UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Profitability During a Sustainability Transformation

A Case Study of a Swedish Petroleum and Biofuel Company

Bachelor's Thesis in Industrial and Financial Management

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Abstract

This report examines the financial profitability of a petroleum and biofuel company during their sustainability transformation. The case company is Preem AB, the largest fuel company in Sweden. The study finds that debt-to-equity ratios tend to increase with investments in more sustainable solutions. This could propose a higher financial risk to the firm. The report also proposes and discuss the use of metrics for CO_2-emission that are easier to understand than just the weight of the gas emitted. Preem does not seem to benefit from being part of the European Union's Emissions Trading System (ETS), since their green investments are focused on reducing emissions in the use phase of their products, not in the production phase, which is what the ETS measures and rewards.

The case study is based on an interview with a director at Preem to get an insight to the green investments. Data for financial- and environmental performance are collected from official reports published by Preem.

Keywords: Sustainability Transformation, Financial Profitability, Biofuels, Oil Industry, Crude Oil, Refinery, ETS

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Michael Crona & Filip Linnér
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Abbreviations

- *3BL* - Triple Bottom Line
- *CapEx* - Capital Expenditures
- CO_2 - Carbon Dioxide
- *ETS* - The European Union's Emissions Trading System
- *GHT* - Green Hydro Treater
- *HPU* - Hydrogen Production Unit
- *HVO* - Hydrated Vegetable Oil, oil made from renewable sources
- *ROA* - Return on Assets
- *ROE* - Return on Equity
- *TWh* - Terra-Watt hour, a measurement of energy

1 Introduction

Each day during 2019, the global demand for crude oil was around 100 million barrels[1]. This is one of the largest contributions to environmental impact since it generates around 11.8 billion tonnes of CO_2 each day[2]. In recent years, the future of oil consumption has become a hot topic. Following this discussion there has been investments into making everything from extraction to consumption more environmentally friendly. Differentiating valuable from non-valuable investments has in turn become more of a challenge both from the standpoint of investors and firms alike. One key factor to consider when doing investments towards a transformation within environmental sustainability is that the firm has to stay profitable, otherwise it will not be sound to make these investments.

1.1 History of Oil Industry

The first known extraction and use of oil occurred in China in AD 347[3]. Back then oil was used to heat up brine to create salt, but this sparked the start for the many use cases of oil that would come. By the end of the first millennia, petroleum and natural gas was extracted from fields in western Asia. Products derived from petroleum, such as tar and kerosene, were used to pave roads and as fuel to light homes and streets.

However, the big break for usage of oil came with the development of large-scale refining. While the knowledge of refining had existed for a long time the difference was the finding of rock oil and with that the expansion of large-scale oil wells[4]. The first wells were built between 1858 and 1859 in Ontario, Canada and Pennsylvania, USA. These wells made it possible to develop large-scale oil processing systems, paving the way for today's refineries. By the early 20th century, the dominant use of refined petroleum was in automotive and airplane fuels, which required more efficient and larger-scale extraction and processing systems. This was further accelerated by World War II and the industrialization that followed, which increased the demand for large quantities of high-quality fuels. By the 1970s, the oil industry was well-established, producing around 2.3 billion tonnes annually[4]. However, this also meant that the impact on the environment became a major concern, leading to the regulation of the industry to reduce the negative externalities of refining and using the fuels[5].

1.1.1 Swedish Oil Industry

By the mid twentieth century, the industrialization had begun to gain momentum in Sweden which meant that, just as the rest of the world, petroleum became an important commodity. To secure the Swedish petroleum supply, the government formed the state-owned company Svenska Petroleum in 1975[6]. This was especially important due to the oil crisis that had hit the world a year earlier. To ensure the supply of petroleum to the industries, Svenska Petroleum bought the refineries in Gothenburg and Lysekil. Seven years later they merged with Oljekonsumenternas förbund (OK) and formed OK Petrolium (OKP). OKP conducted much of Sweden's refinery operations around the beginning of the 1990s but was in 1991 separated from the government and later acquired by Texaco's only to be acquired by Corral Petroleum Holdings one year after[7]. This prompted their name change to what is known today as Preem[8].

1.1.2 Preem AB

Preem is a company selling and refining fuels in Sweden. It is the largest of its kind in Sweden and have domestic and foreign customers[9]. Preem has since the change in ownership provided its around 570 stations with fossil-based fuels and biofuels.

Their two refineries, located in Lysekil and Gothenburg, refine a total of approximately 18 million m^3 of crude oil each year[10]. By 2035 Preem aim to have net zero emissions in their value chain[11]. To reach the goal, one part is to adapt the refineries to produce more biofuels to eliminate the need and use of crude oil.

Preem is privately owned and not listed at any stock market. The owner is the businessman Mohammed H. Al Amoudi[12].

Emissions from the refineries of Preem are covered by the European Union Emission Rights Trading System (EU ETS)[13]. This imply that they have to either pay or receive money depending on their emissions[14].

1.2 United Nations Climate Goals

In 2015 all countries that were members of the United Nations agreed to act for a more sustainable future[15]. 17 goals were decided upon ranging from economic to environmental aspects. One area is to provide energy that is clean (not harmful to the

environment) and affordable. Sweden has been a member of the United Nations since 1946[16], which means that they must work towards the joint goals of a sustainable future.

Fossil fuels are the largest factor to climate change[17]. When combusted they create CO_2, which is a contributing factor to global climate change. In addition to emissions of CO_2 there are also a contribution of particles emitted to the air. This means that usage of fossil fuels is not beneficial for the environment in the long-term, which is why clean energy is on the agenda for the members of the United Nations.

1.3 Fossil Fuels in Sweden

To tackle the problem of fossil fuel usage the Swedish government has enforced a regulation that force fuel suppliers to increase the renewable part of the sold fuels each year[18]. This is to reduce emissions of greenhouse gases. As of today, gasoline, diesel and jet fuel are covered by this regulation. The regulation is called ”reduktionsplikt” in Swedish, which means reduction duty. The regulated level of renewable part is different between the fuels. From the beginning of 2022 the share of renewable fuels in gasoline was 7.8%, in diesel 30.5% and in jet fuel 1.7%. In the future, the renewable share will increase to make the fuels even more environmental efficient.

During 2020 the total energy consumption in Sweden was 355 terrawatt-hours (TWh)[19], with the transport sector accounting for 136 TWh of the total consumption. In the same year (2020) the transport sector for domestic transport used 16.83 TWh of renewable fuels[20]. This means that the rest of the fuels used were not renewable, or in other words fossil fuels.

1.4 Downside of Renewable Fuels

The downside of making renewable fuels is the increased production cost. One way of producing renewable diesel and gasoline is by hydration of vegetable oil, which creates a fuel called HVO[21]. One resource that can be used for HVO-production is pine oil, which is what Preem is partly doing[22].

1.5 Problem Analysis

Countries are setting new rules when trying to reach the set targets within environmental sustainability. This means that some companies have to change their way of doing business. When managing the financial position of a firm the general goal is to create as much value as possible for the shareholders[23]. One way to achieve maximized value is for the firm to make profits, rather than losses. On the other hand, a firm must generate profits in the future, otherwise the value of today will be erased and the business will be short lived. When a firm is facing changes in its environment with different uncertainties it can be hard to manage the situation, it is also associated with risk.

In the case of Preem, there is a change going on in the industry, transforming from a fossil-based feed stock to a renewable. Preem must generate profits today, during the change, but also after the change in the industry. Today, Preem is facing the question of balancing current profits with the forthcoming profits. Investments have been made that focuses on the future, but they are not in the future yet, which means that they cannot focus all business to the upcoming times, because there will be no subsequent business if they lose money today, and not survive to the future.

The oil industry is only one of many industries that face a changing future with respect to environmental sustainability. Similar changes regarding environmental impact can be seen in the steel industry, where SSAB aim to produce fossil-free steel[24]. SSAB is a Swedish company that operates within the steel industry and during 2021 they had a revenue of around SEK 96 billion[25]. Another large Swedish company that faces a future of change is Volvo Group that have announced that they will build a completely new battery factory in Sweden[26]. Volvo Group had total sales of SEK 372 billion in 2021[27]. Preem had a revenue of around SEK 100 billion in 2021[28] which shows that SSAB and Volvo Group are firms within similar size (with respect to revenue) of Preem that also face a sustainability transformation.

For all large industrial companies there will have to be a trade-off between short- and long-term profits. Since at least three large Swedish industrial firms are working to become more environmentally sound there is a need of understand how the profitability of such large companies get impacted during such transformations.

1.6 Purpose

The purpose of this report is to provide an analysis of the financial profitability and environmental performance of Preem AB between 2017 and 2021 to describe what has happened within these two fields during their sustainability transformation.

1.7 Research Questions

To create results that focuses on the purpose of the work, three research questions were created.

1. **How has the profitability of Preem AB been impacted by their sustainability transformation between 2017 and 2021?**

The first question has the focus on creating insights into the economic performance of Preem in relation to the work towards a sustainable future.

The reason for choosing the years between 2017 and 2021 is due to available data. In 2017 Preem started to publish sustainability reports, which is used as the data source for the environmental impact.

2. **How can the change in CO_2 emissions be easier understood?**

The second question is supposed to make it easier to grasp the emissions that is being created. The reason for this is that it will help the understanding of the potential reductions made, since it can be difficult to understand a reduction of, for example, 300 tonnes of CO_2 emissions.

3. **Can the environmental impact be translated to financial impact, especially when Preem are part of the ETS?**

The third, and final research question is a to conclude if there are any trends when it comes to profitability and environmental impact, more specifically the CO_2 emissions. This is a question directly connected to the first research question. Due to Preem being part of the ETS, emissions will have an impact on their financial situation.

1.8 Limitations

The scope of the work had limitations. The first being the focus of CO_2 emissions, not other gases emitted. Motivation for that is the complexity of introducing more emissions to take into consideration. If a broader environmental scope should have been made, the economic focus would have had to be compromised.

Another way of analysing the environmental impact is to consider the electricity consumption of a company, but since over 90% of the electricity in Sweden is either from renewable sources or from nuclear power[29] it was decided to not look into that area.

A second limitation was with respect to the geographical scope. Since the report was written in Sweden a natural limitation was to only focus on a case study of a Swedish company since it is easier to communicate with a local firm compared to a foreign company.

2 Theory

The theoretical framework is divided into nine areas, namely *triple bottom line*, *environmental impact of oil*, *renewable fuels*, *emission rights trading*, *translation of environmental impact*, *financial profitability*, *hydrogen production unit*, *green hydro treater*, and finally *Synsat*.

Reason for focus on the environmental- and financial performance is due to the nature of the research questions, which have the scope of environmental sustainability and financial profitability. The research is based on a case study of a firm, which is why the theory is adapted to be applicable to the case company. This can be seen, for example, when presenting the technologies used to increase production of renewable fuels, which are technologies used by Preem.

2.1 Triple Bottom Line

A point of reference when it comes to sustainability in the corporate world is the *triple bottom line* (3BL)[30]. It is a framework that has three perspectives, namely economic, environmental, and social (see figure 1).

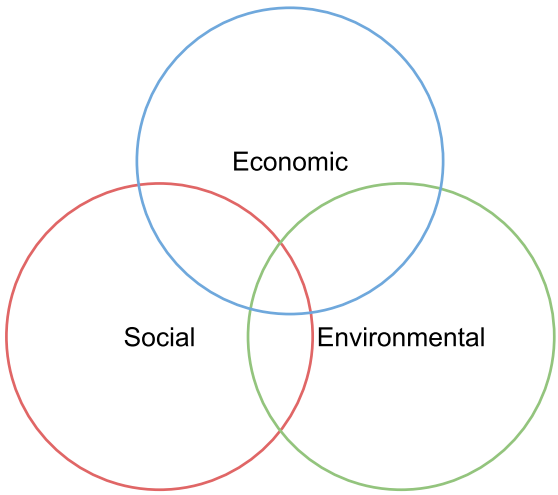

Figure 1: Illustration of the triple bottom line.

The economic perspective is focused on the long-term finances of the firm. If it cannot sustain a profit and sound use of its resources, then it will not be economically sustainable since it will default. The environmental perspective has the target of improving environmental aspects of the firm. It can be emissions and use of natural

resources. The social perspective takes the human-focus, such as public health and education, but also wealth creation in society[30].

The idea is that all three areas need consideration when working with sustainability, which means that it intersects between all three areas in the ultimate when working towards sustainability. One way of using it is by measuring the performance within the three areas.

When working with the 3BL all three areas should be considered, but working with more areas than only the economic part can be considered better than working with nothing more than the financial aspects[31].

2.2 Environmental Impact of Oil

The process when crude oil is turned into the different products used today consists in general of extracting the oil, shipping it to a refinery that separates the different product from the crude oil and transport of the final product to the end customer. Extracting the oil is done by pumping it from depots in the ground, often by offshore oil rigs at sea or at inland oil fields. The second method, which uses oil fields, has the largest impact due to the large scale of the fields which can disrupt and damage wildlife. There is also the risk, for both methods, of oil spill which pollutes the ground or sea which has a large effect on the wildlife in the area[32].

Refining crude oil does also create emissions, this is not only CO_2. These emissions have a high impact on the environment and if not treated right can lead to devastating consequences, e.g., the disposal of wastewater that if not after-treated will cause contamination of ground and surface water. This can have long lasting effects on both human- and wildlife[33]. In addition to these, transporting the crude oil and refined product adds to the total emissions. Emissions from transportation are dependant on the distance traveled and can be a significant portion of emissions if long range shipping is required. The impact from transport comes in large due to the combustion of fuel for both road and sea since it creates CO_2 but also in the form of sulfur emissions when shipping by tanker[34].

2.2.1 Environmental Impact of Carbon Dioxide

The carbon footprint is defined as a measurement of the total amount of carbon dioxide emitted by a product over its entire lifetime[35]. These emissions can be both direct and indirect. Using the carbon footprint as a measurement is one way of analyzing the performance. One formal way of doing this is to use the *Greenhouse Gas Protocol* (GHG), it is a standard describing how organizations can measure their emissions of greenhouse gases, such as CO_2[36].

Emissions can be grouped based on three different scopes. The first scope handles the emissions upstream, for refineries the biggest posts would be connected to extracting and transporting the crude oil. The second scope is the direct result of emissions from the firm i.e. the production and the third scope is the downstream activities such as transporting the refined product and the consumption by the end user [37].

Global warming is one effect of CO_2 emissions. When the world gets warmer it is causing different species to extinction and acid rain[38]. This shows that the use of crude oil as a energy source is part of creating several bad environmental effects.

If taking the perspective of human health, both the psychological and physical side of it, one can see that humans are also affected. One psychological effect is restlessness, and one physical effect is reduced physical performance[39].

These perspectives show that a reduction in CO_2 must be made. If not, the world will not function as it should.

2.3 Renewable Fuels

Renewable fuels are fuels derived from renewable resources. These fuels are considered sustainable because they can be replenished relatively quickly, unlike fossil fuels, which take millions of years to form. One example of a renewable fuel is biofuel, such as ethanol and bio diesel, which can be derived from corn or pine. Other renewable fuels include biogas, which is produced through the breakdown of organic waste, and hydrogen fuel, which can be produced through a process called electrolysis. Renewable fuels are considered an important part of the transition to a more sustainable energy future, as they can help reduce the reliance on finite fossil resources and lower greenhouse gas emissions[40].

2.4 Emission Rights Trading

Emissions rights trading is a tool used to incentivise plants who is operating in either industry, energy production or aviation to lower their impact on the climate. All actors operating within these areas have a certain number of tonnes of CO_2 that they are allowed to emit each year (scope 1 & 2), this to limit the negative externalities and penalize the actors that exceed these limits. This also allows for actors that have invested in reducing their environment impact below their limit to trade these with other actors that exceeds their limit. In the EU this is regulated through the emissions rights trading system *EU ETS* which has a ceiling for the total amount of CO_2 that can be emitted and allows for actors to trade within these boundaries without exceeding the maximum quota for each year[14]. This quota is reduced annually in order to increase the price of emissions rights and in turn the price of polluting, this in order to help meet the targets of the Paris Agreement[41][42]. Currently the price for emissions rights (EUAs) is trading around 80 €/tonne but this is expected to increase to around 100€/tonne in the coming years[43].

2.5 Translating Emissions

Emissions, or the amount of pollutants released into the air, can be difficult to understand or relate to. One way to make emissions easier to understand is to provide a context or comparison. For example, one could explain that a certain amount of emissions is equivalent to the amount of pollution produced by a certain number of cars or power plants. One example is that one trip from Boston, USA to London, UK and back by airplane accounts for a total CO_2 emission of one tonnes per passenger[44]. Another example could be for example a Volkswagen (VW) Golf that with a petrol engine emits around 100 grams of CO_2 per driven kilometer[45]. Using this figure means that one tonnes of CO_2 is what the car does in 10 000 kilometers. You could also use visual aids, such as graphs or charts, to show how emissions have changed over time or to compare emissions from different sources. Another way to make emissions easier to understand is by explaining the potential consequences of high emissions, such as air pollution, health impacts, or climate change. An example of when effects can be seen visually is the smog seen in China or the diminishing of the poles.

2.6 Financial Profitability

When considering the financial management of a firm one must understand the general goal within this area, which is value maximization of the equity that the owners have in the firm[23]. Different methods can be used to measure the performance, and different areas can be measured. The measurements will tell how a firm is doing its operations with respect to efficiency and capital used.

The first measurement is the *gross margin*. Gross margin is calculated according to equation 1[46]. This measurement should be as high as possible since it indicates low costs of the product sold in relation to the selling price.

$$\textit{Gross Margin} = \frac{\textit{Gross Profit}}{\textit{Revenue}} \tag{1}$$

In addition to profit margin the *operating cash flow* can be used as an additional measure for investigating the profitability[23]. If a firm with expensive equipment is considered, it will have large accounting-based costs of depreciation. Depreciation is not a cash flow, but rather a way to split the cost for any purchased goods over its financial life time, which means that the firm might have a low profit margin but still operate efficiently due to high levels of depreciation. If the operational cash flow is being used, it will account for this potential problem (see equation 2).

$$\textit{Operating Cash Flow} = \textit{Earnings Before Interest \& Tax} + \textit{Depreciation} - \textit{Taxes} \tag{2}$$

Two other measurements focus on how capital is used within the firm. By looking at how much capital that is being used in the firm and comparing it to the income, measurements can be constructed which can give insights to how well capital is utilized[23].

The first measurement is *return on assets* (ROA) (see equation 3). It looks at the total amount of capital (assets) used in the firm, independent if it is equity or debt.

$$\textit{Return on Assets} = \frac{\textit{Net Income}}{\textit{Total Assets}} \tag{3}$$

The second measurement is *return on equity* (ROE). In contrast to return on assets it only looks at the amount of equity used in the firm. If a firm is using a high level of leverage the ROE will be substantially higher than the ROA. For computing ROE equation 4 can be used.

$$\textit{Return on Equity} = \frac{\textit{Net Income}}{\textit{Total Equity}} \tag{4}$$

All measurements using the net income as a components are using values found in the *accounting*[23]. There are upsides and downsides of using these measurements[47]. One upside is that they can be used for short-term analysis. Downsides are that they will be affected by changing accounting rules and decisions taken within accounting long before the analyzed period.

One way to tackle the problems when considering accounting-based values is to compare operating cash flow with revenue (see equation 5), this is called *operating cash flow margin*[48]. This is another measure to use in an analysis to get a broader view of the situation.

$$\textit{Operating Cash Flow Margin} = \frac{\textit{Operational Cash Flow}}{\textit{Revenue}} \tag{5}$$

There are other ways of measuring firm profitability, such as with different models from industrial management and finance[49]. The models from industrial management look at the market structure of the market which the firm is operating in, and company-specific measurements, such as the market share. Models from finance focuses on risk measures and returns, for example by using the *Capital Asset Pricing Model* (CAPM). The performance of the models can differ, dependent on which type of market structure that is present. Some research[49] suggest that market share is not a factor that can give insights to the profitability of the firm, which suggests that some parts of the models from industrial management is not the most dependable.

Another tool for analysis is the debt-to-equity ratio (D/E) (see equation 6). It can be used when understanding the leverage of a firm which in turn can give insights to changes in ROA and ROE[46].

$$D/E = \frac{\textit{Total Debt}}{\textit{Total Equity}} = \frac{\textit{Total Assets-Total Equity}}{\textit{Total Equity}} \tag{6}$$

One consequence of increasing the level of debt while keeping the equity at a constant level is the increased rate of return on equity if the firm is taxed. This is called *Miller Modigliani Proposition 2* (MM2)[50]. In essence this means that when leveraging a firm the equity holder requires a higher rate of return on their investment due to increased risk to the firm in case of default or financial distress. The extra return can also be called a *risk-premium*.

2.7 Hydrogen Production Unit

In order to transform the usage from fossil based fuels to renewable fuels in the production of diesel or HVO it is required to use hydrogen in the production process. This ensures that the renewable fuel has the same properties as the fossil-based. The *hydrogen product unit* (HPU) allows for on-site production of hydrogen in larger quantities. This in turn means that higher volumes of renewable feed stock can be processed in the production. Products needed for such a plant are natural gas and electricity[51].

2.8 Green Hydro Treater

The mix of fuel is something that changes with the seasons of the year. This is because different temperatures require different properties. In the production of renewable fuels, the problem has been that during the winter months, the proportion of renewables had to be reduced in order to achieve the desired cold-climate properties. By using a *Green Hydro Treater* (GHT), fuels with higher levels of renewable feed stock can be used while still achieving the correct properties. The process removes oxygen and sulfur from the renewable stock which leaves only the hydrocarbons i.e. the same as its fossil counterpart[52].

2.9 Synsat

Synsat is the name of the plant that Preem uses to mix the renewable fuels with their fossil products. This allows for a larger portion of the fuel to be renewable. The biggest environmental effect of this will be seen in the scope 3 of the GHG-protocol, since the usage of the product allows for a lower net CO_2 emission during consumption[53].

3 Methodology

To answer the research questions the following methodology was used. It consists of six steps (see figure 2). The literature review was the starting point of the work since it provided an understanding of the topic and also a framework for analysing the results. An interview provided in-depth knowledge about the subject since the respondent is working within the case firm. After the interview, the goal was to have enough knowledge about the investments done during the latest years so that they could be mapped over the years. After mapping the investments, the financial profitability was determined and the environmental impact. To wrap it up, a comparison was made to see how the firm had performed with respect to profitability and environmental impact. The time period analyzed was between 2017 and 2021.

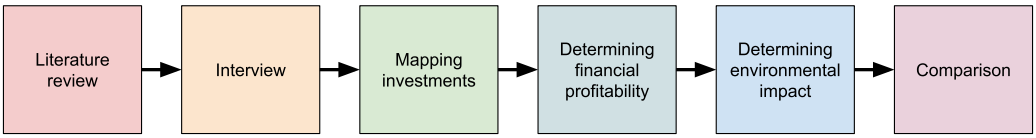

Figure 2: Methodology used in the report.

The following part of the report will describe and motivate the used methodology. The analysis is leaning towards a quantitative analysis. The basis of financial profitability and environmental impact is based on official data available to the public via reports, which can be seen as quantitative elements. The interview was also in general quantitative, since it was done to get information about the investments made, not about the experience of the respondent, although some aspects could be considered qualitative since it required descriptions of the production units.

3.1 Literature Review

A literature review was made to secure an understanding of the topic that the report is focusing upon. Different types of sources were used to collect information, for example books, scientific articles, and industry reports.

Literature within corporate finance were used to get a broad, but aggregated in-

formation of the area, which is a benefit of using printed material[54]. Furthermore, electronic sources were used as well, such as official websites. The benefit of using digital sources was their potential to be constantly updated, which means that they had the possibility of telling the latest information about a topic. A downside of using information that can be changed from one time to another when researching the area, was the risk of creating confusion and misunderstanding if information is different each time the source is used. This is not the case when using printed books, but on the other hand they will not have the ability to tell the latest trends within a topic.

Another source of information was scientific articles. Since the report is aiming at corporate finance and environmental impact, the two areas were searched upon. To find relevant material, searches was made using Google Scholar and then finding ways to access the articles, such as via the university library. The keywords used in the searches were different depending on which of the two topics that was searched about. For the topic of corporate finance keywords such as *firm profitability* and *profitability measurement* were used. When searching in the field of environmental sustainability keywords such as *environmental impact of* CO_2, *climate change*, and *fossil fuels* were used.

3.2 Interview

To gain in-depth information about the company that was being researched, an interview was conducted. An interview made it possible to dig deeper when creating an understanding of the topic. In this case the interview was used to gain insights about the larger investments made between 2017 and 2021 to increase the environmental sustainability. It was needed, since only the total capital expenditures (with respect to environmental improvement) were posted in the environmental reports. These investments needed to be understood better to see what had been made. This information was later used when mapping the investments over time.

The benefit of using an interview was partly to gain a personal connection with the respondent[54]. By getting a personal connection with the respondent there was a better chance of asking follow-up questions in the case of investments being presented and the interviewers not understanding it.

When deciding upon the structure of the interview two main aspects were thought

upon, namely degree of structure and standardization. The interview was semi structured to get a combination of the answer to the given subject but at the same time giving some room for the respondent to form the interview. To make the interview semi structured some questions were open, while some were relatively closed. Open questions tend to have a descriptive answer, while closed questions can have a ”yes” or ”no” character[54].

To facilitate later analysis of the interview, notes were taken of the answers given. When interviews are long, it can be difficult afterwards to recall all information shared. Taking notes of the interview reduced the risk of facing that potential problem.

3.3 Mapping Investments

When information about the investments had been collected from the interview, they were mapped over the years they were performed. The reason for mapping investments was to create an overview of what had been made. In addition to the interview, official sustainability reports from the company were used in the process of mapping investments. The reports included different aspects of the environmental perspective of the firm, such as total capital expenditures towards environmentally sustainable investments and total emissions.

All data was condensed and later used when comparing environmental impact and financial profitability. Without the mapping, it would have been difficult to understand what kind of investments that had been made and their potential impact.

3.4 Calculating Financial Profitability

To provide an answer for one part of the research questions the financial profitability was analyzed. It was analyzed for the same time as for the mapped investments. Different financial measurements were used to create insights from contrasting areas. The focus of the work was not to make an advanced financial analysis, but rather utilizing basic measurements and comparing it with environmental factors.

Data for the financial profitability was taken from the annual reports for the examined years. That data was considered trustworthy, since the reports must comply to laws within accounting.

The time frame for the financial profitability was the same as for the mapped investments.

3.5 Assessing Environmental Impact

To assess the environmental impact, sustainability reports from Preem were used as data sources. They are official data from the firm and is presented besides their annual report. The focus of the impact assessment was CO_2 emissions. These emissions were decided upon since they are a large contributor to the greenhouse effect.

When assessing the environmental impact, the time frame was equivalent to the scope of the investments mapped previously.

The second part of the environmental impact assessment was a translation of the data to units more easily understandable. By making it easier to understand what the effects of the potential savings are, it can be used as a tool to evaluate future decisions within the area. In addition, it will be easier for someone who is not knowledgeable to get an understanding of the size of the emissions reduced.

3.6 Comparison Between Environmental- and Financial Performance

The final step in the methodology used was a comparison between the environmental performance and financial performance. This was done to see if any trends could be seen when the company invested in sustainable solutions and the corresponding financial performance and the environmental impact.

Due to a relatively small data sample, it was not possible to present a statistically significant result, but rather a conclusion with respect to given data set.

3.7 Validity and Reliability

Validity and reliability had to be considered during the entire work. Within the subject of validity the goal is to make sure that the researcher knows what he or she is supposed to investigate[54], without this knowledge it is not possible to create answers to the research questions. To have a high level of validity, the research questions were decided upon early in the process in order to know in what direction the work was aimed at.

Reliability is on the other hand connected to the ability of measuring and collecting information in a way that is optimal to get results that are reflecting the reality. By

interviewing a person who is well versed within the case firm and the research topic the reliability was deemed high.

4 Results

The structuring of the results are divided into four areas, namely *environmental investments*, *financial profitability*, *environmental impact*, and *emission rights* which all are used to provide answers to the research questions.

The environmental investments have been focused on increasing the volume of renewable production, rather than decreasing the CO_2 emissions during production. It can also be seen that share of capital expenditures (CapEx) towards sustainable solutions have become a larger part of the total CapEx during 2020 and 2021.

When looking into the profitability of Preem between 2017 and 2021 it can be seen that the *operating cash flow margin* have been stable during the period, but other measurements have been fluctuating, such as ROE.

Due to the investments made in projects providing more renewable fuels to be produced the share of renewable fuels produced have more than doubled during the examined period. Another environmental measurement that has been improved is the total CO_2 emissions per produced product, which have been reduced in 2020 and 2021 when compared to 2017.

Income and costs related to emission rights have varied during the period. Preem has received income from selling superfluous rights and also have had costs from the need of buying more emission rights in different years.

4.1 Environmental Investments

To understand the sums of money spent at investments in the period between 2017 and 2021 the CapEx was extracted from the sustainability report for 2021[55] (see table 1). Table 1 shows ”green” and total CapEx, where ”green” CapEx are the funds spent at investments towards increased renewable production or other solutions for reduced environmental impact[55]. From the table it can be seen that the levels of CapEx, both ”green” and total, were at the same levels between 2017 and 2019. In 2020 and 2021 on the other hand, there were greater fluctuations. During 2020 the total CapEx was less than half compared to 2019 due to the COVID-pandemic[56], but the ”green” CapEx increased compared to all previous years in the period. A reduction in both total and ”green” CapEx was seen in 2021, but the ”green” part was still at

almost four times the share compared to the period between 2017 and 2019.

Table 1: Capital expenditures aimed at reducing CO_2 emissions and increasing renewable production between 2017 and 2021[55].

	2017	**2018**	**2019**	**2020**	**2021**
”Green” CapEx [mSEK]	306	336	350	477	281
Total CapEx [mSEK]	2,328	2,420	2,700	996	661
”Green” share of total CapEx	13.14%	13.88%	12.96%	47.89%	42.51%
Yearly change of ”green” CapEx		+9.8%	+4.2%	+36.3%	-41.1%

The reduced CapEx in 2020 and 2021 are caused by the COVID-pandemic[56] but if the focus instead is shifted to 2022 the share of ”green” CapEx is expected to be at over 70% on a total CapEx of SEK 2.2 billion[55], whether or not this will happen is not known at the time of data capture.

Due to company secrecy the actual CapEx on each project was not provided in the interview, but the presented projects are the ones which account for a majority of the CapEx[56]. During the examined five-year period seven projects were started and six of them were also finished (see table 2). All projects, except *Pyrocell*, were aimed at the refineries to increase the capacity of renewable fuel production.

Table 2: Overview of the investments made towards the sustainability transformation between 2017 and 2021[56].

	2017	**2018**	**2019**	**2020**	**2021**
HPU	Building	Building	Operational		
GHT Revamp 1		Building	Operational		
Pyrocell			Building	Building	Operational
FCC			Building	Building	Operational
GHT Revamp 2				Operational	
Synsat Revamp 1				Operational	
Synsat Revamp 2					Building

4.1.1 Investments During 2017

During 2017, Preem invested in a hydrogen production unit at their refinery in Gothenburg. The cost of this project was predicted to be SEK 635 million, based on the 2017 sustainability report, and the plant was slated to begin operation in 2019[57]. The investment was made to meet the requirements for hydrogen when implementing an increased use of renewable feedstock, which are necessary for the production of larger-scale renewable fuel production.

Table 3: Description of sustainability investments made during 2017[56].

Project	**Hydrogen Production Unit (HPU)**
Investment description	Hydrogen production for enabling larger scale renewable production
Goals with investment	Increasing renewable production
Outcome of investment	Start of building the production unit

4.1.2 Investments During 2018

The construction of the HPU and revamp of the GHT continued during the year with more investments needed. In parallel, Preem made a number of investments to secure a renewable feedstock, these investments were not mentioned in the interview and do not affect the CapEx because they were made in external parties and not equipment. Preem invested SEK 250 million in increased production of refined pine diesel in collaboration with SunPine. Preem also began working with Setra, RenFuel, and Rottneros to secure the supply of more feed stock from the forestry industry. In addition, they invested SEK 267 million in the Norwegian company Biozin AS to build a new production plant for a renewable feedstock in Norway[58].

Table 4: Description of sustainability investments made during 2018[56].

Project	**Hydrogen Production Unit (HPU)**	**Green Hydro Treater (GHT) Revamp 1**
Investment description	Hydrogen production for enabling larger scale renewable production	Production equipment that enables renewable product to be used in cold climate
Goals with investment	Increasing renewable production	Increasing renewable production
Outcome of investment	Building of production unit	Building of production equipment

4.1.3 Investments During 2019

During the year of 2019 Preem invested SEK 269 million in projects to increase renewable production and/or reduce climate impact. These investments included the continued revamp of the Green Hydro Treater planned of operation in 2020 and end of construction of the Hydrogen Production Unit in Gothenburg. At the start of the year the Hydrogen Production Unit was taken into operation allowing for an additional 60,000 m^3 (or 20% increase) of production capacity of renewable fuels. The revamp of the Green Hydro Treater includes increase in throughput which aims to expand the current production capacity of renewable fuels from 220,000 m^3 to 320,000 m^3[59].

Table 5: Description of sustainability investments made during 2019[56].

Project	**Hydrogen Production Unit (HPU)**	**Green Hydro Treater (GHT) Revamp 1**	**Pyrocell**	**Fluid Catalytic Cracker (FCC)**
Investment description	Hydrogen production for enabling larger scale renewable production	Production equipment that enables renewable product to be used in cold climate	Investment in pine oil factory and logistics	Transforming fossil production equipment to use partly renewable feed stock
Goals with investment	Increasing renewable production	Increasing renewable production	Securing renewable feed stock and logistics for it	Usage of pine oil
Outcome of investment	Unit taken into operation	Equipment taken into operation	Starting to build Pyrocell factory	Starting to build FCC

4.1.4 Investments During 2020

At the start of the year the refinery in Lysekil underwent a maintenance shutdown which in conjunction with mandatory inspections allowed for the start of renewable fuel production. By applying for a new environmental permit for refinery Preem could begin the revamp of their already existing Synsat plant. The revamp allows for production of renewable fuels using the class 1 diesel production equipment. This was predicted to allow for 650,000 - 950,000 m^3 of renewable fuel production per year which estimates to a reduction of 1.7 million tonnes CO_2 annually[60][61]. During the end of the year a small scale test of this was done giving the first production of renewable fuels at the Lysekil refinery. The Green Hydro Treater was also taken into operation at the refinery in Gothenburg, this increased capacity by 40 %, from 230,000 m^3 to 320,000 m^3 of renewable diesel per year[60].

Table 6: Description of sustainability investments made during 2020[56].

Project	**Green Hydro Treater (GHT) Revamp 2**	**Synsat Revamp 1**	**Pyrocell**	**Fluid Catalytic Cracker (FCC)**
Investment description	Production equipment that enables renewable product to be used in cold climate	Production equipment that enables renewable feed stock to be mixed with fossil feed stock in diesel production	Investment in pine oil factory and logistics	Transforming fossil production equipment to use partly pine oil
Goals with investment	Increasing renewable production	Increasing renewable production	Securing renewable feed stock and logistics for it	Usage of renewable feed stock
Outcome of investment	Equipment built and taken into operation	Equipment built and taken into operation	Continuing to build Pyrocell factory	Continuing to build FCC

4.1.5 Investments During 2021

In 2021 Pyrocell, owned jointly by Setra and Preem, began their production of bio oil refined from sawdust at the new pyrolysis plant. Using saw dust from Setra's current production, the plant will refine the dust into bio-oil using the pyrolysis oil plant which then will be further refined at the refinery in Lysekil. The refinery in Lysekil will annually receive 25,000 m^3 of pyrolysis oil which toghether with the current revamp of Preems Synsat-plant planned to be taken into operation in 2024, are estimated to be able to produce around 650,000 - 950,000 m^3 of renewable fuel[61][55]. At the refinery in Gothenburg, the Green Hydro Treater that went into operation in 2020 was gradually switched from fossil fuel production to 100 % renewable fuel[55].

Table 7: Description of sustainability investments made during 2021[56].

Project	**Pyrocell**	**Fluid Catalytic Cracker (FCC)**	**Synsat Revamp 2**
Investment description	Investment in pine oil factory and logistics	Transforming fossil production equipment to use partly pine oil	Further increasing the level of capacity for renewable feed stock
Goals with investment	Securing renewable feed stock and logistics for it	Usage of pine oil	Increasing renewable production
Outcome of investment	Factory taken into operation	FCC taken into operation	Starting to build and test equipment

4.2 Financial Profitability

The results in the area of financial profitability are presented by the measurements described in the theory of the report. During the examined period some measurements have been fluctuating while others have been stable, the reasons for it could be connected to the investments made in sustainable projects, but also due to fluctuations in the oil-and fuel market. The results for financial profitability are divided into three parts, *operating profitability*, *return on equity and assets*, and *cash flow measurements*.

Measurements of the financial profitability are presented in plots so that changes between years are visually presented. All data used can be seen in appendix B, the formulas used are also presented in the appendix.

4.2.1 Operating Profitability

The gross margin is being presented since it gives an insight to the efficiency of the business and operations. From the data (see figure 3) it can be seen that the gross margin has been declining between 2017 and 2020, but went back up to the levels of 2017 in 2021. One thing to keep in mind is that the changes in value of the inventories fluctuate due to fluctuating oil prices and therefore impacts the value of all oil that is being owned by Preem. When oil prices rise, the value of oil inventory rises as well, and vice versa, in turn both scenarios are impacting the profits of the firm.

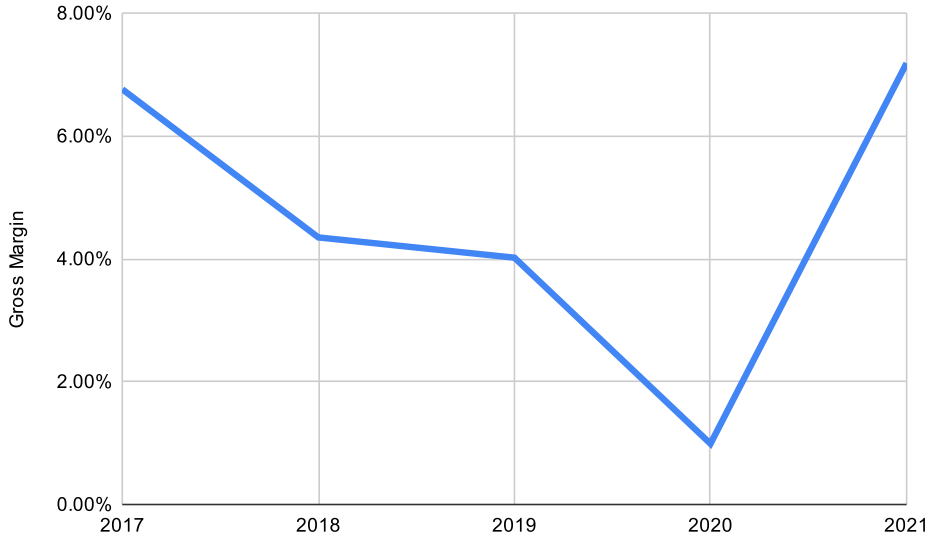

Figure 3: Gross margin for Preem AB between 2017 and 2021[62][63][64][65][28].

During 2020 there was a decline in the gross margin which was mainly due to the COVID-pandemic[56]. The pandemic resulted in volatile oil prices and CAPEX was reduced (see table 1).

If considering the relative changes in gross margin the highest value (7.18% in 2021) is over 700% higher than the lowest value (0.99% in 2020). When 2020 is excluded from the comparison the difference is instead slightly below 180% (between 2019 and 2021).

4.2.2 Return on Equity and Assets

Another measurement of profitability is the return on the capital used in the business. In this case the return on equity and return on assets are considered. Since these two measurements are using net income as a component they have the potential of having similar shapes to the gross margin, which is true in this case. In 2020 both ROE and ROA are the lowest in the examined period (see figure 4).

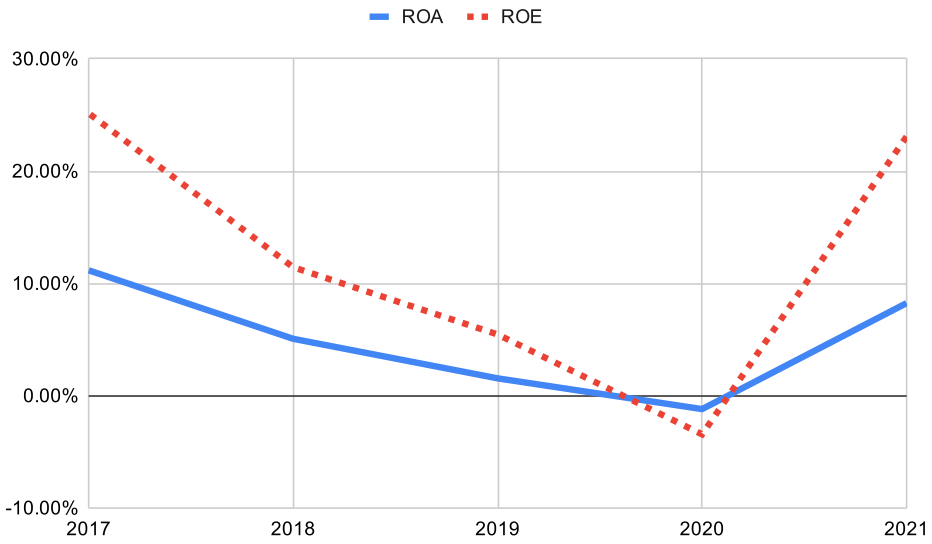

Figure 4: ROA and the ROE for Preem AB between 2017 and 2021[62][63][64][65][28].

Relative changes are even greater for these two measurements compared to the gross margin. During 2020, ROA and ROE were both negative since the net income was negative (see table 11, appendix B). Another observation is that when gross margin increases the difference between ROA and ROE tend to increase, where ROE tend to increase more than the ROA in times of higher gross margin. The firm had a debt-to-equity ratio varying between 125.23% (2017) and 252.58% (2019) during the examined period (see table 11, appendix B). When gross margin increase the cash flow to equity holders will increase if all other expenses are kept at constant levels while the revenues increase.

4.2.3 Cash Flow Measurements

The last subarea within financial profitability are measurements of the cash flow. As described in the theory, these measurements can be used for a more accurate measurement on the firm with respect to the operational performance.

Firstly, the operating cash flow (see figure 5) was determined (see table 11, appendix B). As the plot shows, the relative difference between the highest and lowest value (2020 and 2021) is around 280%, which is less than half of what the gross margin differed in the same period. If 2020 is excluded the difference between lowest and highest value is instead just above 180% (between 2018 and 2021), that is on the other hand slightly more than for the gross margin.

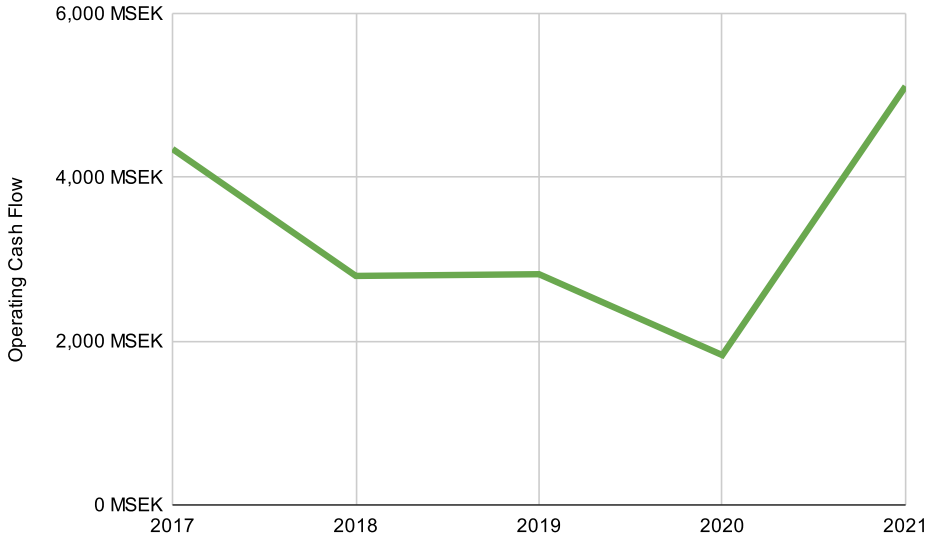

Figure 5: Operating cash flow for Preem AB between 2017 and 2021[62][63][64][65][28].

The second cash flow measurement is the operating cash flow margin (see figure 6). The shape of the graph differ from the other's presented, mainly due to no larger decline in 2020. For this measurement the lowest value is found in 2018, not in 2020. This means that the operating cash flow was not as largely impacted as the gross profit during 2020.

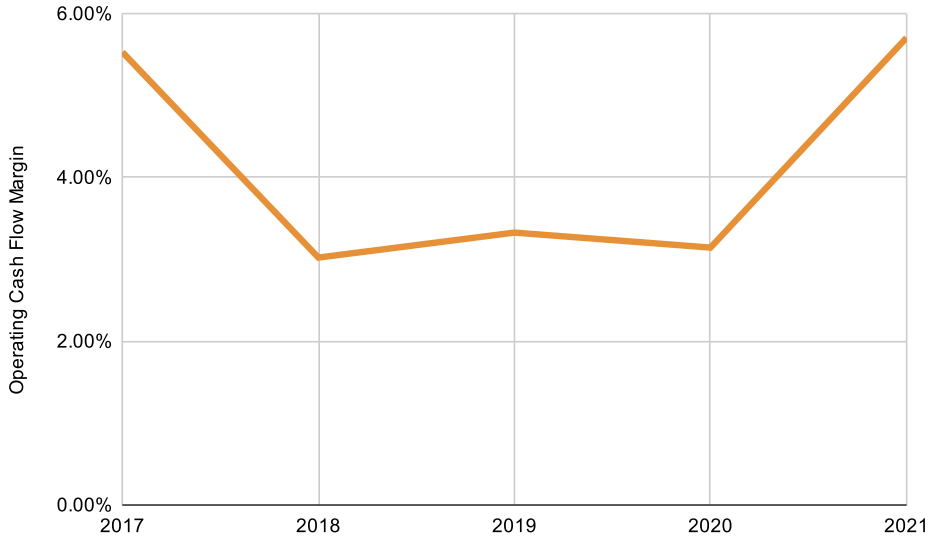

Figure 6: Operating cash flow margin for Preem AB between 2017 and 2021[62][63][64][65][28].

As a comparison the gross margin and operating cash flow margin are presented (see figure 7). From the plot it can be seen that the operating cash flow margin tends to fluctuate less compared to gross margin. During all years in the period examined, only during 2020 the operating cash flow margin was higher than the gross margin.

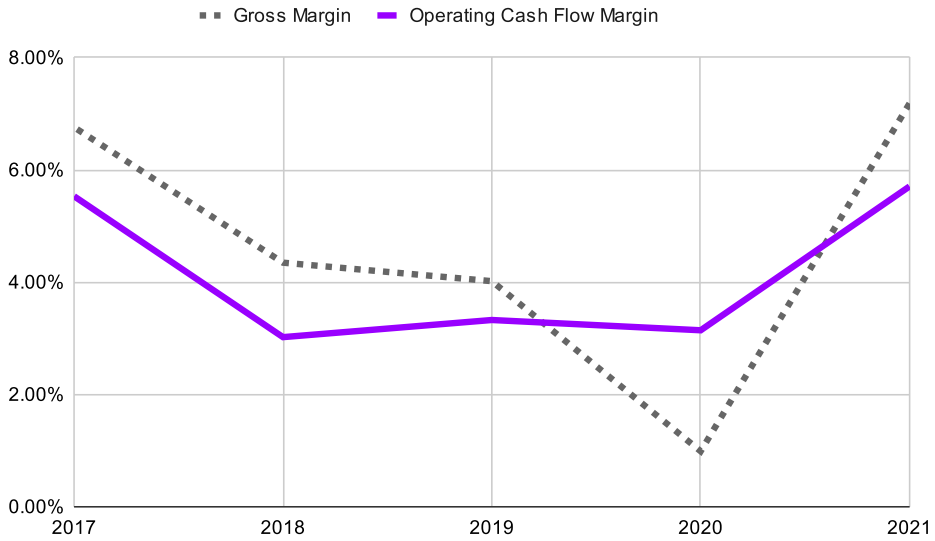

Figure 7: Operating cash flow margin and gross margin for Preem AB between 2017 and 2021[62][63][64][65][28].

4.3 Environmental Impact

The third area to be presented is the environmental impact. To read the full data set, see appendix C. The emissions of CO_2 were divided into the scopes described in the theory of this report. Emissions from refining (scope 1 & 2) were during the examined period always significantly lower compared to the total life cycle emissions (scope 3). The first way to present the emissions is by a plot of the total emissions for each year split by the the scopes (see figure 8).

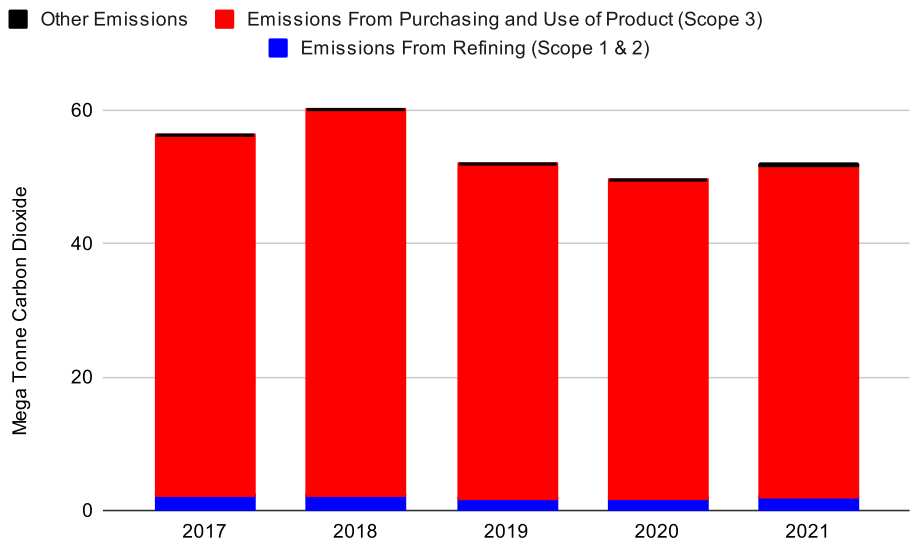

Figure 8: The total CO_2 emissions by Preem AB between 2017 and 2021[57][58][66][60][55].

Figure 8 shows that the emissions have not been drastically reduced, but they have declined from the levels of 2017 and 2018 in each of the succeeding years. But, this measurement does not provide the total picture since it does not take the amount of products produced into consideration. Since the production volumes can vary between years it is needed to consider it when presenting the results for environmental impact. Emissions per produced to product in all scopes can be made while still having the same total emissions since the total production might increase and creating greater total emissions.

The first measurement that takes produced volume into consideration is the emissions from refining per produced product (see figure 9). It shows that the emissions from scope 1 & 2 have been reduced between 2017 and 2020. It was an increase in 2021 from the levels in 2020, but it was not higher than the levels of 2017. The increase in emissions from the lowest (2021) to the highest (2017) value is around 27%.

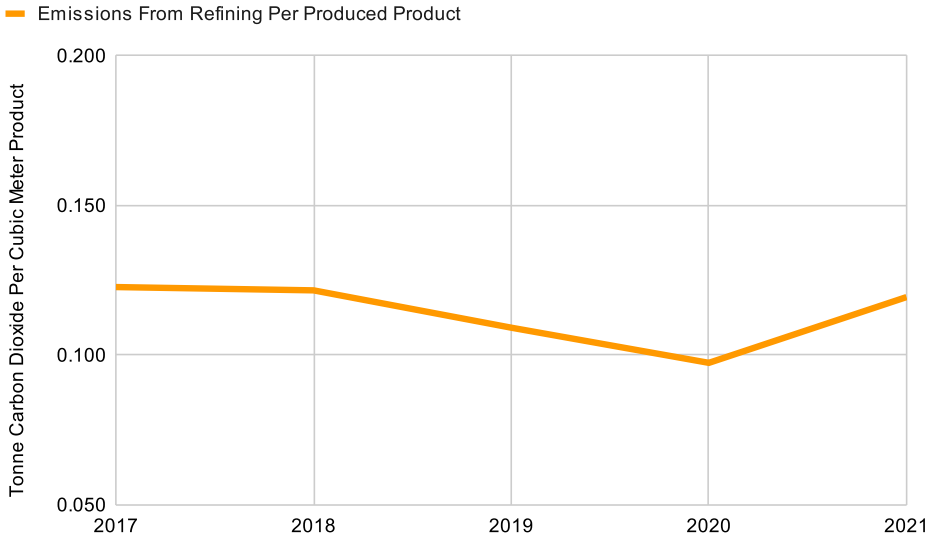

Figure 9: Emissions from refining (scope 1 & 2) per produced product between 2017 and 2021[57][58][66][60][55].

The two other measurements that are being compared with the amount of produced product are the total emissions and emissions from scope 3 since they are greater than the emissions from scope 1 & 2 (see figure 10). These two measurements have been changing more compared to the emissions from production. The greatest decline in the period was between 2019 and 2020 where a decrease of approximately 10% was made in total emissions per produced volume. For these measurements the increase between the lowest (2020) and highest (2018) values is around 12% for the total emissions.

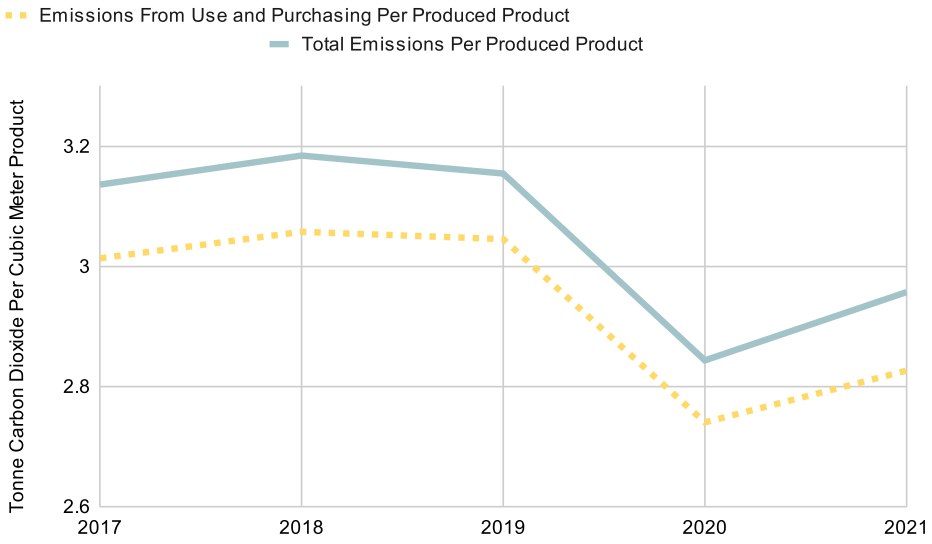

Figure 10: Emissions from scope 3 and total emissions per produced product between 2017 and 2021[57][58][66][60][55].

To understand what kind of products that was produced during the period the split between fossil and renewable products produced were plotted (see figure 11). This plot does also show the share of renewable product produced by Preem. In relative terms the renewable production has increased by over 100% in the last five years.

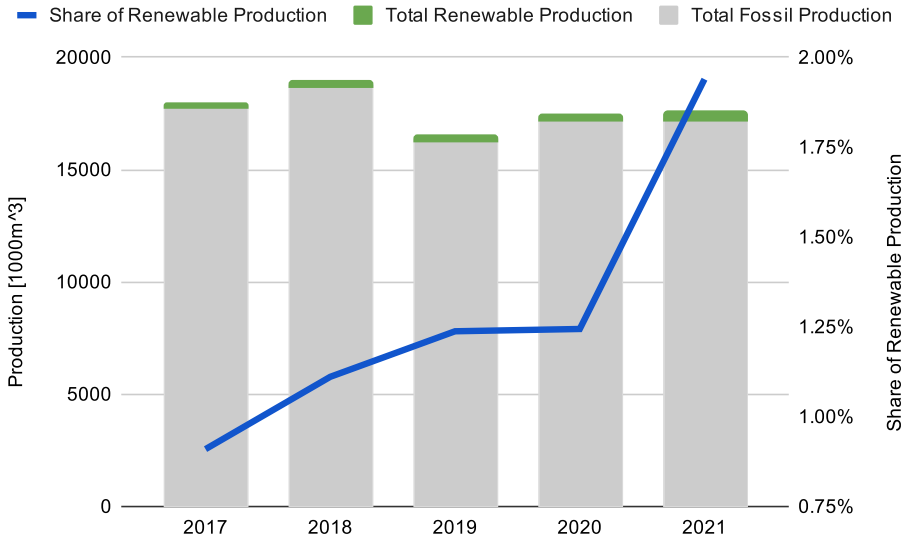

Figure 11: Production of fossil and renewable products between 2017 and 2021[57][58][66][60][55].

As a final note to the results from investigating the environmental sustainability is to provide the relative changes in total CO_2 per produced product in the examined time frame (see table 8).

Table 8: Relative changes in total CO_2 emissions per produced product between 2017 and 2021[57][58][66][60][55].

	2017	**2018**	**2019**	**2020**	**2021**
Yearly change in total emissions (scope 3) per produced product		+1.58%	+0.59%	-9.34%	-5.71%

4.4 Emission Rights

To see how Preem performed within the ETS, the net number of emission rights were collected (see tabel 9). It shows that the net total have changed over the years.

Table 9: Number of excess or deficit of emission rights for Preem AB between 2017 and 2021[13].

	2017	**2018**	**2019**	**2020**	**2021**
Emission rights excess(+) & deficit(-)	-101 241	-260 168	+177 255	+276 390	-378 714

5 Analysis

The analysis aims to provide an interpretation of the information given in the results. By analysing the data between 2017 and 2021 to identify potential trends, patterns, and relationships, insights will be made into the financial and environmental performances during the period. These conclusions will provide valuable insights to the performance of the investments made and will inform future investment decisions. Additionally, by reflecting over the results, especially the translation of environmental, the impact of the investments are evaluated. This analysis will provide a comprehensive view of the performance and provide insights to future investment decisions and strategies.

To understand how Preem have performed during the examined period multiple factors should be considered. In this analysis the focus will be on the financial- and environmental areas as well as the translation of environmental impact. Both financial- and environmental performances are represented in the 3BL[30].

5.1 Financial Profitability

The first financial measurement to be analyzed is the operating cash flow margin which have been less fluctuating compared to the gross margin. One reason for this could be the increase in depreciation of capital, which increased by around 50% between 2018 and 2019, and stayed at those levels during 2020 and 2021 (see table 11 in appendix B). Due to the increased capital expenditures for sustainable investments, mainly in production equipment, the depreciation will increase. If an increase in CapEx continues in the future the difference between gross margin and operating cash flow margin will most likely sustain. This is due to the fact that depreciation reduce the gross profit of a firm, which in turn will reduce the taxes paid on the gross profits. If Preem wants to keep taxes as low as possible, one way is to continue investing in green projects and depreciate them as fast as possible. When taxes are decreased, the firm will be more profitable since one expenditure is reduced. At the same time the cash flow from the business will be kept at high levels.

One area that has been negatively impacted by the increased investments is the ROA, which have been decreasing (see figure 4). This is due to an increase in company assets, which have had a total increase of approximately 34% in the time period examined. The investments are not written off instantly, the balance sheet increase in

value when the sustainable investments are being made. If the investments continues to be made at a high pace, Preem can face the risk of having a continued reduction in ROA caused by an expanding balance sheet. This highlights one drawback with investments that does not increase the profits by a large degree. If the green investments are not made, Preem face the risk of not being able to conduct any business in the future, which could put the firm in future financial distress. One way to look at the problem of decreasing ROA is that it is necessary to keep the firm financially sustainable in the long run, which is needed accordingly to the 3BL[30].

The level of equity in the company has remained relatively consistent over the years in absolute terms. This indicates that the leverage of the company has increased, which means that the company is taking on more debt and exposing itself to greater financial risk when financing new investments. If interest rates where to rise or if the company were to experience financial difficulties, the increased leverage could have negative consequences on the company's financial risk. Since debt holders get prioritized when a firm default, the risk increases for the equity holder when D/E-ratio increases, which should be compensated by a higher ROE. Between 2017 and 2020 the ROE decreased, but increased drastically in 2021. If the D/E-ratio increases even further in the future, Preem should expect the equity to increase in cost, which in turn will lower the profitability of the firm, based on Modligiani & Miller´s second propostion[50].

Gross margins tended to stay constant during the time frame, independent of what type of feed stock used in production. This could be due to the low relative levels of renewable production in comparison to fossil feed stock. It makes it hard to draw any conclusions about the profits that the renewable fuels account for from the given data. The share of renewable products sold is only 6% at the highest levels, which is not a significant amount. If the share had increased more during the examined period, other conclusion could possibly have been drawn about the profitability of the renewable fuels.

For the financial profitability, the conclusion from the collected data is that the capital used in operations have increased and thus, giving a lower return on the total assets. Since the increase in assets is mostly financed with debt, a higher financial risk for Preem occurs due to the investments made. The increase in financial risk does lower

the theoretical profitability since the cost of equity increases with higher leverage according to the MM2[50]. This could imply that in the future, the ROA is expected to rise from the view of the equity holder which could result in renewable investments being more costly from a financing point-of-view.

5.2 Translation of CO_2 Emissions

One way to understand the change in CO_2 emissions is to compare it to other metrics that are relevant to the topic. For example, if the data relates to the emissions from transportation, it may be helpful to compare it to the number of kilometers driven by cars or the number of flights taken by airplanes. This can help provide context and make the data more understandable.

In addition to comparing the data to other metrics, it can also be useful to visualize the data over time using graphs (see figure 8, 9 & 10). The plots show that the total emissions from Preem have decreased during the period, where the biggest improve lies within scope 3. But, since the given unit is CO_2 it can be difficult to interpret which is why it is being translated in two ways below.

5.2.1 Comparison to Car Transport

Comparing CO_2 emissions to that of a car it can be seen that for example a Volkswagen Golf with a consumption of 100 grams of CO_2 per kilometer can drive 10,000 kilometers before having generated a tonne of CO_2[45]. This can then be related to the decrease in emissions per produced product and total emissions for Preem, which are all compiled in table 10. Relating the total emission reduction to that of a car, it can be translated into the yearly use of around 1.7 million Volkswagen Golfs driving approximately 25,000 kilometers per year.

5.2.2 Comparison to Flight Trip

The aviation industry is another, more tangible way to create an understanding of the emissions and can be used as another reference for comparing CO_2 emissions. For example, the same amount of CO_2 emissions as mentioned above (one tonne) is produced by a single passenger taking a round trip between Boston and London[44]. This provides a useful point of reference for understanding the impact of the emissions on

the environment. Comparing number of trips to the reduction in emissions per produced product it can be related as seen in table 10.

Table 10: Reduction in CO_2 emissions between 2017 and 2021 translated to other units.

	CO_2 **reduction**	**Distance driven (VW Golf)**	**Passenger trips by air (Boston-London)**
Total emissions	4.2 Mega tonne	42 Billion kilometers	4.2 Million Trips
Emissions per produced product	0.179 Tonne/m^3	1 790 kilometers/m^3	0.179 Trips/m^3

The conclusion is that the total amount of reduced CO_2 between 2017 and 2021 are equal to that of 4.2 million people travelling by airplane to- and from London and Boston or the annual emissions of 1.7 million cars.

5.3 Environmental Impact and Financial Impact

To provide an insight to the connection between environmental performance and the financial performance three views will be taken.

The first view is between the operating cash flow and the share of renewable production (see figure 12). It shows that the renewable production does not seem to be correlated with the operating cash flow. If only the years between 2017 and 2020 had been examined, the operating cash flow decreased while the renewable production increases. The increase in both areas during 2021 make it hard to draw any conclusions.

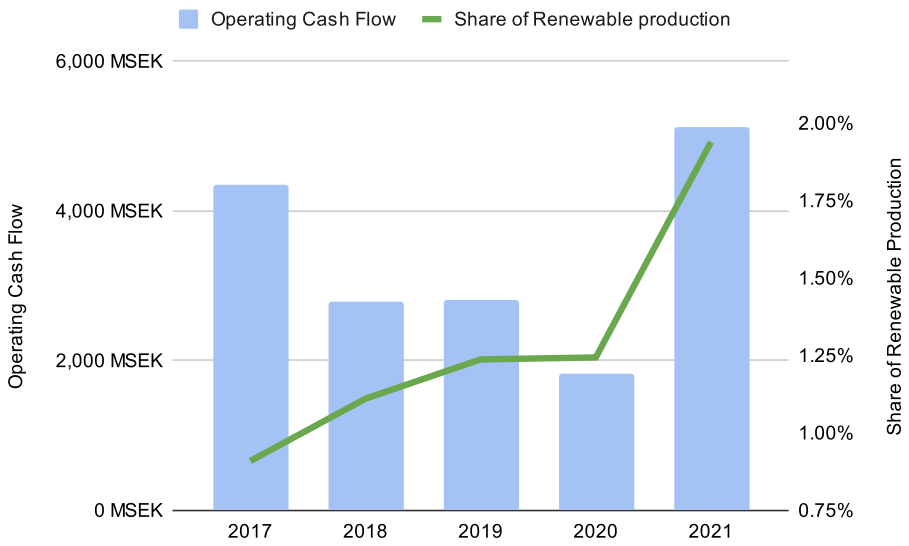

Figure 12: Comparison between operating cash flow and share of renewable production.

The second view is at the leverage of Preem and its renewable production. From looking at the plot (see figure 13) it is possible to spot a trend of an increasing D/E-ratio when renewable production is increased. This is due to the increased investments and non-growing levels of equity. The firm can stay profitable even though the leverage is increasing, which should be a sign that the increased leverage costs about the same as the gains from the investments. This is not beneficial for Preem since the investments are not generating any extra net profit. The potential could be in the future, since the latest green investments have been running for around 3-4 years at the longest (see table 2). One must keep in mind that costs might also occur in the increased corporate risk since the leverage increases with renewable production in the case of Preem, since the investments are connected with increased debt.

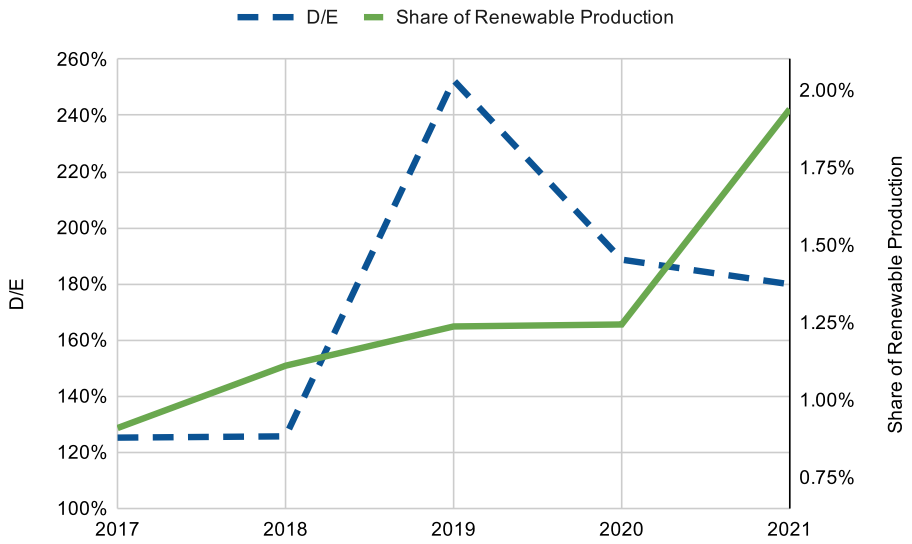

Figure 13: Comparison between D/E-ratio and share of renewable production.

The third view is of emission rights and sustainable investments. Since emission rights trade for money, it should be of interest for a firm included in the ETS to take the net number of emission rights into consideration. During the examined period, the net number of emission rights fluctuated, from positive to negative (see table 9). This can be interpreted as a motivation for improved environmental performance due to the economic nature of the system. Depending on the price of an emission right, the impact will differ, but in general, the net amount should be positive, since that generates a positive income to the firm. The continued transition towards lower emissions is also important due to the allowed quota getting smaller each year. There was a deficit number of rights in 2021, which also was a year with high level of sustainable investments. This could imply that the connection between sustainable investments and gains/losses from emission rights are not related for Preem. The reason could be that the emission rights system only takes scope 1 & 2 into consideration, while scope 3 is the largest emission scope for Preem, and where the results of green investments are seen.

6 Conclusions

In conclusion, the analysis of Preem's financial profitability shows that the leverage has increased when doing the sustainability transformation. However, it is difficult to make conclusions about the effects of this transformation on profitability due to the low production volumes of renewable fuels in comparison to their total production. The ROE should increase further according to theory at the cost of higher financial risk. One other conclusion that can be made is that ROA has been decreasing due to the increase in assets, this may pose a financial risk for the company. It is important to note that, while the transformation may have negative short-term effects on profitability, it is necessary for the long-term sustainability of the company.

To understand the improvements made in reducing CO_2 emissions, they were translated to car transportation and air travel. The numbers can be used to get a more tangible understanding than just the CO_2-equivalents. Between 2017 and 2021 the total sum in reduction of emissions from Preem (scope 3) were the same as the annual emissions of 1.7 million cars or that of 4.2 million passengers flying from Boston to London and back with airplane.

Comparing the increasing renewable production with the operating cash flow, no particular trends can be seen during the time period. Although, when comparing renewable production to the D/E-level a trend can be seen, which is that when renewable production increases the D/E-level increase.

It can be argued that Preem does not benefit from being part of the ETS if their green investments continue to focus on increasing renewable production since it will not change their emissions in scope 1 & 2. For Preem to comply more to ETS, the focus should be to reduce local emissions to lower the use of emission rights.

6.1 Further Research

Further research should be to do a similar study in a couple of years, when Preem have reached further in their sustainability transformation. This is to get a larger data set to make it possible to do statistically significant conclusions. Another area of further research is to focus on ETS and the benefits and drawbacks for Preem to be included in it from the view of green investments. A third area of further research is to evaluate the social aspects with the sustainability transformation, in relation to the 3BL.

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Appendix

A Interview Questions

- Which investments have you made towards environmental sustainability since 2017?
- For each investment, what is it?
- What was the goal of each investment?

B Data of Financial Profitability

Table 11: Financial performance for Preem AB between 2017 and 2021[62][63][64][65][28].

	2017	**2018**	**2019**	**2020**	**2021**
Revenue [mSEK]	78 581	92 553	84 694	58 190	89 592
Gross profit [mSEK]	5 312	4 024	3 403	575	6 437
Gross margin	6.76%	4.35%	4.02%	0.99%	7.18%
Net income [mSEK]	3 081	1 475	582	-364	3 047
Interest expense [mSEK]	265	284	715	574	447
Depreciation [mSEK]	1 000	1 037	1 520	1 619	1 618
Taxes [mSEK]	890	271	340	-97	792
EBIT [mSEK] (See equation 7)	4 236	2 030	1 637	113	4 286
Operating cash flow [mSEK] (See equation 2)	4 346	2 796	2 817	1 829	5 112
Operating cash flow margin (See equation 5)	5.53%	3.02%	3.33%	3.14%	5.71%
Total assets [mSEK]	27 591	29 092	37 617	30 559	36 950
ROA (See equation 3)	11.17%	5.07%	1.55%	-1.19%	8.25%
Total equity [mSEK]	12 250	12 890	10 669	10 587	13 202
ROE (See equation 4)	25.15%	11.44%	5.46%	-3.44%	23.08%
D/E (See equation 6)	125.23%	125.69%	252.58%	188.65%	179.88%

B.1 Additional Calculation Used for Financial Measurements

$$\textit{Earnings Before Interest \& Tax (EBIT)} = \textit{Net income} + \textit{Interest expense} + \textit{Taxes} \quad (7)$$

C Data of Environmental Performance

Table 12: CO_2 emissions during the years 2017-2021, divided by the scopes in the GHG-protocol[57][66][55].

	2017	**2018**	**2019**	**2020**	**2021**
CO_2 emissions from refining (scope 1 & 2) [mega tonne]	2.2*	2.3	1.8	1.7	2.1
CO_2 emissions from purchasing and use of product (scope 3) [mega tonne]	54.0	57.8	50.2	47.8	49.7
Other CO_2 emissions [mega tonne]	0.0**	0.1	0.0	0.1	0.2
Total CO_2 emissions [mega tonne]	**56.2***	**60.2**	**52**	**49.6**	**52**
Total fossil production [000m^3]	17 756	18 693	16 279	17 226	17 243
Total renewable production [000m^3]	163	210	204	217	341
Total production [000m^3]	**17 919**	**18 903**	**16 483**	**17 443**	**17 584**
Total share of renewable products of products sold	3%	3%	4%	6%	6%
Share of renewable production	**0.91%**	**1.11%**	**1.24%**	**1.24%**	**1.94%**
CO_2 emissions from refining per produced product [tonne/m^3]	0.123	0.122	0.109	0.097	0.119
CO_2 emissions from use and purchasing per produced product [tonne/m^3]	3.01	3.06	3.05	2.74	2.83
Total CO_2 emissions per produced product [tonne/m^3]	3.14	3.19	3.16	2.84	2.96
Change of CO_2 emissions per produced product (compared to 2017)		+1.54%	+0.59%	-9.34%	-5.71%

* Due to accounting error 135 kTonne CO_2 is added for the year 2017 in scope 1 & 2 according to the report from 2021[55].

** No other CO_2 emissions were reported in 2017[58] outside of the provided scopes.