in information between the principal and the agent. Thirdly, information is a commodity that can be purchased (Eisenhardt, 1989, p. 58-59). Mostly agency theory has been used in organizational phenomena like acquisition and diversification strategies, compensation, vertical integration, ownership and financing structures and innovation. “Overall, the domain of agency theory is relationships that mirror the basic agency structure of a principal and an agent who are engaged in cooperative behavior but have differing goals and differing attitudes toward risk” (Eisenhardt, 1989, p. 59).

Agency theory is relevant in this study because of the relationship between the government and the companies. More specifically, the problems that arise when the government tries to make companies act like they otherwise would not have done, and in this case about cutting emissions from their operations. The government wants a satisfied public, meaning that they must take responsibility for climate policies. Companies on the other hand is mainly focusing on maximizing profits. It does not necessarily conflict with becoming more environmentally friendly, but it is a bit different approach. They do not wish to do things that can hinder the growth of the business. The government on the other hand does not have the companies’ maximum profit as their main priority, but still wants them

to do well, because it is good for the economy, by creating jobs and so on. The government might try do make policies that is supposed make businesses act in certain ways, for example with policies that make environmentally friendly measures affordable or even profitable. The companies might try to find whatever loopholes they can find, so they do not have to do everything the government had intended, so that they can save money. Such problems can we find in if we look at the different possible ways to interpret a framework or methodology for accounting emissions. This we will discover more in detail later in the study.

3.3 Greenwashing:

A central issue in this research is whether or not the market-based method and the dual reporting makes room for companies to greenwash their business, while it remains grey, or at least do not live up to the image that the business is trying to paint. Greenwashing can be defined as: "the act of misleading consumers regarding the environmental practices of a company (firm-level greenwashing) or the environmental benefits of a product or service (product-level greenwashing)" (Delmas & Burbano, 2011, p.66). The thing to investigate is whether it gives any room for deliberately lie about their emissions through reporting false numbers, hiding leaks and so on, but rather how the market-based method helps preventing greenwashing compared to the location-based method, and how the dual reporting influence greenwashing.

The first and most obvious point to make of this is that it might be a problem with the dual reporting. Dual reporting in itself gives just a broader picture of the carbon performance of a company, so we both see emissions from the local grid, and if we count with the market's emission factors. This is a positive thing. The problem comes when a business is to use those numbers for disclosure purposes. There is possible for a company to makes a sustainability report of some kind and chose the emission factors that favors them the most. It can be both the location-based and the market-based emission factors that favors a business. Sometimes it can be favorable to use high emission factors so that it is much easier to have success with reduction goals, for example if they plan to do energy-saving measures. A cut in electricity will then give a higher percentage of reduction in the total emissions associated with the company. The example becomes even more significant if they buy contractual emission factors, like GOs. Then a company that use much electricity can go from having very high emissions to removing very large proportions of them. Then they can then say that they have reduced their emissions with a certain percentage, and reached the goals set out, and in line with for example the science-based targets. The opposite is also favorable for some businesses. Low emissions can be favorable for a company if that is what they want to present to the world. A

company can say that they have very low emissions associated with their products or services, which again might be positive for the reputation of the company.

It might be a bit far to say that contractual emission factors are greenwashing, but as we portraited earlier, some scholars claims that it has very little effect on actual power generation from renewables. If we take that into account, it might have aspects of greenwashing if the claims are correct, and businesses know about it.

4. Methods:

In this chapter, we will look at the methods that will be used for the study. After the introduction of the methods, we will look at our case from Skretting.

4.1 Literature review:

For this study, qualitative research is conducted. A qualitative study is usually intensive, and consist of few units, where data is primarily gathered as words. It is different form quantitative where many units are researched, and the data one gets are more or less predefined of the researcher (Jacobsen 2016, p. 145 & 251).

The aim for this study is to find out whether or not the market-based methods and the use of contractual emission factor for reporting scope 2 emissions, makes it easier to greenwash their business. It is possible to draw some conclusions of whether this is a common practice, and if companies exploit the system to some extent, but the possibility for doing so and loopholes to be exploited is easier to make confident claims about. If questions of whether companies intentionally exploit the system or not is going to be answered with certainty, additional research needs to be done. Because of this, research on business practices in companies are not undertaken. Instead of this, the company Skretting is used as a case of some sort in order to illustrate the possibilities that this company has to exploit the system. We can to some extent believe that a company that wants to earn money take advantage of methodologies to appear as favorable as possible, instead of disclosing information that is explaining getting a nuanced image of the complex energy markets and accounting practices.

The main method for this study is document analysis also known as a literature review. It is a qualitative method, that gathers data in the form of words, sentences, and stories (Jacobsen, 2016, p. 170). This might also be data that is gathered by others, and in this thesis it will mainly be so. In this study it will be gathered information from public documents, framework instructions, reports, scientific articles, books and more. Document analysis is ideal when you need to find sources that does not exist any longer, for example if a person is hard to reach or not available for any other reason (Jacobsen, 2016, p. 170). It is very important than when I use document analysis that I use sources that is trustworthy. Does the source have any agenda for saying so, or is it to be trusted? Another thing to think about is that the data we gather may have been used for other purposes and settings than the one we are researching. In only a few cases do we have access to raw data, so it is important to be aware of the setting it has been used for, so we do not draw conclusions on the

wrong basis (Jacobsen, 2016, p. 171). I will use document analysis because it is very good for gathering information for what have been said and done.

Building on the document analysis, there are also used some aspects of the method called the single case study. In a single case study, one digs deep into a situation, an organization or something else, in a limited time and space (Jacobsen, 2016, p.99). In this case, it is the company Skretting. It is done so that we through this company, so that we can look at the circumstances surrounding their voluntary carbon-accounting. The case works like an example of how the current system works, with its regulations, framework voluntary disclosure etc. This is the environment that one must navigate through in order understand the reality when it comes to GHG emissions from companies. The case makes us able to better see how problems might affect how companies think and what can be problematic with the frameworks, and the regulations from the governments. Case studies is suited to give "thick descriptions", that means detailed descriptions of the reality. Such "thick descriptions" makes the case study suited to gain new understandings, and possibilities to form new hypothesizes and theories (Jacobsen, 2016, p. 99). Some limitations are to be considered when using the single case study, however. One cannot generalize when using only one case study. This is a weakness that is striking for this study, because only one case is used, and nevertheless, some generalization will try to be made in the end. The reason for this is that we have gathered information through the literature review, where we get some additional information from other companies, but also use the standards and frameworks so that we can generalize to some extent with companies having similar features like Skretting. This does not mean that there will not be examples of companies that does not fit into the examples and problem that we explain, there certainly will be. Many companies do not for example report any emissions at all and will certainly not be relevant to what we are exploring. Another aspect to involve is that single case studies cannot make causal claims when there are no other cases to compare with. For example, if a company has increased the productivity, one cannot say that it is because of reason A or reason B, since it could be caused by of something else (Jacobsen, 2016, p. 100). But in this example with Skretting, it is done somewhat differently. Instead of using the company as what is interesting, we want to find the structural "errors". Still, one cannot say with absolute certainty that Skretting is exploiting the frameworks or standards for reporting emissions, but we can assume that they want to earn money, and we will focus more on finding "errors" in the structure, that potentially may lead to unwanted actions from Skretting or companies like Skretting.

Some work have been done that address carbon accounting, but there are many holes that still needs to be filled. Some academic work is done on this on the market-based methods and the location-based method, but not a lot.

There are many different sources for this study, naming legislative papers, scientific articles, organizational documents, websites and frameworks and academic books. The main contributors to what the conclusions in this document are based on is the work of Brander et al., (2018), He et al., and the information discovered through research in the GHG Protocol, different legislations, and the Skretting case.

4.2 Case: Skretting

Skretting is a large Norwegian fish- and shrimp feed producer, that was founded in 1899 in Stavanger (Skretting, 2023_1). They originally started with producing feed and agriculture equipment, but later turned to only fish- and shrimp feed. The company have about 3500 employees divided in many countries. It has plants in 19 countries and research and validation stations in 9 and produce about 2,3 million tons of feed annually (Mišljenović, 2022). In Norway they have factories in Stavanger, Averøy and Stokmarknes. They are a large producer of fish feed in Norway, and their larges competitor are EWOS and Bio Mar. Skretting's mother company is Nutreco, which have existed since 1994. Nutreco launched in 2021 a roadmap toward 2025, where they set some ambitious targets for becoming more climate friendly. These targets are in line with the science-based targets towards 2030. Some of the ambitions were to use 0% coal and oil by 2030, 0% waste to landfills, 100% deforestation-free, and a reduction in GHG emissions of 30% by 2030 (Nutreco, 2021, p. 13-14). Skretting has as their mother company Nutreco committed to the same emission targets and is looking to reduce their emissions with 30% by 2030 (Skretting 2022). These emission-reduction targets are for scope 1 and 2 emissions, and the reduction from 2018-2021 are 18%.

Skretting gives this statement in their "footprint report fish feed 2021", under the section of emissions:

> "In 2020 Norwegian authorities demanded that Norwegian power suppliers moved from location based to a market-based CO_2eq calculation with background in EU's Renewable Energy Directive. This is in compliance with the science-based target initiative (SBTI) which Skretting has committed to through our mother company Nutreco. We are using the market-based calculation for electricity for every year, also for the years prior to this new demand. Compared to historic printed reports, the number for 2018-2020 has increased due to this new calculation method. *E.g.* The location-based calculation had 10.7 g/CO_2eq for 1 KWh (IEA 2021), while the market-based calculation uses 405 g/CO_2eq for 1 KWh (NVE 2021)." (Skretting, 2022_1).

In the table below [table 1] we find the emissions from the different Skretting-factories in Norway. The numbers are based on information handed from Skretting, that themselves use to calculate their own emissions. The different amount of fuel is multiplied with the emission factor for the given fuel. Further down we see the differences in emissions if the location-based emission factors for electricity are used, and if the market-based emission factors are used.

Factory:	Averøy	Stavanger	Stokmarknes	All 3 in total
Diesel (kwh)	382 060	258 897	371 080	1 012 037
Natural gas (kwh)	-	17 266 220	-	17 266 220
LNG (kwh)	40 211 662	-	-	40 211 662
LPG (kwh)	-	-	5 859 487	5 859 487
Electricity (kwh)	20 838 311	8 823 145	29 941 030	59 602 486
Total energy consumed (kwh)	**61 432 033**	**26 348 262**	**36 171 597**	**123 951 892**
Diesel (tons CO2-e)	101,1	68,5	98,2	267,8
Natural gas (tons CO2-e)	-	3 487,8	-	3 487,8
LNG (tons CO2-e)	8 090,6	-	-	8 090,6
LPG (tons CO2-e)	-	-	1 364,7	1 364,7
European Electricity (tons CO2-e)	8 377,0	3 546,9	12 036,3	23 960,2
Norwegian Electricity (tons CO2-e)	250,1	105,9	359,3	715,2
Total Emissions (tons CO2-e) European energy mix	**16 568,7**	**7 103,2**	**13 499,2**	**37 171,0**
Total Emissions (tons CO2-e) Norwegian energy mix	**8 441,7**	**3 662,2**	**1 822,2**	**13 926,1**
Total emissions (tons CO2-e) with Guarantee of origin	**8 191,7**	**3 556,3**	**1 462,9**	**13 210,8**

Table 1: Own work

What this chart illustrates very well is the difference in emissions based on what type of calculation-method that is being used. For the total emissions of the from the Averøy-factory, it emits according to the location-based energy grid about 8441,7 tons of CO2-eq, but with the market-based grid-calculations, it emits almost twice as much, with 16 568,7 tons CO2-eq. The difference is far more significant when we look at the factory in Stokmarknes. It is a fairly new factory, and the steam boiler is running on electricity, and therefore we see that most of the energy-use in this factory comes from the use of electricity. In this factory the total emission becomes well over 7 times higher total emissions if the market-based method is used over the location-based method for CO2-eq calculations.

In the chart under, Skretting showcase the different emission-factors for their main sources of emissions in their factories in Norway. It also shows what machines or equipment that use the

different sources of fuel. As explained earlier, Skretting has shifted from using the location-based calculation method to the market-based method. Here we can see that electricity is counted as the dirtiest source of energy that they use in Norway, but earlier when the location-based method was used, it would have been the cleanest by far with 0,011kg CO2-eq/kwh if we use the 2021 numbers (NVE, 2022$_a$).

This sudden shift in the way emissions is being calculated have (at least for Norwegian businesses and other countries with fairly clean energy grids) dramatic effects on what measures that can be taken in order to cut emissions. For a Norwegian business that use 100% electricity in its production, can on with the market-based method cut their emissions in about half by switching from grid-electricity to a diesel generator. If a location-based method is used, it would increase the emissions about 18,3 times by switching to diesel.

Sources of $CO_{2\text{-eq}}$ in 3 Norwegian factories

	Stavanger	Averøy	Stokmarknes
Electricity (0.402 kg $CO_{2\text{-eq}}$/kWh)	Motors; Light	Motors; Light	Steam boiler, Motors, Light
Natural gas (0.202 kg $CO_{2\text{-eq}}$/kWh)	Steam boiler; Dryer burner	-	-
LNG (0.202 kg $CO_{2\text{-eq}}$/kWh)	-	Steam boiler	-
LPG (0.2329 kg CO2-eq /kWh)			Dryer burner
Diesel (0.2012 kg CO2-eq /kWh)	Forklifts	Forklifts	Forklifts

Figure 4: Skretting (2022)

In a world where the knowledge about what fuels that emits GHGs are limited, this could cause a severe problem, with stakeholders making decisions where they could favor fossil fuels before electricity, and emissions go up. Of course, if the electricity is made from coal, natural gas would be more favorable. Nevertheless, most people are aware that electrification from renewable energy must be a very large part of all the energy we consume in the future, if the damages of global warming are not going to be extremely bad. Stakeholders probably know that changing from electricity to natural gas or diesel is not great for the environment, so if they do so, it is solely to make the numbers look better. If then natural gas or diesel are favored before electricity, it might slow down the transition towards renewable energy, because the demand for it goes down. That could potentially be harmful for the transition to renewable energy, at least if it happens to a large extent.

There are some things that might suggest that companies will use or is using the market-based calculation method in order to use more fossil fuels, and some that suggest it does not.

Something that suggest that it is happening is that it could save money for some companies. They could simply just continue to use some equipment that they already have, and move the emission reduction to later, when they have used the potential in just buying a guarantee of origin.

Further research is needed for figuring out if this is something that really happens or not, but it is probably fair to assume that some companies take advantage of the lower emission factors for fossil fuels. If it does happen it can be a big problem, and new policies that addresses this problem will have to be arranged, or the frameworks and standards needs to change.

5. Study Area

In the Study area, we highlight different aspects with the problem we have linked to greenwashing that are interesting and useful for getting the full picture of what we deal with.

5.1 Why is it important that accounted emissions are correct?

There are several reasons for it being important that the accounted emissions from companies are correct, in this paragraph a few will be named. It is for example important to customers to have the information available so they can do informed decisions, or at least have the possibility to. As a democratic principle, access to information is very important, because it is the basis for individuals to be able to use their democratic rights. Information about different subjects that affects the society is important for people to be able to raise their voice against something or, for the media as the watch dog trying to expose practices that are not good, like abuse of power (Rønning & Lesjø, 2015, p. 199). It will also be of use for a multitude of different actors to know how much emissions are related to a certain business or a certain product. In this way, investors can do informed decisions in whether to invest in a company, for governments, whether certain industries need new regulations, stakeholder at companies can compare themselves with other businesses for healthy competition, for individuals to know what products to buy and so on.

Another reason for it being important with correct accounting and disclosure, is that if it is correct, there is no “cheating” with the numbers. Businesses might use loopholes in frameworks and regulations from governments to “play” with the numbers and use the methodology that is most beneficial to their company. It is therefore important to have a system that removes the possibility of doing so. Being able to compare businesses against each other is another part of the information that is needed to make right decisions for multiple actors like mentioned in the section above.

GHGs are the main drivers of climate change, and if we calculate them correctly, it will be easier to cut emissions where it is needed if the calculation and disclosure are made correctly. Accurate data, helps to identify where the largest efforts need to be directed. It helps to implement efficient strategies to cut global emissions, and this is much easier with accurate calculation and disclosure.

5.2 Government and company relationships:

Global warming is a worldwide problem that will affect all people to some extent. It would therefore appear to be in most people's interest to stop the man-made global warming that now is happening. All governments in nation states that are members of the EU is elected in democratic elections. In that manner we can say that the governments are dependent on the interests of the people. Companies employ people, and thereby the people build up the companies. Nevertheless, we see that there is not only acceptance of policies that cut emissions, both amongst citizens and companies, although the acceptance is getting higher (Kyselá et al., 2019). This way we can get a scenario, where people elect governments to get rid of the global warming, government suggest policies to get rid of it, but the people and companies that people work in, resists the policies. It might sound contradictory, but as climate change is a wicked problem, it is not as simple as it might look at first glance. Both governments, companies and individuals have own interests, that often conflicts each other. All of them will benefit from a better climate to live in, but each other have reasons for not to do what is needed to make it happen.

Governments can benefit from climate policies but have limited budgets and know that voters have more than one thing they care about, and therefore the government have to make sure that enough money is saved for other purposes that might get them reelected.

Some countries have large industries from fossil fuels, and both companies, individuals and governments profits economically from them getting larger or at least sustaining their operations at the same level. Thereby the development might go slower than what is needed to meet international climate targets.

Companies that are not linked to such industries might also have economic incentives to stall their delay their progress. This might be because of high costs with adapting or changing their operations. Companies might then do the minimum for what is expected of them, either by doing just enough to not get competitive disadvantages, just enough to meet regulations or what they find economically favorable.

Governments might do just enough to not damage their reputation, get reelected, or meet agreements. Of course, governments want to do a good job for their citizens, but with limited resources, they have difficult evaluations to make, and it is hard to know what to prioritize. Often, we see compromises between coalitions wanting different things, and we might get half-good decisions, that all parties can live with. This together with other conflicting interests, means that for climate change policies, some things might not be prioritized by the governments. Nevertheless, it is clear that governments are a very important actor when it comes to fighting climate change. The most

important things that occur to the environment is subject of politics, and the targets of policies (Meadowcroft et al., 2019, p. 240).

The relationship between government and companies is central to this study. As agency theory explains, there might develop a problem between the principal and the agent when their interests are in conflict with each other. The principal in this case is the governments, that have certain agendas for what they want from the companies. This agenda might not go in harmony with what the companies want, that in this example are the agents.

In this study, the instruments that governments use on companies for them to behave like they want is one of the central themes. Governments want to reach their climate targets, but at the same time they want businesses to carry parts of the weight for reaching those targets. Companies might in many cases be positive to such change because this gives them competitive advantages to sell green products amongst other reasons, but also in many cases we see that companies are reluctant to such change, and tries to do the minimum of what they can do without losing market shares. This is a typical example of agency theory in practice. Businesses have risks associated with high investments, and in many cases low return on investments. Some carbon reducing measures have potential of saving money for businesses in the long run, but some have also uncertain economic- or negative economic value for the businesses. Because of this, companies might be reluctant for some measures. Governments have other risks than the companies, like risks of not getting reelected if they do not deliver on their climate targets and want the businesses to reduce their emissions with as much as possible.

In organizational theory, we have a term that is called silo mentality. It is primarily used to explain the relationship between different departments within a company but might also be useful to explain the relationship between government, companies and individuals. Silo mentality means that each department is mostly concerned with themselves and their tasks (Jacobsen & Thorsvik, 2016, p. 114). Silo mentality often leads to what we call sub-optimalization, meaning that the different departments put higher value to their own operations or goals, forgetting that they are all a part of the larger company, and undermines the importance of the other departments operations. That might be for example that one department have surplus money after they have completed the tasks, they got the money for, and chose to use the surplus on something else they feel that they have use for, rather than returning the money for the leaders in the company to use where it is most needed.

5.3 Resistance to climate policies

For the individuals of a community the resistance against climate policies is also significant. Some might be that the measures are just symbolic politics that does not do a lot for the environment and cost a lot of money. Other resistance might be because it becomes more expensive to live the old life, and not make a transition. For example, many rise their voices against higher fuel prices, more taxes on products that is not environmentally friendly and so on. Another reason is if they feel pushed by the government, and feel it is an invasion of their free choice. Later years, the NIMBY (Not In My BackYard) is also a movement that has put a stop to many power projects, especially wind power. There are many that do not like the way a wind turbine looks, when it is mounted in nature that surrounds where people says and live, which is a source of resistance. Behavioral change often take time, and face resistance on the way, the same with solutions for individuals making their lives more environmentally friendly. It takes time to build up the capital to switch from a fossil fueled vehicle, to an electric one, it takes time to get the money to get better insulation in their homes, or install heat pumps or other energy saving equipment, and many can never find the finances to do so.

All this resistance from both companies, individuals and governments makes a fast transition even harder. This does not mean that there are easy solutions to fix the problem of global warming. It is very much a wicked problem (Christensen et al., 2015, p.112), that has a lot of interconnected problems to face. We do have the technology to reach our targets, but the road toward this is difficult. Governments needs to act on other issues in the society and have to prioritize what to use the money on. Politics is mostly about the distribution of scarce resources, and everyone cannot get as much money as they want. Moreover, companies have primarily the economic viability to think about, leaving other priorities in second hand. Individuals wants to live as good and easy lives as possible, and often have limited resources to help the environment.

Global warming is an issue that needs actions much faster and at a scale that is much larger than we see today. Because of this it is very important that we see changes from governments, companies and individuals at a much higher tempo than we have seen before. If such a transition is going to be possible, we need tools that work like they are designed to do. That is why this research is being conducted. If we see companies taking shortcuts and exploit the systems to be green on paper, but not in reality, the progress will not be as great as it must be.

5.4 Debate around contractual emission factors:

There are some debates over whether contractual emission factors, like a GO is an efficient measure to increase the investments in renewable energy or not. In studies from Norway, there are signs that Norwegians companies do not trust that GOs result in environmental effects (Hulshof et al., 2019, p. 698). The reason behind this is the high level of renewable energy in the Norwegian energy grid. In 2021, 97% of t electricity in Norway, came from renewable sources, with a dominating 88% for hydropower, and 9% wind energy (NVE, 2023b). The people and firms therefore feel that buying a GO is not affecting the mix of energy, that already is clean, and therefore finds it not being especially useful.

This research did however take place before the Norwegian power generators had to switch to a market-based method for accounting emissions, so it might look different today. Regardless of this it, is not something that is spoken much of in the medias, so for many it might have slipped passed them unnoticed. The people in charge of emission reporting should of course be aware of the changes, but many businesses report on voluntary basis, and some do not report at all, so it is a possibility that they do not know that they can lower their emissions as much as they can, just by buying GOs or investing in renewable energy production to cover their energy use. At least on paper. In the European system, research conclude with that the level of how well GOs work, depends on whether there exist other support schemes, like feed-in tariffs. It also depends on the electricity markets fundamentals, like the level of competition, and the level of trade, domestically and internationally (Hulshof et al., 2019, p. 698).

“The GHG Protocol's Scope 2 Guidance, published in 2015, requires that companies use both the locational grid average method and the market-based method to report scope 2 emissions (i.e. dual reporting). However, the guidance also allows companies to choose a single method for meeting their reduction targets and for reporting their supply chain emissions (WRI, 2015). The same guidance has been adopted by CDP, formerly the Carbon Disclosure Project” (Brander et al., 2018, p. 30).

There are some things happening in the field of emission accounting. The European Union’s “Corporate Sustainability Reporting Directive” entered into force on 5 January 2023 (European Commission, 2023d). This directive according to themselves: “strengthens the rules concerning the social and environmental information that companies have to report” (European Commission, 2023d). It also is becoming a requirement for more businesses to report on sustainability, this also involves listed small and medium-sized enterprises (SMEs). The first year where the new rules apply is the financial year of 2024, which will be in the reports published in 2025. The companies subject to the new directive will have to report according to the European Sustainability Reporting Standards

(ESRS), developed by EFRAG, an independent company. It will build on international standardization initiatives, but also contribute to them.

“There is significant evidence that many undertakings do not disclose material information on all major sustainability-related topics, including climate-related information such as all GHG emissions, and factors that affect biodiversity. The report also identified the limited comparability and reliability of sustainability information as significant problems. Additionally, many undertakings from which users need sustainability information are not obliged to report such information. Accordingly, there is a clear need for a robust and affordable reporting framework that is accompanied by effective auditing practices to ensure the reliability of data and avoid greenwashing and double counting” (European Parliament & Council of the European Union, 2022, p. 19).

According to Hulshof et al. (2019, p. 701), the GO markets are not transparent. The numbers about quantity of GOs are available, but not their prices. The trade is done through brokers or bilateral trading.

“While running a certification scheme is mandatory, countries have considerable freedom in choosing their own certificate system design. This has led to differences between countries with respect to quality assurance and market organization” (Hulshof et al., 2019, p. 699).

5.5 Challenges with regard of the market-based approach

There are some scholars that have addressed the market-based approach to be problematic. Brander et al. (2018) have two central arguments to why they believe that the market-based approach should not be used. The first one is that it does not generate more renewable energy production. In an optimal world, guarantees of origin works as an incentive to produce more renewable energy. Sometimes as a tipping point, making sure that more projects will be realized. When the residual mix becomes dirty, companies will have more and more incentives to buy GOs, so that their accounting becomes greener. This wil then give more GOs, and more renewable energy. Unfortunately, Brander et al. (2018) claims that this is not the case. Rather the RECs or GOs does not ensure that any additional renewable energy investments come to life. There are structural reasons for that markets of contractual emission factors will not succeed. Many countries have large proportions of renewable energy. This is because legacy investments, government subsidies, and also the fact that renewable energy has become very compatible, and in some area superior to fossil fuels.

Brander and his colleges use a figure to describe why from Gillenwater (2008) and is show in Figure [5]. In the figure we see that the price of the RECs, which is similar to GOs, does not affect the supply

of renewable energy before the price is at the level of Q_1. That means that unless the price for the RECs is at that certain level or higher, it will not increase the amount of renewable energy being produced. So, in order for it generate more renewable energy, it must exceed Q_1. Brander et al. (2018) does not believe that the price will come to this level, because it will be too expensive. Also because of countries already expanding their renewable energy generation rapidly, the point where RECs or GOs would ensure additional renewable energy production, is getting further away.

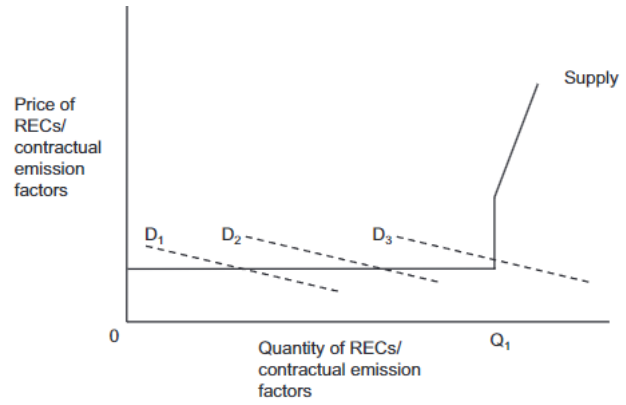

Figure 5 Brander et al. 2018, p. 30

To demonstrate this, Brander et al. (2018, p. 30) use an approximate indication for how much additional demand is needed for affecting the supply of renewable energy:

> "ET Index Research data, which includes 2000 of the world's largest listed companies, shows 97 companies using the market-based accounting method to report lower emissions, equating to 22.2 million tCO2e/yr. This approximates to ~ 1% of globally available renewable electricity generation in 2015, and therefore demand for contractual emission factors would need to increase a hundred-fold to reach the existing supply threshold for renewable attributes (which is continually increasing anyway), and only once above that threshold would demand cause a fractional increase in renewable generation" (Brander et al., 2018, p. 30-31).

There is also evidence for that the GO-market, and the voluntary market of RECs in the US, that shows that buying contractual emission-factors does not have a significant influence on the power generation of renewable energy. Brander et al., (2018) points to Gillenwater's (2013) work and Gillenwater et al. (2014), that concludes with that revenue created from the voluntary RECs-market in the United States, is too uncertain too low to affect investment decisions. The same results also

come out of a study in the Netherlands with GOs. They found that electricity with GOs had only a 1,7% higher price than what they called “grey electricity” (Mulder & Zomer, 2016, p. 104).

5.5.1 Less need for immediate action

A company have low incentives to buy a guarantee of origin a long time before they need to meet their goals. Skretting for example, have emission targets that needs to be met before 2030. First and foremost, these are targets that has no legal grounds, and no sanctions will be incurred if they are not met. The only “penalty” that they will face is if this gives some reputation setback or some deals with other businesses like supplier are broken, or if someone does not want to be in business with them because of it.

But let us say that Skretting intend to reach their goals, the need for cuts in emissions will not need to happen until later when the deadline for their targets is approaching. To reach their emission targets after the market-based approach was implemented, Skretting simply just need to buy a guarantee of origin right before the deadline, and no one can hold against them that they did not keep their promises. We have no proof that this will happen, but when it is a possibility, one cannot rule it out. If it does not happen at Skretting, it will happen somewhere else.

If a market-based approach was not enforced, Skretting would have had lower emissions today, at least on the Norwegian factories, which are the ones we are looking closer at. Another aspect to be aware of is that also the level of effort that is needed in order to fulfill their goals change. Skretting wants to cut 30% of their emissions, using 2018 as the baseline year. In their first reports after the baseline year, they used the location-based model, but the numbers have been changed later on after the market-based approach was implemented, so that it wil be comparable to the newer numbers (Skretting, 2022_1).

As we saw in or chart there was a large difference in the total emissions, when we compare the different calculation methods. Skretting can reduce their emissions with about 64,5% if they just buy a guarantee of origin for the electricity they use, far exceeding what they need to reach their goals for the Norwegian factories. This might make it easier to cut emissions from Norwegian factories than it was before, when the emissions were calculated from the hydro-dominated power grid. Traditionally one could in many cases claim that emissions are more affordable to cut in other countries than Norway. With this new method it is not so crystal clear anymore.

5.5.2 Real life emissions are not cut:

In this case, the difference between real life emissions and emissions on paper becomes very central to the discussion. There might be a difference between what is reported as for example an emission-reduction on paper and what emissions are actually cut. In order to calculate emissions and emission reduction or increase, usually the used energy carrier has a standardized conversion factor linked with it in order to calculate the emissions. Direct measures of emissions to the air can also be installed but is less common. When a company then buys a certificate for renewable energy production, it does not change the amount of emissions that the company emits from their operations, but the electricity is claimed to be from a renewable source. As mentioned earlier, the electricity cannot be traced back to a certain factory or energy source, because of the grid's complexity. Therefore, we use conversion factors that use average values of what is put into the grid, either this is through a market-based or location-based approach for accounting. The claim is however that the location-based approach has conversion factors that are much closer to reality than the market-based one. Brander et al. (2018) also claims that using the market-based approach has a negative effect on the usefulness and accuracy of GHG inventories. They portray a scenario where Company A where this company buys contractual emission-factors like a GO for its grid electricity and reports zero emissions from scope 2. At the same time the company report a 30% reduction in the overall corporate emissions as a result of the GOs they just bought. Unlike Company A, Company B chose a different approach. They do not choose to buy any GOs, but rather reduce their electricity use by 10%. Investors, consumers and stakeholders look at the two companies' GHG reports, and finds that Company A seems to have a much better environmental performance than Company B. Nevertheless, Company A's consumption of grid electricity is the same as before, and it's purchase of GO's has not led to increased renewable energy generation. Company B on the other hand has reduced the demand from the grid electricity, that again has some of its power coming from fossil fuels, and then again reduced the amount of GHGs that end up in the atmosphere. Company A's reported emissions seems not to report an accurate reflection of the emissions that are caused by the company's operations, and it also makes the decision-making more likely to be based on wrong measurements (Brander et al., 2018, p. 31).

5.5.3 A jungle to navigate through

If one thing has become clear throughout this study, it is that carbon accounting is a very complex field of study. There are numerous different standards, regulations, protocols and problematics to get a hold of. It involves measurements, data collections, and their associated impacts. And the different frameworks have their own requirements, methodology, calculation methods, making it

even more complex. It involves challenges related to the quality of data collections, emission factors and estimation methods. To say the least, it demands a great deal of study to get the grasp of the details and nuances within the field. The complexity however makes it much harder for citizens to make well informed decisions. The methodology of accounting GHG emissions is not something that normal people trouble their everyday life with, and therefore the majority of the population fall short of important information about how to navigate through companies' carbon disclosure, and fully understand their carbon performance.

The numbers of different frameworks, methods and initiatives, makes it hard, but also the different standards within the same framework makes it even harder. The GHG Protocol and the market-based and the location-based approach gives an extra complexity to the field. Also, with some companies disclose the results from both methods, others only one of them might give extra confusion to the understanding.

If someone wants to compare companies and their results, they are often met with numbers and percentages that cannot be compared to one another. At least to find out if you can do so, you must do a lot of research on the topic. What country the operations is being conducted at affects what is the required numbers that needs to be reported. Different frameworks can be used, and different emission factors. Also, one needs to find out whether or not they are a part of an emission trading system, and what is required for that system. Maybe are these numbers easily accessible, and maybe you have to just rely on the numbers a business discloses in their own reports. If the latter is the case, it might be difficult to know what methodology is being used, for example the location-based or market-based method for accounting scope 2 emissions. The comparability amongst businesses' carbon performance is an issue that needs to be addressed. Ideally companies whether it is from a mandatory disclosure or voluntary disclosure, should be able to easily compare the results to other companies. If this is not the case, there will continue to be a loss of information, that leads to decisions taken based on false information, which of course is not to be preferred, and probably leads to higher emissions.

5.6 What incentives exist to cut emissions with a market-based approach?

Although the statements above are true, there are still some reasons for companies to act early anyway. Still many companies find reasons to cut emissions anyway. Although they set goals that need to be finished at a certain time, e.g. 2030, some companies might find it beneficial to cut as early as possible.

One reason for example is if a company plans to do energy saving measures like improved insulation, smart controlling of devices and so on. Unless the price falls dramatically in the coming years, the

business will save more money the earlier they end up executing the improvements. This will lower their energy bills, and the earlier the do so, the faster the start saving money. Another example is that increased productivity can save emissions, and we know that increased productivity is good for business. For example, if a company is in the business of producing food, increased productivity from their plants will for example save demand less space, and more untouched nature can be preserved. Other examples of where productivity saves emissions, is if a company can decrease the amount of raw materials they are using in their products, like smaller packaging, or if a company saves space in transport of their products, affecting how many trucks or containers with products they need to transport.

One of the central questions that will be looked at is whether the market-based approach is weakening or strengthen the incentives for a company to cut real life emissions. In this section we will look at what incentives that exist for companies, that is not a part of an emission trading system, to cut emissions.

5.6.1 Competitive advantages:

Becoming more environmentally friendly might in many cases be associated with higher costs, and that might also be true. But there are also aspects about green change, that might be very beneficial for a business. Although there might be more costs in the form of changing equipment, upgrading the quality buildings and so on there are also cost reducing sides of it. Green production might reduce costs in terms of waste disposal (with less waste being accumulated), less use of raw materials, energy savings and so on (Arseculeratne & Yazdanifard, 2014, p. 134).

Brand loyalty is also a benefit that might occur as a result of green marketing for a business (Arseculeratne & Yazdanifard, 2014, p. 134). A business's reputation might be very important in the competition with other businesses. To be viewed as a company that cares about and do measures preserve the environment, has benefits in term of customers being loyal to the brand. With such a product, customers get a more of an emotional relationship with the product, and therefore in general becomes more loyal to the product. These kinds of products are also less sensitive for a high price, given that it can be regarded as more premium.

Being more environmentally friendly is often something that increase the working environment for the staff working on site for a company, with for example fossil emissions in the workplace coming to a halt. Employee engagement would also increase, and the different stakeholders would have a mutual understanding of the way forward (Arseculeratne & Yazdanifard, 2014, p. 135).

For a business to take gain competitive advantage with green marketing, Arseculeratne & Yazdanifard (2014, p. 136) claims that they would need to address some important areas like: "market segmentation, developing a green product, green positioning, setting green prices, application of green logistics, proper waste management, launch of green promotion, forging green partnerships and in essence having the right green marketing mix".

Other benefits that can give competitive advantages is trough certification. Many products are certified and given a specific label because they have met several conditions that the certificate demands. For example, in Norway there is something called the Nordic Swan Ecolabel, that have certain conditions regarding many different areas. For example, they have certain standards for how a product is made, what packaging it has and so on. They label all from Hotels to grocery articles, to furniture, and heating (Miljømerking Norge, 2023).

5.6.2 Financial incentives:

Even though a company is not a part of an emission trading system, there are still some financial incentives to cut emissions.

Carbon pricing is one incentive for businesses to cut their emissions. Emissions is something that affects the societies all over the world, whether it is with droughts, worse crops, worse state of health and so on. With carbon pricing, some of those costs are meant to be given to those who actually emits them. There are many forms of carbon pricing, emission trading systems being one of them, but taxation can also be one, or adding a price on different products that have high emissions. This could for example be higher prices on fossil fuels for transport.

With transport, the cost of using electricity as fuel for a car or a trailer, is much cheaper than running it on diesel or gasoline (KILDE). The investment cost is still a bit higher in most countries, but countries like Norway, have some benefits for choosing electric, that evens out the numbers a bit.

5.6.3 Additional incentives for companies within the EU ETS:

If a company finds itself to be incorporated into the EU ETS, there are some extra incentives to cut emissions. First and foremost, only scope 1 emissions are accounted for in the ETS, so the companies that are a part of it, gain extra incentives to only cut scope 1 emissions. The extra incentives that businesses get to reduce emissions from the ETS is purely financial incentives. There are extra costs associated with emissions, through the trading of allowances, where a company must buy allowances that fit their amount of emitted GHGs. If they are not covered, they wil be financially penalized

trough fines. This is clearly giving incentives for companies to cut emissions, and they will save more money, the earlier they cut these emissions. Another aspect of this is that the European Union is planning to face out their free allowances in the ETS that are allocated to certain companies. This will be giving them more reason to cut even more emissions, and faster.

5.7 What talks for using the market-based approach?

One of the reasons to use the market-based approach is the incentives to reduce electricity in countries with green electricity grids. Norway and France are examples on countries with a high proportion of "emission-free" electricity. France has a large amount of nuclear energy, while Norway mostly I consist of hydropower and wind-energy. If a country has cheap and clean electricity, the need to cut in electricity use, also becomes less urgent with the location-based approach. Norway has historically had low prices on electricity, until the energy crisis originated after the war between Russia and Ukraine started (Fornybar Norge, 2019). If Europe wants to cut its emissions, it is beneficial to have interconnected grids, so surplus renewable energy can travel between national borders. With the market-based approach, this problem is not as relevant, because the market is not restricted to the national boarders but use the emission factors from all the member states together. Then the emissions are equally divided, and no country will have less incentive to cut electricity generation. So, with the market-based approach also countries with low emissions from electricity, have incentives to cut their electricity use, which is a good thing.

5.8 Why is the market-based approach being used?

So far in this document we have presented some problems with the market-based approach, and negative effects it has. In this section we will look at some of the reasons for the market-based approach is being promoted according to Brander et al. (2018).

They give 6 different reasons for the promotion of the market-based approach, and the first is **commercial interests.** Although the extra income for the companies selling contractual emission factors is small, it gives windfall revenue that is only beneficial for the power producers producing renewable energy. Also, contractual emission factors give companies a cheap way of reducing emissions on paper and is therefore popular amongst companies the is reporting their emissions. At the same time, companies that engages in social responsibility primarily because of public relations,

will have less incentives to actually do something for the environment, but rather just look like they care (Brander et al., 2018, p. 31).

The second reason is the **ideology of the market**. Contractual emission factors are often referred to as a market-based solution in the fight against climate change, and that they represent solutions that are not by regulations. Therefore, it is looked upon favorably. Nevertheless, Brander et al. (2018, p. 31) claims that they are rather examples of market failures. This is because it the goals of reducing GHG emissions and increase renewable energy investments is not sufficient and therefore only has the appearance of a market-solution, but not the appearance.

Third is the **implied legitimacy of compliance markets**. RECs were originally invented as compliance instruments in renewable energy portfolio standards. Utility companies later retired the RECs to demonstrate that they have achieved the level that they were mandated to supply. The regulatory background might make some people conflate the new and the original practice, giving them more legitimacy for actually ensuring renewable energy production (Brander et al., 2018, p.31).

The fourth reason they call **Regulatory capture**. They give the example of some regulators and environmental NGOs like the World Wildlife Fund (WWF) and US Environmental Protection Agency, that are otherwise trustable in scrutinizing the integrity of emission accounting practices, have developed their own attribute programs for renewable electricity trading programs. Therefore, they have self-interests in downplaying the "errors" of the market-based approach. Brander et al. (2018, p. 31-32) continues to say that it seems to be a reluctance amongst the environmental watchdogs to criticize organizations that have the appearance of promoting renewable energy. Besides, the GHG Protocol that is a voluntary and non-governmental standard-setter, depends partly on the funding from these very companies that has the self-interest in trading these contractual emission factors (Brander et al., 2018, p. 32).

A fifth reason is **lack of awareness**. Both consumers and policymakers are in general unaware of the problems connected with the market-based approach. This is also to be expected according to Brander et al (2018, p. 32), because of the message that comes through the marketing from those selling contractual emission factors, which sometimes are opaque or misleading. The National Capital Partners for example stated that "'Clients are able to immediately and effectively meet their global renewable energy targets, support the generation of renewable energy in the locations of interest to them, and address their Scope 2 impacts, through our customised, global portfolios of renewable energy instruments. Our renewable energy solutions meet all Greenhouse Gas (GHG) Protocol requirements and CDP quality criteria, providing greater recognition to businesses buying renewable energy certificates" (Brander et al., 2018, p. 32).

The last reason portraited is **Conceptual confusion**. Earlier we described the differences between attributional and consequential GHG accounting. Brander and colleagues (2018, p. 32) claims that this is something that is little known in the field of corporate GHG accounting, where the attributional GHG accounting is traditionally used. However, it is better known in fields like life cycle assessment (LCA). Because of the differences is not well known, there has occurred conceptual confusion in some of the justification of the market-based methods (Brander et al., 2018, p. 32). Scope 2 guidance, for example, suggests that additionality is only relevant to the consequential accounting of GHGs, like project level accounting. This because it is only these methods that measure the changes in emissions compared to not intervening at all. Differently from this, attributional inventories only allocate total emissions among reporting entities, while ensuring that double counting not finds place. Nevertheless, to be accurate and relevant according to Brander and colleagues (2018, p. 32), one needs to reflect the emissions caused by the reporting entity. The problem with contractual/market-based method is that it does not represent any causal relationship between the entity reporting emissions, and the emissions reported (Brander et al., 2018, p. 32).

Another example of conceptional confusion is also obtained from Scope 2 guidance, is that the market-based reflects decisions that companies make about their electricity products.

5.9 Left in the dark:

Today, the field of carbon accounting is not very easy to be

The EU ETS and the Norwegian Government do not require companies to report their indirect emissions from electricity use, but rather demands the producers of the electricity to report their emissions with the production (Miljødirektoratet, 2023b). This gives the power generators a large incentive to reduce their emissions, because of the price for emission-allowances. Both large Norwegian power generators and large power generators from EU-member states is part of the EU ETS.

One positive effect of the power generators taking the bill for the emissions associated with electricity generation is makes renewable energy more profitable, and therefore be more reason for power generators to build renewable energy installations rather than power plants that burn fossil fuels. Other positives are that reporting is simplified and gives a clear responsibility of who needs to reduce the emissions. On the other hand, it gives less incentives for the consumers of electricity to reduce their electricity use through efficiency measures, behavioral change, or adaptation of renewable energy. This might lead to higher emissions. And even though reporting is simple, and a

clear responsibility is given, it gives less accountability to the companies using the electricity. Companies that use a significant amount of electricity might avoid scrutiny with this way of reporting emissions from electricity, and not take necessary measures to reduce emissions in line with for example the science-based targets.

It is clear that there are emissions associated with electricity production (from some sources more than others), and therefore, reduced usage of electricity means reduced emissions. But in the EU ETS, the power generators are the ones that gets the extra economic incentives to cut emissions through the system with buying and selling allowances. For EU, it is important to avoid double counting, so that the total emissions are calculated as correctly as possible. Nevertheless, this as shown, causes some problems when it comes to reducing electricity use. We are then left with the companies own accounting of scope 2 emissions in order to find their environmental impact from the electricity that they have purchased.

Companies within the EU ETS is as mentioned not required to report scope 2 emissions. But we might nevertheless get some information about their environmental impact from scope 2 emissions. Some companies have committed to initiatives like the CDP, or some might just present their own calculations voluntarily in a report. Some use the GHG Protocol as a tool for calculating their own emissions, and some use other frameworks. For the companies inside the EU ETS, they report the scope 1 emissions to the EU, and the rest is on voluntary basis. There might still be some reasons for calculating scope 2 and 3 emissions, like if they participate in sustainability initiatives, they want to meet the requirements of customers and stakeholders, and for internal monitoring and reporting purposes. For companies outside of the EU ETS, they might report emissions for mostly the same reasons as the ones inside EU ETS, but they do not have the same financial incentive for cutting scope 1 emissions like the ones that are inside. Scope 1 emissions are also voluntary to report for companies outside the EU ETS, although there are some national differences, where often large companies must report their emissions from scope 1.

So, if a company chose to account for their emissions through the different scopes, also then including scope 2, what can these numbers tell us? Brander et al. (2018, p. 30) says that "One feature of purchased electricity from a public distribution grid, which makes it difficult from an accounting perspective, is that it is not possible to trace the electricity consumed by an entity back to any particular grid-connected power plant". Because of this, we must use either the market-based approach or the location-based approach. The GHG Protocol published a guidance in 2015, that addressed how to report emissions from purchased electricity. They do require that a companies use both the location-based and the market-based method for reporting scope 2 emissions and calls it

dual reporting. The GHG Protocol says that dual reporting "allows companies to compare their individual purchasing decisions to the overall GHG-intensity of the grids on which they operate" (GHG Protocol, 2015c, p. 62). Through the Scope 2 guidance, the GHG Protocol, claims that dual reporting is beneficial because it:

"• Distinguishes changes in choices vs. changes in grid emissions intensity

• Provides for a more complete assessment of the GHG impact, risks, and opportunities associated with energy purchasing and consumption

• Provides transparency for stakeholders

• Improves comparability across operations (on location-based method) where the company's GHG inventory includes operations in markets without contractual instruments

• Facilitates participation in programs with different reporting requirements." (GHG Protocol, 2015c, p. 62).

According to the GHG Protocol, the dual reporting should help against double counting, when for example a United States-based company that usually use the market-based method is comparing their emissions with a UK- based company that usually use a location-based method (GHG Protocol, 2015c, p.62). Nevertheless, the protocol allows for companies to choose a single method for meeting their reduction targets, and for reporting their supply chain emissions. The same guidance is adopted by the CDP (Brander et al.,2018, p. 30). This can be highly problematic, when one is to compare the results from different companies. Investors, shareholders and governments for example might do thorough research when looking at a company's overall emissions and find that there are two different methods for accounting the emissions from electricity. For normal consumers, it is not so normal to get on a very detailed level of research for examining a company's emissions. If a customer see that a company has reduced their emissions with 30%, they usually think that is a great result, but does not reflect on that it might be a significantly smaller emission-reduction if they used another accounting-method. This might lead to customers favoring other product or companies, than they would have done otherwise, if results from both methods or the other method was used.

He et al. (2022) did a systematic review of 117 papers from influential accounting journals between 2005-2018, and made some findings related to carbon- accounting, disclosure, management, performance and assurance. When it comes to carbon accounting issues, the disclosure part is the most studied. Studies of carbon disclosure can be divided into two groups. The first one is concerned with internal and external factors that affects companies' decisions on disclosure, and the second

one is evaluating and commenting the quality and adequacy in voluntary carbon disclosure (He et al., 2022, p. 273).

One of the findings from He et al. (2018) was that research show that the complexity involved with measuring carbon performance, may influence the reliability and comparability of emission reporting. Because of this, caution should be exercised when it comes to using and interpreting self-reported emission data (He, et al., 2018, p. 283-284).

5.10 Is it really cheaper to buy a GO than doing something else?

Guarantees of origin is a good and easy way for companies to cut their emissions. Nevertheless, it does not, at least directly, earn the business any money. It is something the company buys, keeps throughout the year, and must buy again in order to "remove" the emissions from the used electricity. There are also other options if a business wants to get rid of the emissions from their electricity. A very popular option is to put solar panels on the roof or other surface. This will have higher initial costs than guarantee of origin, which by April 2022, cost 0,02 NOK/kwh (Lyse, 2023). This would give Skretting an additional cost of a just under 2 480 000 NOK for their Norwegian factories. This is if we add the cost per kwh with the total amount of electricity used in 2021. If Skretting want to install solar panels to cover a significant amount of their energy use, it would have a much higher initial cost than GOs. But over time, the investment would pay itself back, the time depends on amongst other things electricity price, and investment cost. It is of course a possibility to invest in other energy sources that cuts emissions from electricity in the same way, like wind for example. Ways of cutting energy use is also an opportunity to cut emissions from scope 2. Better insulation, energy saving technology, energy storage and alternative heating methods can be a way of reducing the impact from scope 2. These are also ways that similar to solar panels, have a high investment cost, but over time will earn itself back.

5.11 Comparability:

Is this problem a problem that only applies to Skretting or is it something that can be a problem also for other companies? This is something that is essential in this research. If this problem only applies to Skretting, we do not have a structural problem, and it becomes less interesting to examine. Then the next step is to identify the aspects of the Skretting case, that can be applied in other businesses, and see if the same problem occurs also here.

The first aspect of the Skretting case is the size, or the amount of energy that is consumed a decisive factor in the comparability of the case? Skretting is a company that consume a lot of energy, that including electricity amongst other energy carriers. Only in their Norwegian factories they use 123 951 892kWh or almost 124 GWh and with the market-based method this gives emissions of 37 171 tons of CO2-eq. If the electricity use is left out of the equation it is 13 210,8 tons of CO2-eq. Compared to Norway largest single emission source in Norway, that is Mongstad oil refinery, who emitted 2 034 336 tons of Co2-eq in 2021 (Miljødirektoratet, 2023a), Skretting is fairly small, but if you compare the to many other companies that is covered by the EU ETS from Norway, we see that there are many companies that use less energy, and emits less GHGs than Skretting. This means that they are not too small to be a part of the EU ETS, but it is still not a part of it. So, we can classify Skretting as a fairly large business in Norwegian standards.

In an ideal world, all companies would disclose their emissions, so that we would have an accurate and comparable, instead of using sector averages and so on. Nevertheless, the larger the businesses that do not report emissions are, the larger margin of error there are for emitting the right emissions. Therefore, the larger businesses in Norway report their emissions to the Directorate for the Environment. Skretting reports their emissions to the directorate, but as mentioned before, they do not report emissions from electricity use, which rather is counted as emissions for the companies generating the power. In one way, the country as a whole, will have approximately the right number of total emissions from electricity. What burden that should be put on each company that uses the electricity however (scope 2), is up to each company to find out and potentially disclose that on a voluntary basis.

The size of Skretting matters in the form that there are a quite large company, that might give some unwanted consequences if large companies, and more of them account their emissions in the wrong way. But for consumers of product or services, the size does not matter as much. The emissions per product you buy, or service you use, does just need a average measurement for the emissions linked with 1 product.

That means that the case is comparable to businesses in different sizes.

There is like mentioned a problem if companies prioritize fossil fuels over electricity, and if companies do not report emissions from electricity to governments or the EU ETS, there is not an incentive to switch from electricity to some kinds of fossil fuels, other than if they have their own company reports where they disclose their emissions. But many companies do this, and it is very common to include all of the scopes in these kinds of reports. Thereby, it might be problematic with

emission factors that gives us fossil fuels that are cleaner than electricity. If no one acted on this, there is no problem, but we see that there are incentives to do so, and that might be problematic.

One thing that might be interesting to find out is whether or not this problem exists inside the EU ETS. If this problem exists within the emission trading system also, maybe we have a problem that needs a solution that affects a wide range of businesses. If it does not exist, a possible solution to the problem might be to implement more companies into the EU ETS. The way of reporting emissions inside the EU ETS does as mentioned, not take emissions from electricity use into consideration, so if this is being reported by the businesses it is trough company reports, or voluntary reporting trough some initiative. That gives the same incentives to switch to fossil fuels, like the ones that are outside. However, there exist a crucial distinction between the emission trading system and the once outside. This crucial difference is that the companies within buys and sell emission allowances, and in a way makes it a currency within the system. This gives clear incentives in cutting real life emissions from scope 1, which again gives incentives to switch to electricity instead of fossil fuels. The price of carbon permits/allowances seems to be sufficiently high to outweigh the benefits possibly gained from switching to fossil fuels. This claim is backed with the fact that the EU ETS has reduced its emissions with 35% in the period from 2005 to 2021 (European Commission, 2023a). In that case, we can conclude with that the problem is not as applicable within the EU ETS, because the economic incentives to cut emissions from fossil fuels is already so severe, that companies will not act on using market-based emission factors to “cut” emissions from scope 2 by switching to fossil fuels. Nevertheless, what can be done, is using the calculation method that fits best for the company, choosing whatever emission factor that benefits the company the most.

6. Results

In this chapter, we will present the results from the Skretting case, and from the EU ETS, and draw some points out of the results, that can be used in the discussion.

6.1 Results from Skretting:

From the Skretting case, we saw from their example with a market-based approach, that without contractual emission factors, the business used emission factors where some fossil fuels accounted for less emissions than electricity. As mentioned before, this is a consequence that is unfortunate, because it might lead businesses to keep fossil fueled machineries for a longer period of time, or in a worst-case scenario to switch from electricity to fossil fuels. In this section of the study we will look closer at the numbers/results from the Skretting case, and talk about what consequences this may have.

Below we have the same table as used in the Skretting case, but also with added numbers for amount of feed produced at each factory, and the amount of emissions linked with one ton of feed produced at the different factories. These are again own calculations, from dividing the total emissions from each factory with the feed produced at each factory. To the right all three are added together. This was added for this part because it matters how much feed is being produced at each facility, if we are trying to compare the emissions for the same amount of feed. It is not enough to see how much energy, and what type of energy each factory uses when we are to compare the emissions from the same amount of feed from the different factories.

Factory:	Averøy	Stavanger	Stokmarknes	All 3 in total
Diesel (kwh)	382 060	258 897	371 080	1 012 037
Natural gas (kwh)	-	17 266 220	-	17 266 220
LNG (kwh)	40 211 662	-	-	40 211 662
LPG (kwh)	-	-	5 859 487	5 859 487
Electricity (kwh)	20 838 311	8 823 145	29 941 030	59 602 486
Total energy consumed (kwh)	**61 432 033**	**26 348 262**	**36 171 597**	**123 951 892**
Diesel (tons CO2-e)	101,1	68,5	98,2	267,8
Natural gas (tons CO2-e)	-	3 487,8	-	3 487,8
LNG (tons CO2-e)	8 090,6	-	-	8 090,6
LPG (tons CO2-e)	-	-	1 364,7	1 364,7
European Electricity (tons CO2-e)	8 377,0	3 546,9	12 036,3	23 960,2
Norwegian Electricity (tons CO2-e)	250,1	105,9	359,3	715,2
Total Emissions (tons CO2-e) European energy mix	**16 568,7**	**7 103,2**	**13 499,2**	**37 171,0**
Total Emissions (tons CO2-e) Norwegian energy mix	**8 441,7**	**3 662,2**	**1 822,2**	**13 926,1**
Total emissions (tons CO2-e) with Guarantee of origin	**8 191,7**	**3 556,3**	**1 462,9**	**13 210,8**
Tons of feed produced	287 611,0	111 417,0	188 957,0	587 985,0
Total emissions (kg) per ton of feed (European energy mix)	**57,6**	**63,8**	**71,4**	**192,8**
Total emissions (kg) per ton of feed (Norwegian energy mix)	**29,4**	**32,9**	**9,6**	**71,9**
Toral emissions (kg) per ton of feed (Guarantee of origin)	**28,5**	**31,9**	**7,7**	**68,1**

Table 2: Own work

So, if we look at the specific numbers, we see that the factory in Averøy use LNG the most, electricity second, and a smaller amount of diesel. The factory in Stavanger uses natural gas the most, electricity second, and a smaller amount of diesel also here. LNG and natural gas, we know from the emission factors shown earlier in Figure 4, that have the same emission factors. And the ratio between the LNG/natural gas and electricity is quite similar in the two factories, so no wonder that the emissions are quite like when it comes to comparing one ton produced fish feed between them as well. The Stokmarknes factory, however, is very different. I use primarily electricity, second is LPG, and some diesel. Because Stokmarknes has such high amount of electricity use, compared to the total, it gives large differences to the total emissions. We see that Averøy have the largest total emissions, no matter how we calculate the emissions, because they by far makes the most feed. Who comes second can be decided by which calculation method that is chosen. If the market-based one is used, without buying GOs, we look at the line that says European energy mix. That is the residual mix that we explained earlier, and with this method, the Stokmarknes factory emits the second most GHGs, making the Stavanger factory the one emitting the least. But even though Stokmarknes use much less energy in total, it is quite close to the amount of GHGs that Averøy emits. If the location-

based method is used (the line called Norwegian energy mix), Stavanger and Stokmarknes change place, so Stokmarknes electricity is viewed as green, and the total emissions in Stokmarknes. The same happens if a market-based approach is used, but GOs have been purchased, but this gives electricity zero emissions instead of just a low number.

So, what happens if we use the same methods, and compare with the emissions created for each ton of feed? Here we have totally different results. The Averøy factory is never the worst emitter when it comes to per ton of feed produced. There are however some very interesting results. In the market-based approach when the residual mix is used, the Stokmarknes factory is the worst emitter, Stavanger second, and Averøy is the greenest one. With the purchase of GOs, or with the location-based approach, it is rather Stokmarknes that is the greenest, with Averøy still in the middle, and Stavanger as the dirtiest factory. What is most interesting is that the factory in Stokmarknes can be either the greenest factory by a far, or the dirtiest factory with some margin, just by switching calculation methods. Either it emits 9,6kg per ton fish feed, or 71,4. This might seem absurd, but when companies are going to set climate targets, they can freely pick the option that suits them best.

6.2 Results from the EU ETS:

Compared with many other countries, the EU is an ambitious part in the transition towards sustainable development and emission reduction. In other for the EU to reach its targets, it is important that they have the right measures to push businesses, so that it becomes favorable to emit less GHGs. In the EU- ETS we see that there is a cap-and-trade system, where the number of allowances is being reduced gradually, to ensure that the different climate targets of the EU are met. Companies are forced to cut emissions, and real-life emissions, because the allowances only cover scope 1. The evidence show that the EU ETS is an efficient tool for cutting emissions within the trading system with 35% between 2005 and 2021. Outside of the EU ETS there are not such a system, and the companies does not have the same incentives to cut emissions. There are still reasons to do so, but the guarantee for it is much more secured within the ETS.

7. Discussion

In this section of the study, we will examine and discuss the relevant information and results compared to the research question. We remember from the objectives that the research question is: "Does the market-based methods, dual reporting and contractual emission factors for emissions associated with electricity; make it easier for companies that is not covered by the EU ETS to greenwash their business?".

The main problematic with the market-based approach is related to companies voluntary reporting. Obligatory reporting to national governments like Norway or through the EU ETS, is not covering scope 2 emissions, where electricity usage comes into the picture. Such a system does not give extra incentives for the companies to reduce their electricity use, the whole responsibility is handed to the power generators. This is not optimal, but it does at least give large incentives to scope 1 emissions, that is ensured to give real-life emission cuts. A company of the size like Skretting is large enough to report their emissions to the Norwegian Government, and one can look at the emissions from their sites and see the development year by year. This is all they are required to do, but most large companies have some kind of company report where they disclose how "good" they have been over the last year, and what they plan to do. This also covers environmental performance, and some, to show that they take things very seriously, voluntarily agreeing to report their emissions from all scopes to organizations like the CDP or declare that they are conducting business in line with certain targets like the Science Based Targets. This information can be useful for possible investors, customers or stakeholder to make decisions on whether to buy from the company, invest, how to run it and so on. But if this information is to be useful, it should be possible to compare with other companies to see how good or bad the data from the given company really is. This is an Achilles heel in the dual reporting. GHG Protocol, which is the most recognized framework, do require dual reporting, meaning both the market-based and the location-based methods for reporting emissions. However, the GHG Protocol which is adopted by the CDP and the SBTi allows for companies to chose if they want to use the market-based or the location-based methods when they are setting emission targets. This means that they can decide the one that fits them the most. This might be very problematic for several reasons. Firstly, because information about emissions cannot as easily be compared to other companies. If you want to compare two companies, and one is using the market-based approach, and the other is using the location-based approach to show their progress, the numbers are not easily comparable. If we use the different factories at Skretting, and pretend that they are different companies, we will get strange results if they use different methods. If we set the market-based method on the factory in Stokmarknes, we see that it emits 71,4 kg CO_2-e for each ton produced feed. If we take the Averøy factory and use the location-based method, they will have

emitted 29,4 in comparison. According to these comparisons, the Stokmarknes factory is about 2,4 times as bad as the factory in Averøy. If we switch methods, so Stokmarknes gets location-based emission factors, and Averøy gets the market-based ones, we see a very different picture. Then the methods say that Averøy emits 57,6 kg for each ton feed, and the one in Stokmarknes only emits 9,6. Then, suddenly the feed from the Averøy factory is 6 times worse for the environment than the feed from Stokmarknes, according to the numbers. This example illustrates well how wrong it can go if a customer with little knowledge of carbon accounting, just takes two emission numbers from two different companies with different methods. The knowledge the customer ends up with does not reflect reality at all. This particular problem with the market-based approach is primarily linked to the dual reporting part, and the possibility to chose what methods to use. If everyone had to use one or the other, the results would have been comparable.

The second problem is with the market-based approach and that it punishes initiatives where more electricity is used. Yes, it is a good thing for a company to use less electricity if that means more energy efficiency, better habits, smart systems and so on. The problem, nevertheless, occur when someone wants to switch from fossil fuels like natural gas to electricity. Skretting for example use steam boilers in the production of the fish feed. In Stavanger and Averøy, these run on gas (LNG and natural gas), but in Stokmarknes, they have invested in an electric steam boiler. This is naturally a good thing to do, especially in a country like Norway, where the majority of the power comes from renewable energy. With the market-based method however, the factory in Stokmarknes double their emissions compared to if they had used gas. This is contradictory to what we want to do in sustainable development. The goals are to stop using fossil fuels, but we have frameworks that are globally recognized that punishes electrification, which is said to be the way to go if we are to get rid of fossil fuels. This is certainly a problem. The factory in Stokmarknes got electric steam boilers before Skretting changed calculation method. Although it is difficult to know what are being decided behind closed doors, and what decisions would have been made, it might at least not have been as favorable to go for the electric alternative if the market-based approach were implemented earlier. It is not very disputed to say that the world needs to electrify most of the fossil energy in the world with renewable energy, or at least change to a clean source of energy. It might then be a problem that frameworks that are being used might give incentives to the opposite.

The reason of course for that the market-based approach has such high emission factors for electricity is because one is removing large portions of the renewable energy from the equation. Defenders of the market-based approach may of course say that a company can just buy contractual emission factors from a GO for instance, and then electricity becomes the greenest alternative, and electrification suddenly makes a lot of sense again. And they are right to say so, but contractual

emission factors are not something that everyone agrees on that is a good thing. Brander et al (2021) for example claims that they do not give any significant amount of additional renewable energy. That is after all the sole purpose of having such a system. Companies are rather offered a cheap way to meet their emission targets, and the ones who do not buy such emissions have to carry the extra load and count other companies' emissions as their own.

A third problem with the market-based approach is in relation to that it uses contractual emission factors to cut emissions from electricity. Like mentioned in a paragraph earlier, the need for gradual and immediate action falls away with the market-based approach. If a company wants to cut their emissions by a certain percentage within 2030, they can buy contractual emission factors close to the deadline, and "reach" their targets buy just paying some money. This is not something that encourages energy savings, own renewable energy production or switching away from fossil fuels.

The nature of the problem might lie in the voluntary aspect of the accounting, but it might just not be an easy fix. Because it is something that companies do on a voluntary basis, there are not as much reason for governments to intervein in the errors of the different practices. Governments and EU ETS cover scope 1 emissions for certain companies, and if they did do scope 2 and 3 emissions as well, there would be a real risk of double counting GHGs. If the power generator reports scope 1 emissions, and Skretting accounts the same emissions as their electricity use, we get unreliable numbers as well. If all companies reported their scope 1 emissions, we would be the closest to getting 100% reliable emission numbers in total. However, there would be some missing information about what emissions are linked to buying a certain product for example, and companies would not care about reducing scope 2 and 3 emissions. It is probably for the best that companies do this in their own reports and trough their own commitments. There can still be improvements to the frameworks.

All these problems with the market-based approach, the dual reporting and the contractual emission factors clearly show that this practice makes room for greenwashing. Let's take the dual reporting first. It is clearly parts of the framework that makes room for greenwashing. The fact that a company can choose which method to use for their target-setting, lets a company that want to take advantage of the situation to chose whatever framework that suits them best. If they want to show as low emissions as possible, they can use the location-based approach, at least if they find themselves within a country with large portions of renewable energy in its grid. Most likely will it be better than the residual mix from the market-based method. If a company however really wants to reach carbon-reduction targets, they could use the market-based method for the target-setting and have a very easy way of cutting emissions fast. Buying GOs is then a very favorable alternative and can remove

major parts of the company's emissions in the blink of an eye. If Skrettings factory in Stokmarknes did so, they would go from 13 499 ton of CO_2-e totally emitted to 1 463 ton emitted, that is almost 90% of the emissions gone in the blink of an eye. This does not give a good impression of how much GHGs the factory in Stokmarknes have cut. This is clearly a possibility for greenwashing.

If the company really wants to greenwash their business, they can with the market-based method just switch from electricity to natural gas and get half the emissions that they had with electricity. This would of course also be far away from wanted behavior and an example on how the market-based approach makes greenwashing possible.

The example from Skretting show us that the framework developed from the GHG Protocol have room for companies to exploit the framework in a way where the companies greenwash their operations. But is this only in the case of Skretting? The clear answer to that is no. Companies in different forms can do the same, it does not matter if they are large or small, but the potential to greenwash is greater in companies that are consuming much electricity in their operations. It is also a more serious problem in the companies that use much electricity. The higher percentage of the energy a company use, that originate from electricity, the larger is the potential to cut emissions through contractual emission factors, or switching to gas as fuel source. However, it is very applicable in different companies, because most companies do not have climate targets that say that they shall cut 80% of their emissions by 2030. A company can also just buy GOs for parts of the electricity, so that it covers their climate targets.

Above we have found several problems with the market-based approach, the dual reporting and the contractual emission factors. What should we then do with it. There are probably a number of different solutions to this problem, but nevertheless, there will be proposed a few alternatives.

The dual reporting is not in itself something bad. There are strengths and weaknesses with both the market-based approach and the location-based approach. However, the fact that one can chose which to use for setting and tracking emission targets is something that should be abandoned. This because of named reasons above, and if only the location-based approach is used in the future, we would have comparable emission numbers in the future. The market-based methods could for example be supplementary and give a wider understanding.

One solution is to move away from the market-based method, and rather use another, like the location-based method, that has less problems connected to greenwashing. This is backed by scholars like Brander et al. (2018, p. 30-32) that claim that the market-based approach for accounting emissions have several problems and should be abandoned.

Another possible solution to the problem is to implement more companies into the EU ETS. The EU ETS gives additional incentives for cutting emissions. The possibility of switching from electricity to gas or diesel is no longer applicable, because this increases the number of allowances that a company would need to buy. The punishment for electrification would still be there if the company still report on voluntary basis, but there is a reward from the EU ETS for electrifying, and this one is through money saved which is probably more important than the company own emission reports and targets. It would probably be more favorable to choose the location-based methods, because then there would be incentives from both sides to replace fossil fuels with electricity.

The final advise would be to stop using the market-based approach, and switch to the location-based, like Brander et al. (2021) also suggested. In addition to that there could be wise to implement more sectors and companies into the EU ETS. Especially companies like Skretting that use relatively high amounts of energy. Its track record shows success in reducing emissions, and there would be less incentives and possibilities to greenwash if these two solutions are implemented. Even though this means more regulations on companies, they usually accept it if a level playing field is ensured, so they can compete on similar terms.

8. Conclusion

In this study, we have looked at the field of carbon accounting, and discovered that there are some problems with the practices that are commonly used, and internationally recognized. After an introduction focusing on climate change and sustainable development, we had an essential walkthrough of the carbon accounting field, and the most used and recognized standards and practices within the field. After that we looked at the European context, and what ambitions the European Union had, some taxation affecting the Norwegian and European companies and as the last part of the chapter, looked at the cornerstone of their emission-reduction, the EU ETS. Thereafter, some theoretical principles were introduced, followed by the methodology, including the Skretting case. Following this we looked at different aspects that are important for discussing the problems with the current practices in carbon accounting. This was followed by the results of the Skretting case, that showed in numbers what is the root of the problem greenwashing within carbon disclosure. In the discussion part the different problems were discussed and some possible solutions to the problem were proposed. The research concludes with that there are clear signs of that the dual reporting, market-based approach and contractual emission factors, all allows for companies to use the framework to greenwash their operations. The solution proposed is to abandon the market-based for the location-based approach or a new and better way of reporting emissions. Additionally, more companies that use much energy should be implemented into the EU ETS, to give them additional incentives to cut real-life emissions. Carbon accounting is a field that has yet to be fully understood and studied and will need more research in the future. The consequences of these "errors" connected to the market-based approach, dual reporting and contractual emission factors could be a field to study further in later research.

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