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Drivers for Reducing GHG Emissions from Purchased Freight Transports

Exploring if and how Science-Based Targets influence companies to manage Scope 3 emissions from freight transports

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Abstract

Despite that freight transports account for a notable and increasing share of global greenhouse gas (GHG) emissions, previous studies have identified that buyers of freight transport services often do not engage sufficiently to reduce emissions from the freight transports they purchase. An aspect that has not been adequately investigated, however, is how transport purchasers are influenced by new potential drivers or facilitators, such as by adopting voluntary environmental agreements (VEA). In line with this are the overarching aims of the thesis to contribute to the understanding of how adopting such agreements can influence companies to manage emissions from purchased freight transports as well as how this is done. For this purpose, the thesis focuses specifically on Science-Based Targets, (SBT) which is an increasingly popular VEA for carbon reduction. Qualitative data collected through interviews with eight Swedish companies with SBTs are analyzed according to four research objectives, *background and intention to adopt SBTs*, *selection of Scope 3 categories*, *management of freight transports*, and i*mpact from SBTs*. The findings indicate that adopting SBTs can constitute a facilitator for stakeholder pressure to manage freight transport emissions, as companies often adopt SBTs as a tool for stakeholder management without facing explicit pressure to include specific Scope 3 categories. It further reveals that the impact from SBTs mainly concern overall governance, mainly driven by that target achievement seems often to be of high priority by top management. In general, the findings indicate that SBTs have a high potential to result in increased internal engagement for the commitment to reduce GHG emissions, but as the requirements for Scope 3, in difference to Scope 1 and 2, are not science-based, it is concluded that the full potential is not utilized.

Keywords: Freight transports, green logistics, Science-Based Targets, voluntary environmental agreements, corporate carbon strategies, carbon governance, Scope 3 emissions

Executive Summary

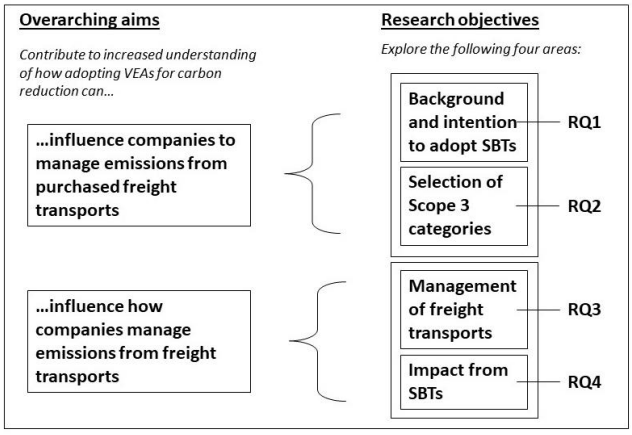
As a sector largely reliant on fossil fuels, the transport sector poses a major challenge for achieving the climate targets in the Paris Agreement. Although decarbonization for all types of transports is challenging, it has been found that decarbonization of freight transports, not least because of technical barriers, is surrounded by particularly large challenges. As such, with projections showing that global freight demand will triple between 2015 and 2050, its share of total transport emissions is expected to increase to 48% by 2050 (ITF, 2019).

What distinguishes the freight transport market from many other markets is that most of the performed transports are outsourced, which means that both the performer and purchasers of transport service fill an important role in reducing the emissions. Previous research, however, reveals that transport purchasers often engage insufficiently in the environmental impact from the transports they purchase, which, among others, have been attributed to a general lack of external pressure and drivers (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Jazairy & von Haartman, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010).

Concerning this, a **research gap** is identified as it seems clear that previous research has not adequately investigated factors that could possibly push companies to engage more in emission reductions from purchased freight transports, such as adopting voluntary environmental agreements (VEA). In line with this, the thesis will investigate VEAs as drivers or facilitators for transport purchasers to address and manage emissions from purchased freight transports. It will specifically look at Science-Based Targets (SBT), an increasingly popular VEA for setting carbon reduction targets that are supposed to be in line with the Paris Agreement.

The two **overarching aims** of the thesis are to contribute to the understanding of how adopting VEAs for carbon reduction can influence companies to manage emissions from purchased freight transports as well as how this is done. Further, with the focus on SBT specifically, the aim is also to gain a better understanding of how purchased freight transports are addressed in relation to other Scope 3 categories. To operationalize these aims, four **research objectives** are defined with the help of findings in the literature review, covering a broader scope of the strategy relating to SBTs than freight transports (see Figure A). This is built on an assumption that the strategy must be understood as a whole rather than only regarding the management of freight transports. In turn, the understanding of such a (broader) strategy is based on the *framework for integrated assessments of corporate carbon strategies*, as proposed by Damert et al (2017), which suggests that such a strategy consists of three different *strategic objectives* (or *components*): *carbon governance*, *carbon reduction*, and *carbon competitiveness*.

Figure A. Overview of overarching aims and research objectives.



For each research objective, one research question is formulated:

RQ 1	Why have the companies adopted SBTs?
RQ 2	Why have some companies adopted targets for purchased freight transports as a part of their SBTs while others have not?
RQ 3	In what ways do the companies plan to fulfill the SBTs for purchased freight transports?
RQ 4	(How) has SBT-related work influenced the way the companies manage GHG emissions in general and specifically concerning purchased freight transports?

The **research design** follows a case study approach in which eight Swedish companies with SBTs are used as cases. These companies represent different business sectors and segments and have further dealt with freight transports in two different ways as five of them have included it in its Scope 3 boundary (and as such set targets for it) while three have excluded it. For data collection, semi-structured interviews were conducted, mainly with sustainability managers. The interviews focused on the four research objectives, each corresponding to one research question. The data were subsequently analyzed using thematic analysis.

The **results** are structured according to the four research objectives:

For the **first research objective** (*background and intention to adopt SBTs*), the findings firstly indicate that most of the companies adopting SBTs have a history of working strategically with its climate impact including Scope 3, often based on life-cycle assessments (LCAs). For most companies, adopting SBTs has hence not meant any notable changes in which emission sources are addressed. Regarding reasons to adopt SBTs, the findings indicate that SBT is perceived to be effective to provide credibility both internally and externally that the climate strategies are based on substantive intentions, which makes it effective for both internal and external communication as well as a tool for stakeholder management.

For the **second research objective** (*selection of Scope 3 categories*), the findings indicate that Scope 3 categories mainly are decided on basis of the relative significance of emissions (e.g., the CO_2 emissions relative to other Scope 3 categories). The findings further indicate that the companies do not face stakeholder pressure regarding which Scope 3 categories to include in the Scope 3 boundary to any significant extent. Rather, it is illustrated that the external pressure the companies perceive is directed to the company's overall GHG emissions. This means that stakeholder pressure is not a factor influencing if freight transports are included or not, which to some extent presents a different view than the findings in the literature review. Further, the findings also indicate that companies that have a dominating share of their emissions within *use of sold products* tend to exclusively include this category in its Scope 3 boundary.

For the **third research objective**, (*management of freight transports*), the analysis is based on reference literature of *how* transport purchasers influence the environmental performance of the transports and *which* practices that are available for reducing GHG emissions (e.g., *supply chain structure changes*, *modal shift*, *transport optimization*, *energy efficiency measures*, and *change fuel type*, based on McKinnon (2016a)). The findings, firstly, indicate that most companies tend to focus the most effort on transport optimization and energy efficiency measures, while also paying attention (but to a lower extent) to the other carbon reduction practices. Secondly, the findings reveal that the companies have not made detailed plans of how to use the practices to fulfill the targets. Neither has the companies, in general, changed how they work with these practices as a response to the SBTs, rather have they continued to focus effort on a few practices they were prioritizing also before the SBTs. Further, it is found that some of the companies have rather implemented (or experienced) other, more structural

changes, as a measure to fulfill the SBTs. This includes new KPIs for CO_2 and acceptancy of higher costs, which the literature review point to is rare regarding transport purchasing.

Concerning the **fourth research objective** (*impact from SBTs*), the findings indicate that the main impacts from the SBTs (both regarding freight transports and overall carbon management) concern *carbon governance* rather than *carbon reduction* (according to the framework by Damert et al (2017)), meaning the overall governance rather than the more concrete management *practices*. This comes from the fact that the main impacts are described in terms such as that it has led to "focus" around the targets, to have challenged the "silos" on the management of the emission sources, and to have resulted in higher intensity of how they work with the management practices (even though the management practices are essentially the same). This finding is attributed to the *organizational involvement* of the targets, in which the findings indicate that top management in general are target owners and have (often) decided that target fulfillment is considered to be important.

It is concluded that SBTs could *possibly* serve as a driver (or facilitator) to address climate impact from purchased freight transports. Not least is this the case as it is described that the companies do not face stakeholder pressure regarding which Scope 3 emissions to include, which mean that SBTs can be a facilitator for stakeholder pressure to manage freight transports emissions if these account for a relatively significant share of total emissions. However, as it is also found that neither of the case companies has started to manage freight transports strategically while adopting SBTs (as they already had targets or strategic management for it), this finding is *theoretically traced* rather than *empirically*. Regarding this are also three factors identified that seems to hinder that SBTs pushes companies to manage freight transports when adopting SBTs: i) that freight transports in fact often is a relatively small emission source for individual companies even though it is globally large, ii) that many companies do not have a company-wide global strategy for freight transports, and iii) that some companies already have climate reduction targets for freight transports and chooses to not incorporate into the SBTs **This contributes** to the previous knowledge by identifying a possible stakeholder pressure to manage emissions from purchased freight transports, something that the previous literature illustrate are rare. Further, it points to the importance of the relative size of emissions as a base for managing emissions from purchased freight transports.

It is further concluded that the impact of SBTs on the management of purchased freight transports (as well as other included emission sources) seems to be that it reinforces internal engagement and that it has the ability to motivate cross-functional collaboration around the targets. As such, it concerns *carbon governance* rather than *carbon reduction* according to the framework by Damert et al (2017). **This contributes** to previous knowledge as it reveals that adopting VEAs for carbon reduction (at least SBTs) could result in higher effort for reducing emissions in general and from freight transports in particular. Further, it points to that the impact on governance could contribute to that companies accept higher costs for freight transports, implement KPIs for GHG emissions, and that GHG is considered as a more important aspect relative to cost and transport service quality in transport purchases.

With these results, **it is concluded** that even though it is difficult to identify the exact impact on the management of purchased freight transports (and other emission sources), the influence the SBTs are found to have on carbon governance is likely significantly positive for enabling a further engagement for actual emission reductions. However, with this conclusion in mind, the thesis discusses the fact that the requirements for Scope 3 emissions for setting SBTs are, in difference to Scope 1 and 2, not science-based. This, it is discussed, is both considered to enabling symbolic adoption of SBTs and to restrain its full potential to be utilized.

Based on the results and conclusions, **recommendations** to (especially) managers are providers which outline usable principles for formulating SBTs that can result in increased engagement for emission reductions. Further, **directions for future research** are outlined, which point to relevant research areas concerning both SBTs and freight transports.

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Abbreviations

EEA	European Environment Agency
GHG	Greenhouse Gas
IEA	International Energy Agency
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ITF	International Transport Forum
LCA	Life-Cycle Assessment
MSI	Multi-Stakeholder Initiative
SBT	Science-Based Targets
SBTi	Science-Based Targets Initiative
US EPA	United States Environmental Protection Agency
VEA	Voluntary Environmental Agreement
WRI	World Resource Institute
WTW	Well-to-Wheel
WWF	World Wildlife Fund

1 Introduction

As a sector largely reliant on fossil fuels, the transport sector poses a major challenge for achieving the climate targets in the Paris Agreement. Globally, it accounts for roughly 23% of energy-related greenhouse gas (GHG) emissions (IPCC, 2014). In the EU and US, it accounts for almost 30% of the total GHG emissions, and is in US also the single largest GHG-emitting sector (EEA, 2019; US EPA, 2020). Moreover, in difference to other large-emitting sectors are the transport sector still witnessing fast emission-growths. According to IPCC (2018), it was subject to annual growth of 2.5% between 2010 and 2015 and has during the last 50 years increased faster than any other sector. One explanation for this is increased transport volumes in developing countries, but in contrast to many other sectors are developed countries also experiencing high emission-growths from transports (Gross, 2020). In the EU, where a general emission reduction is witnessed for most sectors, the transport sector constitutes the main exception in which emissions are still increasing (EEA, 2020).

Projections of future emission growth do not offer any reassurance either. IPCC (2014, p. 603) stresses that without "aggressive and sustained mitigation policies being implemented, transport emissions could increase at a faster rate than emissions from the other energy end-use sectors and reach around 12 Gt CO2eq/yr by 2050". Such a scenario would according to McKinnon (2016a) mean that transports alone consume 60% of all emissions available in a scenario in which temperature increases are limited to 2°C. Projections in the EU show that even in optimistic scenarios is the transport sector unlikely to contribute to EU:s climate targets for 2030 nor to achieve climate neutrality by 2050 (EEA, 2020). The main reason for this pattern is the almost total dependency on oil. The transport sector is the least diversified sector among energy-end users: 92% of its energy-demand consists of oil, and it accounts for 43% of the global oil demand (IEA, 2019). As such, increases in transport volumes do still inevitably result in emission growths.

However, while low and zero-carbon techniques exist and likely will gain significant market shares for light-duty transports such as cars and vans, heavy duty vehicles and freight transports in general compose a particular challenge (ITF, 2019; McKinnon, 2016a). Today, it accounts for 36% of transport-related GHG emissions globally (ITF, 2019). Even though alternatives to oil products exist for trucks, it accounts for a small share of the transports, and factors such as limited battery capacity and limited supply of biofuels make the technological progress far more challenging than for light-duty transports (Gross, 2020; ITF, 2019). For ships, alone accounting for almost 3% of global emissions (IMO, 2020), this challenge is even greater. Hence, with projections showing that global freight demand will triple between 2015 and 2050, its share of total transport emissions are expected to increase to 48% by 2050, even with expected growths for the total transport sector (ITF, 2019). Trucks alone are projected to account for 40% of the global oil demand growth by 2050 and 15% of the global increase of GHG emissions (ITF, 2019). Evidently, this points to the unavoidable importance to address the freight transport sector if the GHG emissions are to be reduced in line with the Paris Agreement.

1.1 Problem Definition

Given the above-mentioned challenges facing freight transports and the important role it fills for society, there is a continuously ongoing political debate about both new and existing policy measures for reducing (or not reducing) its climate emissions. Even though it is clear that not enough is being done within policy-making, it is important to understand that policy-makers are not the only actor influencing the scale of climate impact. Freight transports are performed by private companies and – most often – purchased and paid for by other companies. The final decisions of how transports are performed are as such taken by private actors, and as long as

they are not coerced by regulation into a certain behavior, there will always be room for flexibility. Governments can invest in railways to promote train alternatives, incentivize low-carbon trucks, tax fossil fuels, and put charges on old trucks, but it is in the end up to companies to adapt to the policy instruments, which may very well collide with other business-related interests. This does not mean that the policy perspective is not important, but rather points to a position that the business perspective is also important. Not surprisingly, this issue is also surrounded by a discrepancy in that freight transport decisions by companies are often not aligning with intentions by policy-makers, which logically helps explain the insufficient emission reductions in the sector.

As such, although it can be said that governments are responsible for introducing policies that meet the demand set by the Paris Agreement, responsibility for emission reductions cannot fully be attributed to governments. It is often argued that the complexity of climate change means a polycentric governance approach is necessary (Ostrom, 2014; Walenta, 2020). This means that not only governance conducted by state actors is important, but by many actors across a scale from global institutions to individuals, not least companies, which are all subject to different types of governance (Walenta, 2020). Hence is a valuable approach to the need to reduce emissions from freight transports to look at other means of governance, besides governmental policy, that can push for corporate action.

Within the freight transport sector, a focus that has gained research attention for understanding the environmental impact is how purchasers of transport services (e.g., companies that buy transport services for their raw materials or products, henceforth "transport purchasers") influence the transport performed by companies that sell and perform transport (henceforth "transport service providers"). These studies point to that transport purchasers tend to be less likely to address emissions from purchased freight transports compared to other emission sources (Jazairy & von Haartman, 2020b; Wolf & Seuring, 2010). Further, it shows that for various reasons they often do not put sufficient pressure on environmental performance in their purchasing decisions. Lammgård and Andersson (2014) found that they put most importance to cost, followed by basic transport services such as time precision and delivery time, and only after that followed by environmental aspects. Further, they found that this priority order did not change between 2003 and 2012, despite a widespread societal focus on climate change. Judging by the number of studies that present similar findings, including new research, this should be understood as a pattern (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010). Such pattern is naturally worrying giving the intensity and growth of emissions from the sector as well as the fact that the absolute majority of global freight transports is purchased (see Lammgård, 2007; Royo, 2020), which means that actions from transport purchasers are profoundly needed.

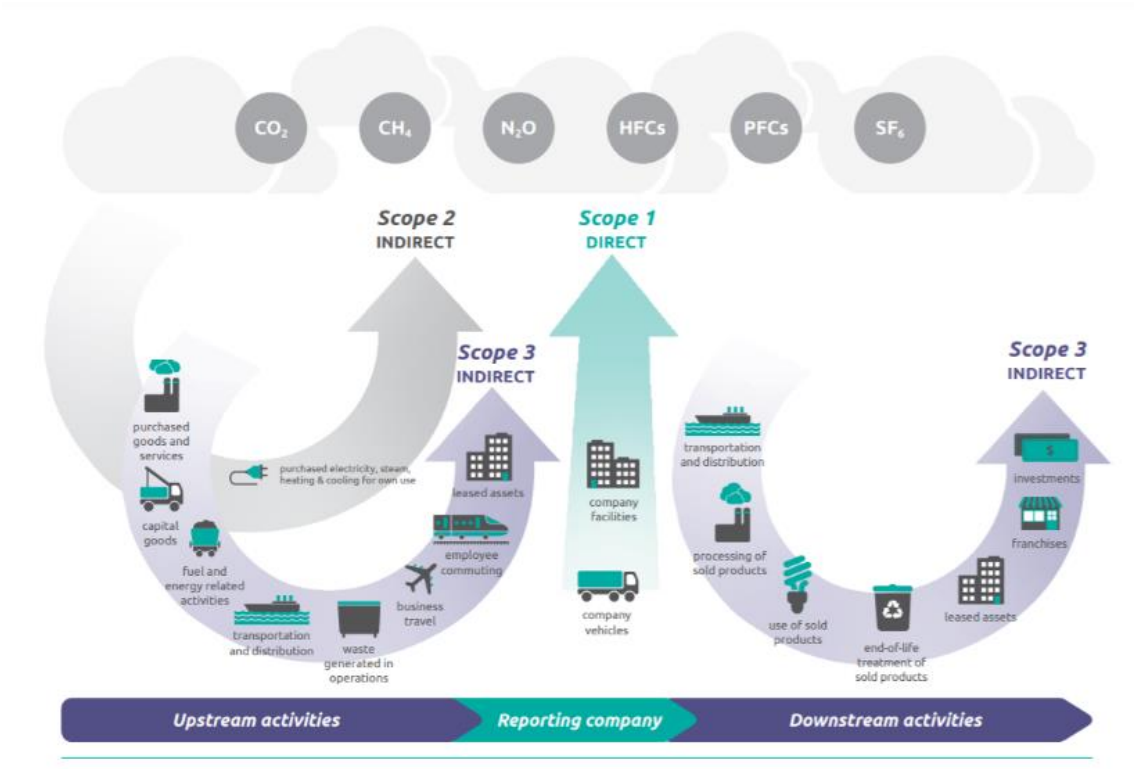
This raises questions regarding what can drive or influence transport purchasers to address these emissions and put more pressure on environmental impact during transport purchase. As evidently understood by the findings by Lammgård and Andersson (2014), a general societal focus on climate change did not constitute such a driver. Indeed, in a study of institutional pressure for transport purchasers to address and manage emissions from purchased freight transports, it was found that external pressure, in general, is missing. Transport purchasers face low regulatory pressure, low market pressure, as well as low competitive pressure, and it was further found that such pressure instead was directed toward other environmental impacts caused in the companies' value chains (Jazairy & von Haartman, 2020b).

In this context, it seems clear that previous research has not sufficiently investigated factors that could possibly change the pattern described above, by for example putting up new drivers to engage in emission reductions from purchased freight transports. To continue along with the

perspective that other means of governance above governmental policies can be important to push companies to reduce GHG emissions, this thesis will investigate Voluntary Environmental Agreements (VEAs) for carbon reduction as drivers or facilitators for transport purchasers to address and manage emissions from purchased freight transports. It will specifically look at Science-Based Targets (SBT), and if and how companies that have adopted it have dealt with purchased freight transports in the process of formulating the targets and implementing a carbon reduction strategy on it.

The focus on SBT is motivated by two factors. Firstly, SBT is an increasingly popular VEA communicated as substantially ambitious, as the underlying idea is that by having validated SBTs, a company have aligned with the ambition level set in the Paris Agreement. It is thus relevant to look at if it can influence if and how emissions from purchased freight transports are managed. This is especially the case since SBT is gaining more and more popularity with more companies committing out of which many are transport purchasing companies. Second, Science-Based Targets Initiative (SBTi) has not developed its own framework but has based SBT on the *GHG Protocol* and the three emission Scopes. In this, Scope 1 refers to direct emissions from the companies own operations, Scope 2 to indirect emissions from the production of purchased energy, and Scope 3 to all other indirect emissions in a company's value chain that is not under the direct control of the company (GHG Protocol, 2011) (see Appendix A for a more thorough description of the GHG Protocol). Since the requirements by SBTi mean that most companies have to set Scope 3-targets (see section 2.3 below for a more detailed description), the focus on SBT will also provide knowledge on how freight transports are dealt with as companies base climate strategies on the GHG Protocol, especially in the sense of how companies prioritize between the Scope 3 categories. This is important as Scope 3 emissions are getting more attention both in target setting and carbon management, not only through the fact that it is used by SBTi.

Figure 1. Overview of the GHG Protocol including Scope 3 categories.



Source: GHG Protocol (2011, p. 5)

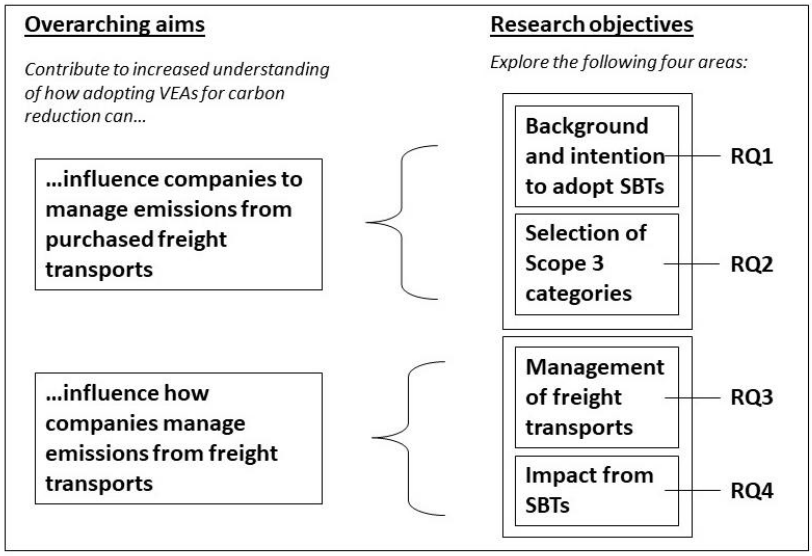
Lastly, in this thesis, targets and management of freight transports are understood in relation to the companies' overall strategies for carbon reduction built on the SBTs. As such it is assumed that this strategy must be analyzed as a whole rather than only regarding freight transport. The thesis will as such focus on four objectives of the strategy with a wider scope than freight transports, that are found to be important in the literature review (*background and intention to adopt SBTs*, *selection of scope 3 categories*, *management of freight transports*, and *impact from SBTs*).[1] These objectives are further approached through a framework by Damert et al (2017) in which three *components* (*carbon governance, carbon reduction* and, *carbon competitiveness*) are argued to be important to understand a corporate carbon reduction strategy, both in how the components are influencing the activities and how it is influenced *by* the activities (see chapter 3). This understanding of a carbon reduction strategy has assisted in designing the research objectives as well as the focus of the literature review.

1.2 Aims and Objectives

The problem definition has pointed to a research gap concerning how participation in voluntary environmental agreements can influence companies to put importance to the environmental impact from its purchased freight transports. It is held that previous research has not examined if participation in such agreements can challenge the pattern described above in which purchased freight transports often is not a prioritized source of emissions to address and manage. In line with this are the overarching aims of the thesis to contribute to the understanding of how adopting such agreements can influence companies to manage emissions from purchased freight transports as well as how this is done. Further, with the focus on SBT specifically, the aim is also to gain a better understanding of how purchased freight transports are addressed in relation to other Scope 3 categories.

To operationalize the overarching aims, four research objectives are defined to each of which one research question is formulated (see Figure 2). These are based on the findings in the literature review and are argued to be a proper operationalization of the overarching aims (see section 2.4 below for motivation).

Figure 2. Overview of overarching aims and research objectives.



[1] See section 2.4 for motivation for these objectives.

Further, the four research questions defined to operationalize each research objective are:

RQ 1	Why have the companies adopted SBTs?
RQ 2	Why have some companies adopted targets for purchased freight transports as a part of their SBTs while others have not?
RQ 3	In what ways do the companies plan to fulfill the SBTs for purchased freight transports?
RQ 4	(How) has SBT-related work influenced the way the companies manage GHG emissions in general and specifically concerning purchased freight transports?

With these RQs, the thesis can contribute with knowledge in three major areas:

- By investigating if SBTs influence companies to manage freight transports, or if it results in increased effort for how this is done, the thesis can provide important knowledge on what can (or do not) push companies to engage in emission reductions from purchased freight transports. This is important as more engagement from transport purchasers is needed to reduce emissions from freight transports in line with the Paris Agreement.
- As SBT is based on the GHG Protocol, the thesis can provide important knowledge on how companies decide which Scope 3 categories to include in its Scope 3 boundary. This can enlighten how freight transports are dealt with in comparison to other Scope 3 categories in particular, and on which factors influence the selection of Scope 3 categories in general. Such knowledge is important as Scope 3 emissions have gained significant attention in carbon reduction activities and strategies (see Patchell, 2018).
- Even though the focus on SBT should be seen as a case of a VEA for carbon reduction, the thesis can contribute with knowledge on the implementation of SBTs (especially setting Scope 3 boundary) as well as how it impacts companies' carbon management. This can be a valuable contribution as SBTs have gained an important role within the business community while so far being subject for research to a limited degree.

1.3 Scope and delimitations

Two aspects are important to explicate regarding the scope of the research. First, aspects regarding target level, type of target, time frame, as well as other factors that concern the *ambitiousness* of the *targets*, are not included in the research scope and neither considered in data collection nor analysis. This is primarily because these aspects in general are complex and that it would have meant a too large research scope to address it. It is also motivated by findings in the literature review that points to that the SBT-framework makes it profoundly complicated to assess the ambitiousness of SBTs, why this was not doable within this project (see Faria & Labutong, 2019; Giesekam et al., 2021). Second, as this is an interdisciplinary study of the relation between VEAs for carbon reduction and management of purchased freight transports, it must be added that it does not investigate the management of freight transports in the same level of details as likely would have been done in a study within logistics about the management of purchased freight transports.

Concerning companies, the scope of the thesis is companies with Science-Based Targets. Given that this includes around 600 companies globally (and a further 600 if companies that have not had the targets approved yet are included), the scope requires delimitations.

- First, as geographical scope Swedish companies were decided. This was motivated firstly by that the literature review reveals that Swedish companies, in general, have higher ambitions for freight transports compared to many other origins (see Jazairy & von

Haartman, 2020b; Touratier-Muller & Andersson, 2020), and second that the contexts of the freight transport sector differ significantly between Sweden and many other countries (not least regarding the role of biofuels)[2]

- Second, it was decided to only include companies with adopted and validated SBTs, meaning that companies that have only committed for participation are not included as they are still in the process of establishing the SBTs.
- Third, only companies that had adopted SBTs as of January 26 were included, as this was the date when the examination of the targets started.
- Fourth, business sectors (as defined by SBTi) for which it was deemed to be unlikely that freight transports are a relevant emission source were excluded, such as financial institutions, real estate, and professional service (see Appendix B). This estimation was done by the author together with the supervisor at IVL.

The scope and delimitation mean that a few possible interesting approaches were not included:

- First, it could be interesting to include companies without SBTs to compare the management of purchased freight transports. But on basis that it would have meant a smaller focus on companies with SBTs, and that the literature review offers an understanding of companies without SBTs, it was chosen not to include such companies.
- Second, one idea was to compare companies that have SBTs with companies participating in other VEAs for carbon reduction.[3] However, it was decided to only focus on SBT as it gave more time for qualitative examinations of more companies and because other such agreements not necessarily are based on GHG Protocol, which would make it difficult to compare.
- Forth, with a larger group of companies included, a larger descriptive data set could have been collected concerning how the five different carbon reduction practices (see section 2.1.2 below) are used to achieve the targets. As the thesis investigates a novel field, this would have been interesting. But as it is a limited number of Swedish companies that have adopted SBTs, this was deemed unsuitable.

1.4 Ethical Considerations

A few ethical concerns need explicit consideration. First, since the thesis has been written with a supervisor at an external organization, IVL Swedish Environmental Research Institute, it is important to note that neither the supervisor nor any other have had financial interests in the thesis or its results. The supervision has rather been motivated by a joint interest in the subject.

Second, by relying preliminary on data collected through interviews with representatives from the companies, it is inherently important to consider the possibility to expose the participating interviewees and/or companies for risks. Because of this, all interviewees and companies are anonymized throughout the thesis. When asked for has the information revealed about the company also been adjusted to be more difficult to relate to the actual company, to the extent possible without damaging the analysis.

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[2] However, as all but one of the case companies are multinational, all but one company have operations in countries where the context for freight transports differs. As such, it could be argued that other delimitations could have been used.

[3] Not least were the *Fossil-free Sweden's* 'Transport challenge' considered, in which a long list of companies operating in Sweden have committed to only perform and purchase fossil-free transports in Sweden as for a self-elected year (see Fossil-free Sweden, n.d.).

Third, it should be noted that the research design has been reviewed against the criteria for research requiring an ethics board review at Lund University and has been found to not require a statement from the ethics committee.

1.5 Audience

The thesis can firstly be of interest to anyone interested in the subject of decarbonization of freight transports (or reduction of other environmental impacts from it). Not least could this include managers who seek inspiration from how other companies how addressed the issue, for example in what has been successful and not. It could also include policy-makers, as the thesis point to important aspects concerning the decarbonization of freight transports which are in specific need of policy attention. Naturally, it also includes scholars who want to investigate factors that can influence the management of freight transports.

Secondly, the thesis could further be of interest to anyone interested in how companies are impacted by VEAs in general and SBTs in particular, not only regarding freight transports. As SBT is based on GHG Protocol, it could also be of interest to anyone interested in how companies handle Scope 3 emissions in targets and management. Concerning this area too, managers who seek inspiration from other companies could be a potential audience group, as well as scholars researching the area.

Lastly, the thesis could also be of interest for SBTi and organizations responsible for other VEAs, as it points to potential weaknesses in the requirements.

1.6 Outline

The thesis is structured as follows: **Chapter 1** (*introduction*) provides a thesis outline in which the overall topic is introduced through a description of the research subject as well as an identification of a research gap. Based on this, aims, research objectives, and research questions are defined. In **chapter 2**, (*literature review*) a thorough analysis of the research field concerning the management of freight transports and VEAs is conducted, which helps to delimitate a proper research focus. SBTs are further properly introduced and described, both regarding the framework and research that has focused on it. In **chapter 3**, a theoretical understanding of *corporate carbon strategies* is presented, and it is described how it influences the analytical lenses used in the thesis. In **chapter 4**, the research design and methodological approaches are outlined. In **chapter 5** (*results*), findings from each of the eight case companies are first presented (in 5.1 *Findings*) and subsequently subject of analysis (in 5.2 *Analysis*) according to the four research objectives. In **chapter 6** (*discussion*), the results are discussed both of its contribution to previous knowledge and from the angle of what it reveals about the overarching aims. This is followed by a more normative discussion of whether or not SBTs seem to be enough and a discussion of a potential limitation in the SBT framework. Lastly, in **chapter 7** (*conclusions and recommendations*), the main conclusions of the thesis are presented and recommendations for principal audience groups are provided. It also outlines directions for further research.

2 Literature Review

The purpose of this chapter is to investigate the research fields in which the thesis subject belongs. As such, it will overall look at two different fields of literature. First, the focus will be on relevant research regarding freight transports, mainly from the logistics discipline, and specifically the role of transport purchasers in reducing environmental impact and GHG emissions. Second, findings regarding VEAs (not restricted to freight transport) will be presented. This is motivated by that the examination of if and how VEAs can influence companies to address freight transports emissions require a background of why companies engage in such practices, important influential factors, and of corporate response to the engagement. Above these two fields, SBTs and SBTi will be properly explained and relevant research on it presented.

2.1 Freight Transports and Transport Purchasers

This section of the literature will present the freight transport field and guide the reader through two main themes that will provide the necessary background to the research problem. The section is primarily based on academic literature from the logistics discipline, meaning that it often focuses on more logistical activities than freight transports, such as warehousing and packaging (see McKinnon & Piecyk, 2012).[4] However, given that freight transports have the by far largest climate impact of all logistical activities (Wolf & Seuring, 2010) and are the main logistics-related focus for policy-makers, the thesis, as well as the literature review, specifically focus on freight transports.[5]

2.1.1 Managing Emissions from Purchased Freight Transports: a closer look at transport purchasers

To understand the focus on transport purchasers verses transport service providers, it must first be explained that a feature that distinguishes the freight transport market from most other markets, is that the absolute majority of all transports are outsourced. In a study of Swedish companies, it was found that transport service providers were contracted in 95% of the investigated cases, with only smaller variations depending on size and type of companies (Lammgård, 2007), and in a newer study it is suggested that freight transports and logistics are the most common activity to outsource (Royo, 2020). This means that actions by transport purchasers fill an important role in influencing environmental performance (Rogerson, 2016).[6]

In general, a list of literature illustrates a pattern on the freight transport market in which transport purchasers tend to put a low priority on environmental impacts caused by freight transports. What is important to understand, is that the explanation for this is not necessarily attributed to low environmental awareness in general. Huge-Brodin et al (2020, p. 590), for example, found that even in companies that stated a "very high priority to environmental issues at corporate level, driven by the managing director", the companies did not place significant importance on environmental impacts from purchased freight transports. Rather, as will be seen during this chapter, is this attributed to several factors that firstly often result in that companies

[4] It should be noted that the term for transport purchasing companies used in logistics literature, *shippers*, have intentionally been replaced with "transport purchasers" (or "transport purchasing companies") as the author perceive a risk that readers with other backgrounds than logistics might misunderstand what type of company's it refers to.

[5] Most consulted research also looks at broader environmental impact than GHG emissions, but as this often goes hand in hand, a focus specifically on GHG emissions does not bring significant changes.

[6] For a more thorough description of the freight transport market and the different actors within it, as well as how this relates to the Scope 3 categories, see Appendix C.

are not addressing this emission source and secondly in that the environmental impacts are gaining low importance during the transport purchasing process.

Factors Influencing If and How Purchased Freight Transports are Addressed

The literature point to several factors affecting if and how transport purchasers address the environmental impact from their purchased freight transports. These factors can be categorized into two major groupings: internal factors and external influence (see Bask et al., 2018; Björklund, 2011; Jazairy & von Haartman, 2020b).

Internal factors

Starting with internal factors, Björklund (2011) points to the importance of the environmental awareness and priorities of top/middle management as well as the characteristics of the environmental management as an "enabler" for addressing emissions from purchased freight transports. In line with this, González-Benito and González-Benito (2006) also points to the importance of how top management chooses to interpret stakeholder pressure in explaining if and to which extent the environmental awareness of top management drive, enable or constrain environmental ambition. If the top management believes that attention to the environmental impact from freight transports specifically is an effective way to please stakeholders, it will work as a driver (González-Benito & González-Benito, 2006).

The fact that companies tend to be oriented toward cost reductions is also a factor of high influence (Bask et al., 2018; Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b). In one sense it could act as a driver since there are economic incentives for companies to reduce costs for fuel by efficiency measures in vehicle/vessels and load factors (Bask et al., 2018). However, often the case is that the transport purchasers are unwilling to pay for the environmental practices, even though that they are interested in the environmental benefits (Bask et al., 2018; Huge-Brodin et al., 2020), something described as "at the same cost, but less polluting" by Touratier-Muller and Andersson (2020, p. 10). This does, according to Huge-Brodin et al (2020), mirror the fact that the customers to the transport purchasers also have a reluctance toward cost increases, and are therefore not interested in paying for sustainable freight transport practices. According to Jazairy and von Haartman (Jazairy & von Haartman, 2020b), this points to a general lack of market incentives for companies to address and manage emissions from purchased freight transports, and it is well illustrated by an interviewed transport purchaser who described sustainable freight transport practices as something "'luxury', that does not help the business case" (Jazairy & von Haartman, 2020b, p. 66).

Moreover, a few studies investigate transport purchasing from a supply chain management perspective. In this do Royo (2020) firstly points to that the mere fact that emissions from purchased freight transports are Scope 3 emissions and thus the direct emission of another company, often is used as an excuse for inaction. Further, information sharing is emphasized to be an important component for successful supply chain management (Wolf & Seuring, 2010), while it is found in several studies that this is often unsuccessful regarding freight transports, both due to cooperation problems within the supply chain and to lack of standardized measurement (Bask et al., 2018; Royo, 2020; Wolf & Seuring, 2010). Most importantly, the literature points to that management of purchased freight transports in many ways differs from the management of other value chain emissions sources. Wolf and Seuring (2010) found that this can be attributed to that (multinational) companies do not have an explicit strategy for environmental impact from purchased transports and that they in general are uncertain of how to cooperate with transport service providers within complex supply chains. A suggested explanation for this was that companies direct their attention towards suppliers of raw materials, and not to transport (Wolf & Seuring, 2010). Further, Evangelista et al (2012, p. 55) found that the level of importance attributed to purchasing of logistics was "dramatically" lower than

concerning other purchasing functions. These findings are partly described by a general lack of external pressure concerning purchased freight transports (Jazairy & von Haartman, 2020b), which is discussed further below. However, a possible internal explaining factor distinguished treatment of purchased freight transport might be what is found by Abbasi and Nilsson (2016, p. 279), that companies perceive transportation and logistical services as a "non-value added, activities that must be carried-through", meaning that there simply is a lack of reasons for some companies to address and manage it.

External influence

Björklund (2011) suggests that external factors influence transport purchasers more than the internal factors outlined above. As such, it is important to consider what these influences are based on and how it impacts companies' actions. First, it has been found that the visibility of a company and the proximity to end customers have an impact (Jazairy & von Haartman, 2020b). Transport purchasers in business-to-consumer setting (B2C) are more likely to put environmental pressure than transport purchasers in business-to-business setting (B2B). However, the proximity to end-customers affects also within the B2C category, as transport purchasers that operate close to their end-customers (and thus have high visibility) are most likely to consider the environmental impact (Jazairy & von Haartman, 2020b).

Furthermore, there is evidence that the degree of transport intensity in the transport purchaser's value chain also is influencing (Martinsen & Huge-Brodin, 2014). Transport purchasers within industries with large volumes of transports are more likely to consider environmental impacts compared to transport purchasers with small volumes, Martinsen and Huge-Brodin (2014) indicate this may be explained with that these companies have higher pressure from stakeholders to address freight transport emissions. Further, while Björklund (2011) argues that company size also has a large influence, as it is found that it is mainly large companies who consider the environmental impact from purchased freight transports, Touratier-Muller and Andersson (2020) argue that there is no difference based on size. On top of this Bask et al (2018) found that it concerns mainly globally operating companies, as these are subject of most stakeholder pressure and therefore confront the risk of negative publicity.

The country of operation is also held to have an influence, as transport purchasers that operate in countries with high environmental awareness are more likely to consider the environmental impact from purchased transports (Jazairy & von Haartman, 2020b). In line with this, Jazairy and Von Haartman (2020b) interviewed one transport service provider who stated that Nordic transport purchasers in general demand environmental practices more than U.S. and Asian companies, which they conclude could be explained by a stronger stakeholder pressure. In line with this, Touratier-Muller and Andersson (2020) found that Swedish companies put more importance on environmental concerns in the selection of transport service providers compared to French transport purchasers. This is relevant background as the thesis will focus on Swedish companies.

Lack of drivers

Despite the potential for these internal and external factors to help push companies to consider the environmental impact from purchased transports, the literature mainly points towards insufficient drivers for companies to do this (Jazairy & von Haartman, 2020b). Firstly, several studies identify general low regulatory pressures on transport purchasers (as opposed to for transport service providers) to address these emissions (González-Benito & González-Benito, 2006; Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b). Huge-Brodin et al (2020) emphasize that legislation could *potentially* result in that companies put higher pressure, but with present legislation (Sweden and Italy) the requirements are considered insufficient for transport purchasers to change habits. Jazairy and Von Haartman (2020b) further note that (in

Sweden and Germany) environmental regulation that affects transport purchasers in general are affecting other emission sources than transport purchases, especially activities closer to the companies' core business, whereas there is a lack of regulation affecting the transport purchasing activity. Rather, regulations in the freight transport sector are directed toward transport service providers, vehicle manufacturers, and fuel producers/importers.

The major potential stakeholder pressure is identified to come from the customer of the transport purchaser. Björklund (2011) finds that a majority of the companies in the study consider environmental demands from customers to be a driver for putting pressure at environmental impact. Further, Huge-Brodin et al (2020) find that in cases where customers put a high importance on environmental impacts, it may be a competitive advantage for transport purchasers to contract transport service providers with high environmental performance. However, in practice, it is found that customers of transport purchasers tend to put low importance on environmental impact from freight transports (Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b; Martinsen & Huge-Brodin, 2014), and on the opposite are non-environmental demands by the customers (such as time windows for delivery and delivery frequency) a significant barrier for transport purchasers to consider environmental impacts (Björklund, 2011).

Huge-Brodin et al (2020) suggest that the lack of market pressure could be explained by that stakeholder pressure often targets company's core areas of business. And whilst freight transport is not the core competency for transport purchasers, it is for transport service providers, and as such are transport service providers subject of most stakeholder pressure in the freight transport market. It is also identified that customers that in general address environmental impact from their suppliers tend to direct this attention to other suppliers than transport service providers (Jazairy & von Haartman, 2020b; Martinsen & Huge-Brodin, 2014).

As such, to conclude with the results from Jazairy and Von Haartman (2020b), there are a lack of regulatory pressure as legislations regarding freight transports seldom targets transport purchasers, insufficient market pressure as market stakeholders tend to focus on other environmental impacts than the one caused by purchased freight transports, and finally, insufficient competitive pressure as transport purchasers tend to not use environmental performance from purchased freight transports for competitive advantage. However, it can be noted that some of the influencing factors mentioned point to that there are some degree of stakeholder and/or institutional pressure facing transport purchasers.

Participation in VEAs for Freight Transports

Looking at participation in VEAs, only one study was identified by the author concerning freight transport purchases. In it, Touratier-Muller (2017) analysis a French governmental voluntary program aiming at pushing freight transport purchasers to reduce emissions from purchased transports (the *FRET 21 program*). Firstly, several motives for companies to join were identified. Company values communicated from top management through employee values was one such motive, corroborating the importance of top management and adding the importance of employee commitment. A second motive was to seek competitive advantage versus other transport purchasing companies and as such obtain financial advantage, which contradicts the lack of competitive pressure and market pressure identified by Jazairy and von Haartman (2020b). Other factors were to reduce costs from purchased transports, to improve company image, and to increase supply chain involvement for the environmental concern (Touratier-Muller, 2017). Motives to join VEAs will be further discussed in section 2.2.1 below, in which it will not be restricted to the freight transport context. That perspective will be important for the thesis as SBTs, in difference to the FRET 21 program, concern all types of GHG emissions in a company's value chain. Further, an identified impact from the participants was that the

participation enhanced team-building within the company by creating an environmental challenge to be solved, and as such had intra-organization influence, which in turn motivated further engagement for the issue (Touratier-Muller, 2017).

Table 1. Factors influencing environmental attention by transport purchasers. Synthesize of findings.

Top/middle-management attention	Top/middle management attention increases the likelihood to manage freight transport emissions (Björklund, 2011; González-Benito & González-Benito, 2006).
Cost aversion	Cost aversion can both motivate and hinder to manage freight transports as some efficiency measures can lower costs while other environmental practices can increase costs (Bask et al., 2018; Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b; Touratier-Muller & Andersson, 2020).
Proximity to end-customer	Companies in B2C setting more likely to manage freight transport emissions than companies in B2B setting (Jazairy & von Haartman, 2020b).
Transport intensity	Companies in transport intense industries are more likely to manage freight transport emissions (Martinsen & Huge-Brodin, 2014).
Geographical scope	Multinational companies are more likely to manage freight transport emissions than small companies (Bask et al., 2018).
Size	Large companies are more likely to manage freight transport emissions (Björklund, 2011), vs: No difference of likelihood based on size (Touratier-Muller & Andersson, 2020).
Country of operation	Environmental awareness in countries in which companies operate impact the likelihood to manage freight transport emissions (Jazairy & von Haartman, 2020b; Touratier-Muller & Andersson, 2020).
Regulative pressure	Regulations concerning freight transports are in general directed to other actors than transport purchasers, not least transport service providers (González-Benito & González-Benito, 2006; Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b). Transport purchasing companies are under regulative pressure for other activities than freight transports (Jazairy & von Haartman, 2020b).
Market pressure	Customers of transport purchasers tend to focus on other emission sources than freight transports (Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b; Martinsen & Huge-Brodin, 2014).
Competitive pressure	Environmental performance of purchased transports seldom used for competitive advantage purposes (Jazairy & von Haartman, 2020b). Participation in freight transport voluntary programs can be motivated by competitive reasons (Touratier-Muller, 2017).

How Transport Purchasers Influence Transport Service Providers

Environmental and non-environmental demands

Given that transport purchasers are not the performer of transports, it should first be stated here that the literature is clear that transport purchasers are important in influencing the transport service providers, since the environmental options are "within the hand" of transport purchasers rather than the transport service provider (Wolf & Seuring, 2010). Rogerson (2017, p. 605) suggests that "although the realization of the transport is the responsibility of transport service providers, the purchasing company bears a large part of the responsibility because the transport is executed in accordance with agreements". As such, the transport purchasers do

have the possibility to both push transport service providers for sustainable solutions, but also the potential to constrain them from initiating such options on their own (Björklund, 2011; Rogerson, 2017; Wolf & Seuring, 2010).

To understand how demands by transport purchasers impact the transport service providers, the literature distinguishes "environmental demands" from "non-environmental demands" (Rogerson, 2017). Whereas the first refers to demands specifically relating to environmental practices, such as transport mode, energy efficiency of vehicles, and route planning (see section 2.1.2 below for a presentation of each of these), the latter refers to other types of demands that can impact the environmental performance by setting requirements for, especially, time (Rogerson, 2017).

Starting with environmental demands, it is found in several studies that transport purchasers in general use such demands to a relatively small extent, at least compared to what is offered by transport service providers (Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020a; Oberhofer & Dieplinger, 2014). In a study of transport purchasers in Sweden, Jazairy and von Haartman (2020a) found that the most common environmental demands to use concerned environmental management systems, green transport management, and access to emissions data. In general, it is further found in several studies that environmental demands by transport purchasers are essential for transport service providers to offer environmental practices, but that it is mainly large transport purchasers that use it (Jazairy, 2020a; Martinsen & Björklund, 2012; Martinsen & Huge-Brodin, 2014).

Despite environmental demands, the literature clearly illustrates that a major barrier for transport service providers for improving environmental performance is the use of constraining non-environmental demands on transport service quality, especially regarding time (Björklund, 2011; Eng-Larsson & Kohn, 2012; Rogerson, 2017). This means that transport purchasers set strict demands for time-related aspects such as lead time, delivery windows, and delivery frequencies (Abbasi & Nilsson, 2016; Björklund, 2011; Rogerson, 2017), which are found to hinder transport service providers to improve the environmental performance by, for example, improving the load factor or using other transport modes than trucks (Rogerson, 2017). Concerning this, these types of demands are set up to achieve the transport service quality that the companies of different reasons perceive to be in need of, however, as found by Bask et al (2018), they rarely reflect upon the environmental impact of this type of demands. Further, it was found by Eng-Larsson and Kohn (2012), that sometimes, transport purchasers set *stricter* time-related demands than they need (such as regarding delivery precision), without reflecting upon that such demands both increase costs and environmental impact. In line with this, Jazairy (2020a) found that transport purchasers often do not coordinate environmental demands with non-environmental demands (referred to as "conflicting demands"), such as when demands on lower emissions are combined with demands on short lead times that necessitates trucks. A consequence of this is that environmental demands often do not result in intended outcomes, and this was empirically traced to 'inter-departmental misalignments' within the transport purchasing company in which different departments work with different objectives and goals (Jazairy, 2020a).

As have previously been mentioned, demands concerning transport service quality (especially time) and cost are in general also of higher priority for transport purchasers compared to environmental impact (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010). The consequence of this is, as has been discussed, that transport service providers use environmental practices to a lower extent, which have implications on the environmental performance (see Abbasi & Nilsson, 2016). Touratier-Muller (2017), in the analysis of the French FRET 21 program, found that the

participation in the program did not seem to have resulted in any larger changes in priorities of environmental versus non-environmental demands. Cost and transport service quality was still found to be of higher priority than environmental performance. However, it was also found that for half of the investigated companies (5 out of 10), environmental aspects were "incentive criteria", meaning that after cost and transport service quality, different types of environmental aspects were considered.

Inconsistencies in the freight transport purchase process

A further mean in which the literature reveals that transport purchasers influence the transport service providers is within the different steps of the transport purchasing process. In this, it is suggested that often, even when companies set environmental demands in the initial requirements, the attention and priority to these aspects tend to decrease or fully be disregarded during the different steps of the transport purchasing process. This causes inconsistencies where the final environmental performance of the purchased transport does not mirror the initial demands (Bahr & Sweeney, 2019; Bask et al., 2018; Jazairy, 2020a; Wolf & Seuring, 2010).

In general, the pattern illustrated is in line with the finding by Bask et al (2018), who suggests that environmental aspects overall are an "order qualifier" rather than an "order winner", meaning that as transport service providers have stated that they fulfill the environmental requirements in the first step, the rest of the purchase process is decided by other criteria. This is first seen in the process of selecting supplier (among the companies that fulfills the requirements for tender), in which it is found that pressure is put on conventional performance objectives, such as cost, time precision, and delivery time, whereas environmental performance is "minimally considered, if at all" (Jazairy, 2020a, p. 18). However, it is also found that some transport purchasers select the supplier that performs best in environmental aspects once the conventional requirements are fulfilled. Further, Jazairy (2020a) also finds that there are examples where ambitious transport purchasers have put more pressure on environmental criteria in the supplier selection, for example by including a sustainability manager in the negotiation with potential suppliers.

Further, in the process of signing a contractual agreement, Bask et al (2018) found that in cases where environmental performance is included in the initial requirements and is considered in the supplier selection process, it tends to be disregarded in the written contracts. A suggested reason is a lack of tools for follow-up and monitoring, which means there are few if any possibilities for penalties for non-compliance (Bask et al., 2018).

Jazairy (2020a) also points to that the contract time and contract type (standardized or tailor-made) have a large influence on environmental performance. Although both transport purchasers and transport service providers in the study agree that long contract time is necessary for transport service providers to invest in techniques and infrastructure that enables the demanded environmental practices, it is found that transport purchasers, in general, prefer short, standardized contracts as these leave larger flexibility to cut prices onward (Jazairy, 2020a). In contrast to this are long contract periods often used for tailor-made solutions, and according to Jazairy (2020a) are these contracts much more likely to result in high environmental performance as the transport service providers receive more suitable conditions to invest in their environmental practices. However, it was also found that transport purchasers often combine environmental demands that necessitate investments (for example to offer intermodal transports) with short contract times, which set up financial barriers for transport service providers to make necessary investments. This point to that a potential pathway for creating emission reductions could be a new standard of contract conditions. In line with this, it was identified by Touratier-Muller (2017) that one of the most significant impacts from participation in the FRET 21 program, was that it enhanced collaboration between transport purchasers and

transport service providers. It was perceived that the program made the latter "strategic partners" of the transport purchasers. This is an important finding for the thesis, as a similar impact could be identified from SBTs.

Lastly, it is noted in several studies, inconsistencies are also identified in post-contractual phases (Bahr & Sweeney, 2019; Björklund & Forslund, 2013; Jazairy, 2020a). Björklund and Forslund (2013) found that transport purchasers that include environmental criteria in the contracts often do not measure environmental performance and have no plan for how to deal with non-compliance. A similar phenomenon is identified by Bahr and Sweeney (2019), who further notes that follow-up is important to motivate transport service providers to commit to high environmental performance, but all transport service providers in the study say it is rare that transport purchasers set any KPIs on environmental performance, in contrast to the situation for more traditional operational objectives. Jazairy (2020a), however, finds that follow-up and monitoring, in general, are better considered in tailor-made contracts.

Table 2. How transport purchasers influence the environmental performance. Synthesize of findings.

Environmental demands	Demands for specific environmental practices (see section 2.1.2 below) (Huge-Brodin et al., 2020; Jazairy, 2020a; Martinsen & Huge-Brodin, 2014, 2014; Oberhofer & Dieplinger, 2014). Important for transport service providers to offer environmental practices but used to a relatively small extent (Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020a; Oberhofer & Dieplinger, 2014). More common to set environmental demands by large transport purchasers than small (Huge-Brodin et al., 2020; Jazairy, 2020a).
Non-environmental demands	Demands relating to transport service quality, especially time (such as lead time, delivery windows, delivery frequencies, and delivery precision) (Abbasi & Nilsson, 2016; Björklund, 2011; Rogerson, 2017). Substantial impacts on the environmental performance of the transports, yet this is rarely considered by transport purchasers (Bask et al., 2018; Björklund, 2011; Eng-Larsson & Kohn, 2012; Jazairy, 2020a; Rogerson, 2017). Combinations of environmental demands and non-environmental demands are often not aligned (Jazairy, 2020a).
Low priority to environmental performance	Environmental performance often prioritized after cost and transport service quality factors, hence often low acceptance of trade-offs with these factors from environmental practices (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010).
Interdepartmental misalignments	Misalignments of goals and objectives among departments involved in logistics (Jazairy, 2020a). Participation in governmental VEAs for freight transports found to be able to impact the intra-organizational structure for transport purchase (Touratier-Muller, 2017).
Consideration of environmental aspects in the purchase process	Environmental aspects an "order qualifier" rather than an "order winner" (Bask et al., 2018). Environmental demands often not included in contracts, resulting in few possibilities to penalize non-compliance (Bask et al., 2018). Long-term, tailor-made contracts often result in higher environmental performance (Jazairy, 2020a). Transport purchasers rarely set KPIs for environmental performance (Bahr & Sweeney, 2019).

2.1.2 Carbon Reduction Practices in Freight Transports

The focus of this section is to describe and discuss practices that can be used to reduce GHG emissions from freight transports. In this, five different overall categories as defined (but slightly modified) by McKinnon (2016a) will be discussed both in general and from the perspective of transport purchasers (see Table 3). A general note on these categories is that in the order they are arranged, they move from more strategic to less strategic, and it is pointed out that companies tend to focus on the bottom objectives (e.g., the less strategic) while more actions in the top ones are further needed (McKinnon, 2015a).

Table 3. Carbon reduction practices in freight transports (after McKinnon, 2016a).

Carbon reduction practice	*Means of emission reduction*
Supply chain structure changes	Decrease the transport volumes through changes in location of activities in the supply chain
Modal shift	Shift to more energy effective transport modes, especially to inter-modal transports including train and ships instead of all-road
Transport optimization	Improve vehicle utilization by increasing load factor, avoiding empty running, and reduced route length through transport management
Energy efficiency measures	Increased energy efficiency through usage of more efficient vehicles/ships and/or eco-driving and other operational changes in trucks and ships
Change fuel type	Usage of renewable and/or low-carbon fuels

Supply Chain Structure Changes

The structure of a supply chain has a large influence on the transport volumes performed within it (McKinnon, 2016a). Strategic decisions on the location of raw material sourcing, factories, warehouses, shops, and terminal will thus influence the very need for freight transports, which can have a large impact on the carbon intensity of a product (McKinnon, 2015a). Currently, the trends in decisions in supply chain structures tend to result in more freight transports rather than less. One reason is the spatial fragmentation of manufacturing processes and the wide geographical scope of many procurements, which have pushed for global and fragmented supply chains and, as such, has increased the freight transport intensity of products (McKinnon, 2016a). Another such trend is the centralization of inventories by the usage of larger distribution centers. Not least in Europe, since the introduction of the single market, many companies have switched from national distribution centers to pan-European ones, which also have increased the freight transport intensity of products (McKinnon, 2016a).

However, the contribution of GHG emissions from the supply chain structure is based on more variables than only transport volumes and distances. Looking at the life-cycle emissions of products, it is often found that transport-related emissions is much smaller than for example production-related emissions, meaning it is more important to locate production where the emissions are lower than where the transport volumes are reduced (McKinnon, 2016b). Although, it should be noted, is localization more likely often based on cost rather than environmental impacts. Regarding centralization of inventories, the increased emissions from transports could in the other end result in lower emissions from warehouses, as small (and many) warehouses tend to contribute to more emissions than large (and few) ones, resulting in a trade-off between transport and warehouse emissions (McKinnon, 2016b). Further, Garnett (2015), analyzing the "food miles debate", points to that unilateral focus on distance in a supply chain risk to distract from the emissions caused by the selected transport mode and transport efficiency. In other words, even if distances are shortened, it could be performed with higher emissions.

Since supply chain structure changes are not a practice related to freight transport purchasing per se (but rather to avoid having to purchase transports, or having to buy shorter/fewer transports), it is not discussed in the consulted logistics literature. As such, very little is identified on how transport purchasers tend to work with this practice. Although, McKinnon (2015a) notes that there in general is a tendency to work with less strategic decisions (e.g., the carbon reduction practices below) rather than this type of measures. However, as supply chain structure could be used to reduce Scope 3 emissions from freight transports (and as such to fulfill corporate carbon targets), it is an important practice to include in the analysis.

Modal Shift

Modal shift refers to shifting transport mode(s) to alternatives with lower emissions per ton-km compared to the previous utilized mode. Given that trucks are the by far most common transport mode (see Woodburn & Whiteing, 2015), it most often refers to modal shift from truck to rail and ship, both of which in general are much more energy efficient.[7] Often, it refers to combinations of these transport modes (intermodal transports), as routes often do not allow ships or trains to reach both ends (see Lindgren & Vierth, 2017). Often stated to be one of the most important means to reduce emissions from freight transports (McKinnon, 2016a), it is relevant to look at how transport purchasers impact it.

Given the large potential to reduce emissions through a modal shift, the question of transport purchasers role in impacting this is well-researched. A few aspects of how transport purchasers focus on modal shift revealed in the literature is that transport purchasers often have negative perceptions of intermodal transports in general, and rail transports in particular, as it is perceived to decrease the transport quality compared to all-road transports (for example delivery time, punctuality and flexibility in departure) (see Eng-Larsson & Kohn, 2012; Liljestrand, 2016). This, logically, can help explain why all-trucks transports are common.

Regarding barriers to implementing modal shift, the literature also points to that not all goods or transports are suitable. In general, it is often stated that intermodal transports require a high frequency of deliveries, large volumes, and long distances (Eng-Larsson & Kohn, 2012; Liljestrand, 2016). However, in a study by Eng-Larsson and Kohn (2012), it was empirically found that many of the well-known truths about the disadvantage and inconvenience of intermodal transports should be nuanced. In this, they found that even though most investigated transport purchasers experienced a mild decrease in transit time and punctuality after switching to rail/truck-transports, they found that this could be compensated with easy measures, for example by changing delivery time windows to stores (which did not cost anything for the investigated company). Based on such findings they concluded that it seems to be that transport purchasers today often pay for a transport quality that they do not need and that intermodal transports as such can offer a more reasonable transport quality to a lower price. Also, McKinnon (2016b) has pointed to that transport purchasers could do more to adopting to slower (intermodal) transports by administrative means.

Further, Eng-Larsson and Kohn (2012) found that many successful intermodal transports in operation cover distances, volumes, and frequencies shorter/smaller than the often stated minimum, and also goods often stated to be unsuitable. As such, even though they admit these aspects impact the feasibility to use intermodal solutions, they are not necessarily a barrier per se. Instead, an identified barrier is "purchasing inconvenience", meaning that the process of contracting transport service providers to use intermodal transports are complicated as the

[7] Given the low volume of freight transported by aviation (<0.5%), air transports are often excluded in modal split literature (Woodburn & Whiteing, 2015).

interest for them is low compared to all-road transports, both because the knowledge among transport purchasers are lower and that transport service providers are not as used to selling this type of transport (Eng-Larsson & Kohn, 2012). However, as Jazairy and von Haartman (2020a) found, there is no shortage of transport service providers that offer intermodal transports compared to the demand, meaning that if a transport purchaser wants to use intermodal transports, it is possible yet potentially complicated.

Regarding how transport purchasers impact modal change, Bask et al (2018) notes that this has changed over the years. Decades back, the typical transport purchasing process was to first choose transport mode and second to find a matching transport service provider. However, today the decision of transport mode is often taken by the transport service provider, and as they identify, it is seldom that transport purchasers put environmental demands related to transport mode (although exemptions were found). In line with this, Jazairy and von Haartman (2020a) found that transport modes are among the least common environmental demands by transport purchasers. Instead, as partly illustrated above, are non-environmental demands especially regarding time, such as delivery time window, punctuality, and flexibility in departure, common in constraining usage of intermodal transports. Such demands restrict transport service providers from using anything else than all-road transports.

These findings together point to that the decisions by transport purchasers actually have an important role in influencing the selected transport mode, and that perceived barriers could be more based on perceptions than the actual circumstances. As the decisions of carbon reduction practices by the transport purchasers are analyzed later in the thesis, this will be an important background.

Transport Optimization

Transport optimization offers large potential emission reductions as vehicles seldom are used optimally (McKinnon, 2015c). This is caused by three factors, firstly that trucks seldom are loaded fully in terms of weight and/or size (load factor), second from the fact that many trucks run empty on the way back from a delivery (empty running), and third that the routes often offer a potential for optimization (transport management) (McKinnon, 2015c; Rogerson, 2017). Although empty running might sound as a waste of money, an average of 24% of the trucks in the EU are empty (McKinnon, 2015c). As pointed out by McKinnon (2015c), the fact that improved vehicle utilization means profoundly more cost-effective transports makes it one of the most attractive environmental practices for companies (both transport purchasers and transport service providers) to work with regarding logistics.

Findings by Rogerson (2016) indicate that low load factor and high empty running are often amplified by non-environmental demands by transport purchasers. For example, by demanding a frequency of transports at specific times, without providing the transport service provider any notification of load, the transport service provider is required to be prepared for higher volumes than what is often utilized, resulting in usage of over-dimensioned trucks. Another example is the usage of defined delivery times. For transport service providers, this results in reduced flexibility to consolidate with deliveries from other transport purchasers, and as such to both lower load factor and empty running. Further, McKinnon (2015c) points to that other also aspects controlled or influenced by the transport purchaser influences vehicle utilization, such as the design of packaging and cooperation within the supply chain. However, low vehicle utilization is also driven by factors that are beyond the control of both the transport purchaser and the transport service provider, such as a fluctuation of demand and geographical imbalances of transport flow (resulting in barriers to avoid empty running).

It was found by Jazairy and von Haartman (2020a) that "green transport management" (also including to increase load factor and avoid empty running) was the second most common demanded environmental practice (after environmental management systems) by transport purchasers. Further, Rogerson (2017) found that vehicle utilization can be increased by better managing the non-environmental demands mentioned in the previous paragraph.

Energy Efficiency and Electrification

The energy performance of trucks and ships can be improved by using more energy-efficient vehicles/ships and by utilizing operational efficiency measures (regarding trucks most often referred to as eco-driving). Generally, new technology is often considered as one of the most important measures to reduce the environmental impact of freight transports (McKinnon et al., 2015). It can focus on measures such as increasing the efficiency of combustion engines and developing electric and fuel cell technologies. Although the energy efficiency has increased substantially from both trucks and ships, there is in general a lack of regulations that pushes for it (McKinnon et al., 2015). For example, the main EU legislation for environmental impacts from trucks, the EURO standards, does not include energy efficiency or CO_2 emissions (see TransportPolicy, 2018). On the opposite, it has been shown that tightening regulations for emissions of NOx can result in increased emissions of CO_2, which reveals important trade-offs in the area (McKinnon et al., 2015) (although new CO_2 requirements was introduced in 2019 and regulates emission standards from 2025 and beyond (European Commission, 2019)).

Eco-driving and operational efficiencies refer to the possibility to operate trucks and ships in a more energy-efficient manner. Generally, eco-driving includes a wide range of operational changes that can be applied in different combinations and together reduce emissions (McKinnon, 2015b). Not least are reduction of the speed of trucks and ships considered to be a significantly large potential for emission reductions. Within shipping, for example, speed reductions ("*deceleration*") have often been used by shipping companies to save costs in times with low demands for transports and have been shown to reduce daily emissions from ships by as much as 27% (McKinnon, 2016b).

The literature reveals that demands regarding vehicle technology are used by transport purchasers but that it is not common. Bask et al (2018) notes that transport purchasers seldom include environmental demands related to vehicle technology, whereas Jazairy and von Haartman (2020a) find it to be the fourth most common environmental practice to include. In difference to the previous carbon reduction practices, vehicle efficiency is not shown to be constrained by non-environmental demands. However, given that there yet are no classifications of trucks (or ships) on energy efficiency, a question is also what to base environmental demands on. The literature suggests that used practices include euro-classes, age of vehicle, and tires (Björklund & Forslund, 2013; Rogerson, 2017). No examples of technological requirements for ships were found in the literature.

Eco-driving (regarding trucks) on the other hand is shown to be common to include as an initial requirement for participating in tender (Jazairy & von Haartman, 2020a) and several examples of environmental requirements (such as eco-driving training) were identified by Rogerson (2017). However, non-environmental demands on time restrictions could constrain the usage of it (Rogerson, 2017). Regarding ships, Finnsgård et al (2018) found that transport purchasers, in general, felt they had no or little influence upon operational aspects, and as such mainly had to learn to adapt to longer delivery times when shipping companies chose to slow the speed.

Changed Fuel Type

The last carbon reduction practice is changed fuel type, which refers to the possibility to fully or partly substitute fossil fuels with either biofuels (such as biodiesel, ethanol, and biogas) and

other low-carbon fuels (such as natural gas) (McKinnon, 2016a). Generally speaking, while biofuel is the major alternative fuel for road transports (not least freight transports) are low-carbon fuels (most notably Liquified Natural gas (LNG)) the major alternative fuel for ships. Different kinds of biofuels are used and have different characteristics. One worth mentioning given the high potential it is considered to carry is Hydrotreated Vegetable Oil (HVO), which has similar chemical settings as fossil diesel and can thus be used in most diesel combustion engines either as a pure fuel or in blends (Unglert et al., 2020). However, it should be noted that benefits regarding carbon reduction as well as other environmental (negative) impacts vary depending on the source of the biofuels. In general, there is also a limited supply of biofuels which restricts the potential overall benefits from biofuel usage. Further, it should also be noted, are the context for biofuels very different depending on the country, mainly through the fact that it is given a substantially more important role in Sweden compared to most other countries (see Committee for fossil-free road vehicles, 2013).

The literature point to that environmental demands regarding biofuels are common for participating in tender, however, it is also found that it less often is included in the contract (Bask et al., 2018; Jazairy & von Haartman, 2020a). This could mean that the control of the actual fuel usage is lower. As a comment by the author, there are surprisingly few studies that look at biofuel usage from the perspective of transport purchasers', given the wide attention it gets in the public debate in Sweden *especially* regarding freight transports.

Emission Reductions in line with the Paris Agreement

Each of these carbon reduction practices is preferably not only understood in the context of how they can help an individual company to report lower emissions. To understand how they – and the company utilizing them – can and do contribute to emission reductions necessary for fulfilling the Paris Agreement, they must be understood in a wider context. Hence, it is worth looking at the findings from a Swedish governmental investigation from 2013 that assessed policy-measures needed for fulfilling the transport and climate target of that time, in which it was stated that the "transition requires far-reaching efforts within *all* of the five areas of actions":

1) "Stimulate societal transition towards fewer and more effective transports.
2) Infrastructure measure and changed transport modes.
3) More efficient vehicles and more efficient operation of vehicles.
4) Biofuels.
5) Electrification of road transports". (Committee for fossil-free road vehicles, 2013, p. 155 (translation by the author))

What this means is that actions directed to one or only a few of these areas are not enough, rather are actions on all areas required. Even though the committee's suggestions were directed to the government and thus from a policy perspective, it is not different from how companies could resonate, and how their actions should be understood. And as seen, these action areas are essentially the same as the five carbon reduction practices above, and presented more or less in the same order. And as have been stated, McKinnon (2015a) finds that whereas companies tend to focus on measures in the bottom-end of the framework (e.g., changed fuel type, energy efficiency measures, and improved vehicles utilization), more strategic decisions influencing the need for transport and transport modes are more seldom in focus, which is explained with that these are more difficult to combine with economic benefits.

This perspective is important to put actions by companies in a wider perspective. For example, while high ambitions on biofuel usage allow the individual company to report lower Scope 3 emissions and at the same time, in fact, contribute to lowering emissions from the transport sector, it can be asked if their contributions will have a greater impact in the long run if they do

not at the same time strive to change transport mode from energy inefficient trucks to train and ships were possible or in various ways decrease transport volumes. This does not imply that biofuels, better trucks, or improved vehicle utilization are wrong or unwelcome, but to point to that it is not always enough.

2.1.3 Concluding Reflection from the Freight Transport Section

Two main reflections are relevant to explicate here. First, the literature indicates that companies, in general, are less likely to address the environmental impact from purchased freight transports compared to other sources of environmental impact. This is partly influenced by the fact that they are likely to face more stakeholder pressure related to other such sources than for purchased freight transports (especially for Scope 1 and 2 emissions, or "core business areas", but also regarding other sources in the companies' value chains (e.g., Scope 3 emissions)). Some variations are suggested based on for example size, proximity to end-customers, transport intensity, and country of operation, but it still seems that the companies can be expected to pay lower attention to purchased freight transports than other sources.

Second, even though it is through the five carbon reduction practices (as seen in section2.1.2 above) that emissions from purchased freight transports can be decreased, it has been found that the means to achieve these can be more complex than initially thought. It can be done by setting environmental demands on the transport service provider, stating that for example biofuels should be used. But it can also be from other management practices, such as considering trade-offs, changing non-environmental demands (especially regarding time), from making sure that the environmental impact is considered during the full transport purchase process, or through having a lower focus on cost-reductions and perhaps even accept higher costs for low-emission transports. These management practices can also have a relation to governance aspects, such as in which objectives and goals are set up by different departments, and how risk assessments relating to freight transports impact the willingness to invest in changed management for transport purchasing. For the remaining thesis, these are important insights.

2.2 Corporate Voluntary Sustainability Practices

As the research subject means that the issue of freight transport purchase is understood in the context of participation in *voluntary* environmental agreements (also referred to as multi-stakeholder initiatives (MSIs)), it is relevant to look at research of voluntary corporate practices. The section will address why companies engage in such practices as well as aspects that is important to influence the outcome. These sections build on learnings from the literature on several types of voluntary corporate sustainability practices, not just related to environment or climate, as the underlying forces and rationales of such engagement are essentially the same.

2.2.1 Why Companies Engage in Voluntary Sustainability Practices

Concerning motivations to participate in voluntary agreements, the literature suggests several factors that matter. One such factor is that companies that are known for high environmental performance are more likely to join as they do not need to change their existing practices, but are instead seeking to increase the previous environmental differentiation and reinforce advantage (Aragòn-Correa et al., 2019; King & Lenox, 2000). A second factor is to create price premiums compared to competitors that do not participate (however, the literature provides different suggestions whether or not it is financially viable) (Aragòn-Correa et al., 2019; King & Lenox, 2000). It has also been found that regional cultures are important, as pro-environmental cultures tend to cause more companies to participate (Aragòn-Correa et al., 2019; York et al., 2018), which naturally could mean Swedish companies are more likely to adopt SBTs. The role of peer pressure is also suggested to be important, meaning that participation can be motivated

with that competitors to a company have participated (Aragòn-Correa et al., 2019; King & Lenox, 2000). A last important factor suggested is the ambition to reach legitimacy from stakeholders, which – as will be discussed below –can be done both by substantive and symbolic adoption of agreements (Berrone et al., 2017).

Similar to these motivations, Hoffman (2005) suggested seven overall motivations to why companies engage in GHG reduction *practices* (meaning, not specifically to participate in agreements). This firstly included cost savings from energy and transportation through operational improvements and second to anticipate and influence climate change regulation. A third aspect suggested was access to new sources of capital, which by Hoffman (2005) was exemplified with capital from public sources such as emission trading schemes. However, as SBTs can influence a company's CDP scoring, and as such impact access to investment capital, it has been found by Mnacakanjan (2017) that also this is a motivation to participate in SBTi specifically. Further, Hoffman (2005) suggested that a fourth motivation to engage in GHG reduction practices is to improve risk management, referring both to risks from natural consequences from climate change but also financial risks with mandatory GHG regulations, such as fines, taxes, regulations, and caps. Lastly, three competitive aspects were also suggested, including improving corporate reputation, identify new markets and opportunities, as well as to become a more attractive employer (Hoffman, 2005).

The suggestions presented in this section is interesting to the thesis as it could help understand why a company chose to address purchased freight transport emissions or not. For example, a company that above all seeks to reduce operational costs might strive to reduce energy usage from purchased transports. However, if so, a question of knowledge appears. Does the company know that it is possible for purchased transports (as seen in 2.1 above) and do they know how they can do this? Or are there other barriers? If a company on the other hand wants to create price premiums for their products or to identify new market opportunities, they might be less likely to address purchased freight transports. Also, if the company already has environmental routines and is using the agreement mainly to reinforce or take credit for what they are already doing, freight transports will likely not be addressed if it is not already the case. Aspects such as this will be important to discuss if and how the reasons to adopt SBTs influence if and how purchased freight transports are addressed and managed.

2.2.2 Influences on Voluntary Practices

It has been found in many studies that voluntary sustainability practices often do not result in intended impact (Aragòn-Correa et al., 2019; Dahlmann et al., 2019; Damert et al., 2017; de Bakker et al., 2019; Doda et al., 2016). For example, Dahlmann et al (2019), Damert et al (2017), and Doda et al (2016) found that the mere presence of carbon targets or carbon management practices is not positively related to actual emission reductions. Further, a long list of studies assessing the impact of international voluntary agreements finds that it often creates "selective or only marginal positive outcomes for the final beneficiaries" (de Bakker et al., 2019, p. 365).

To explain why carbon targets lead to carbon emission reductions or not, Dahlmann et al (2019) argue that the underlying intention to engage is determinantal for the outcome. In this, *substantive* "commitments to reducing environmental impacts" are distinguished from *symbolic* "attempts to manage external stakeholder perceptions via 'greenwashing'" (Dahlmann et al., 2019, p. 1). This echoes the fact that a company can communicate environmental ambitions without any attempt to break from status quo (Berrone et al., 2017), and as such, a significant difference in the outcome appears if the engagement is based on a genuine will to fulfill the stated ambition. Further, the literature indeed suggests that a risk of symbolic adoption exist also concerning voluntary agreements. Often, this is explained with *policy-practice decoupling*, meaning that companies adopt a policy of an agreement without adopting the

practice (de Bakker et al., 2019). In other words, that a company can commit to a goal, target, or ambition but fail or intentionally avoid implementing the practice that it necessitates. Just as in the case above, a motivation to this can be, besides that it is enabled by weaknesses in the requirements, to manage stakeholder relations and to provide legitimacy to the company without changing business practices (de Bakker et al., 2019; Schwartz & Tilling, 2009; Selfa et al., 2014).

Expanding on the concept of policy-practice decoupling, Wijen (2014) introduced 'means-end decoupling' as an alternative explanation for why adopters fail to fulfill the intended goals. In this view, the lack of intended impact is not attributed to companies not implementing the practice as in policy-practice decoupling, but rather that the decoupling occurs because companies implement practices to instrumental and not oriented toward impacts. Such narrow focus lead companies away from adopting practices that are designed to result in the intended goal and instead implement practices that are above all designed to comply with formal requirements set up by the agreement (Wijen, 2014). In line with this, it was suggested by Doda et al (2016, p. 266) that cases where carbon management practices did not result in emission reduction could, possibly, be explained with that the carbon management practices "that are being implemented by a large proportion of the world's largest corporations are not sufficiently impact-oriented". Instead, it is assumed by the companies that just by having carbon management practices, they will automatically reduce their emissions, and are not evaluating if this is the fact (Doda et al., 2016).

To avoid the risk of symbolic adoption, policy-practice decoupling, and/or means-end decoupling, the literature suggests a couple of aspects important:

- **Presence of stakeholder and institutional pressure.** Damert et al (2017, p. 132) found that "pressure to reduce carbon emissions from regulatory bodies, civil society and industry peers" has a significant impact on the emission reductions. However, it is argued by Jiang and Bansal (2003) that the influence from stakeholder and institutional pressure depends on if it is interpreted to benefit the financial performance of the company or not.
- **Bottom-up approach**. Concerning GHG reduction targets, McKinnon and Piecyk (2012) argue that successful targets must *bottom-up* in the sense that they should be specifically formulated for specific functions and based on analysis of what is possible and economically viable rather than implemented uniformly for all functions.
- **Target ambition**. It was found by Rietbergen et al (2015) that companies tended to try to avoid the risk of under-achievement, and thus adopted easy-met and low ambitious targets instead of more difficult ones. However, somewhat paradoxically, Ioannou et al (2016) found that target difficulty, meaning the degree of difficulty to fulfill a target, was positively related to target fulfillment. This was explained that difficult targets tend to attract more managerial attention.
- **Target type**. In general, it is disputed among scholars if and how target type (e.g., absolute vs. intensity targets) influences the performance. Some scholars argue that intensity targets, in general, is used when the underlying intention is symbolic (Dahlmann et al., 2019) and that intensity targets often are easy to meet (Rietbergen et al., 2015). However, as argued by Faria and Labutong (2019), absolute targets can be achieved by downsizing business operations, which not necessarily are of environmental advantage. In line with this, Byrd et al (2014) found that companies with high growth are more likely to choose intensity targets, to be able to continue growing (although, a second reason to set intensity target was that it is easier to reach). For SBTs, Giesekam et al (2021) found that there was no differences on target progress based on target type.

As such, it can likely be concluded that target type in itself is not a mirror of the intention (while it still naturally could be in specific cases).

- Time frame. Both Dahlmann et al (2019) and Rietbergen et al (2015) found evidence that long time-frames of targets increase the likelihood to improve carbon performance. In the study by Rietbergen et al (2015), short time-frames were often used in cases where companies already knew the targets would be achieved, for example, because of already planned investments. However, it is further argued by several scholars that long time-frames should be complemented with short-term interim targets (Dahlmann et al., 2019; McKinnon & Piecyk, 2012; Rietbergen et al., 2015).

It could be argued that given that SBTi (as it at least claims to) require science-based methods by companies to formulate carbon targets that are in line with the Paris Agreement, neither symbolic adoption, policy-practice decoupling, nor means-end decoupling should be a risk. However, experiences from other programs with self-claimed "ambitious" targets reveal that the performance can be lower than intended. Rietbergen et al (2015) evaluated a Dutch governmental program in which companies had to set "ambitious" climate targets to participate in certain public procurements. In this, however, it was found that several shortcomings in the program enabled the companies to fulfill the requirements with targets that were notably less ambitious than the stated intention. Not least where this explained with unclear requirements. Although this was the case for all three emission scopes, it was especially evident for Scope 3 requirements, for which several interpretations of the most central requirements existed among the target validation auditors (Rietbergen et al., 2015).

2.3 Science-Based Targets and Scope 3 emissions

Even though the focus on SBTs and SBTi is motivated by being an example of a VEA for carbon reduction (based on the GHG Protocol) which potentially can influence if companies choose to manage Scope 3 freight transport emissions and how this is done, it is important to look at how SBTs works and on previous research of it.

General background of SBTi

SBTi was first launched in 2014 jointly by CDP (formerly Carbon Disclosure Project), World Resources Institute (WRI), World Wildlife Foundation (WWF), and UN Global Compact (Giesekam et al., 2021). It encourages companies to set carbon reduction targets that align the company ambition with the ambition level as defined in the Paris Agreement, meaning to limit global warming to either 1.5°C or well-below 2°C compared to pre-industrial temperatures. Targets in line with this are labeled *science-based*. To date (March 9th, 2021), 615 companies have adopted SBTs, and roughly the same number of companies have committed to preparation, meaning they have not yet had their targets approved (SBTi, 2021a).[8]

Requirements to set SBTs

To join, a company first signs up for commitment, after which the company develops targets that are to be assessed and approved by a technical advisory group. This process should not take more than 24 months.[9] It is stated by SBTi that a science-based target is considered to have three components: "a carbon budget (defining the overall amount of GHGs that can be emitted to limit warming to 1.5°C or well-below 2°C), an emissions scenario (defining the magnitude

[8] Generally, in the thesis, a company that has "committed to SBTi" refers to a company that has not had its targets validated by SBTi whilst a company that has "adopted SBTs" refers to a company that has committed and had its targets validated. As stated in *Scope and delimitation*, all case companies have validated targets.

[9] However, interestingly, it was found that 175 companies on the list labeled with "committed" have passed the 24-month limit (Giesekam et al., 2021).

and timing of emissions reductions) and an allocation approach (defining how the carbon budget is allocated to individual companies)" (SBTi, 2020, p. 5). Besides this, a few specific requirements are important to understand for the thesis:

- Companies can choose between paths aligning with emission reductions necessary to limit global warming to 1.5°C or well-below 2°C (SBTi, 2020).[10]
- To a minimum, the targets must cover 5 years and a maximum of 15 years. As a complement, companies are also encouraged to develop long-term targets, up to 2050, which must be complemented with a mid-term target. As base year, SBTi recommend that companies choose the most recent year with available data (SBTi, 2020).[11]
- All companies must set targets for Scope 1 and 2 which aligns with one of the temperature paths. This means it should at least cover 95% of company-wide Scope 1 and 2 emissions (SBTi, 2020).
- All companies must conduct a Scope 3 screening. If Scope 3 emissions account for 40% or more of total Scope 1, 2, and 3 emissions, targets for Scope 3 is required that cover at least 2/3 of the Scope 3 emissions (SBTi, 2020).[12]
- Targets can be formulated either in relative or absolute emission reductions, although relative targets must result in absolute emission reductions. Companies can also choose to set one target for all Scopes, one target for each Scope (or one for Scope 1 and 2 and one for Scope 3), or targets for Specific Scope 3 categories (SBTi, 2020).

It is noted by SBTi that the requirements for Scope 3, in difference to Scope 1 and 2, mean that the Scope 3 targets do not have to be science-based (SBTi, 2020). They do however underline that besides that it must cover 2/3 of Scope 3 emissions, it should be "ambitious, measurable and clearly demonstrate how a company is addressing the main sources of value chain GHG emissions in line with current best practice", and that it "should include the majority of value chain emissions, for example, the top three emissions source categories" (although the only *requirement* for validation is that it must cover 2/3 of the Scope 3 emissions) (SBTi, 2020, p. 6). As noted by Giesekam et al (2021, p. 5), the requirements for Scope 3 have been strengthened as previous requirements simply required companies to "demonstrate how they were 'addressing the main sources of GHG emissions within their value chain in line with current best practice"'.

For deciding the Scope 3 boundary, SBTi offers guidelines but no strict requirements besides the 2/3 criteria. Factors that SBTi recommend companies to consider is the size of the Scope 3 categories, the potential companies have to influence it, the degree of risk it exposes the company of, if it is considered important to stakeholders, and if it is an outsourced activity that is often performed in-house (SBTi, 2020). This means that companies have large flexibility to select Scope 3 categories to include. Unfortunately, no previous research has been identified concerning companies' decision to set Scope 3 boundary, neither for SBTs or other targets based on the GHG Protocol. The only identified research that has at least touched upon the issue, is a master thesis about the different steps of SBT Scope 3 target setting process, in which Agné and Vernet (2017) show an example of where lack of available data cause companies to exclude freight transports. It is as such important that this issue gain more research attention.

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[10] SBTi has also announced that a net-zero standard will be introduced in late 2021 (SBTi, 2021b).

[11] However, as shown by Faria and Labutong (2019), the choice of base year, together with the choice of methodology, can have a large impact on the emission trajectory. As such they see a risk of opportunistic setting of base years, by choosing a year that provides an unproportionally large carbon budget.

[12] As seen in Appendix D, the majority of companies have Scope 3 targets as only one of the companies (a steel producing company) within the research scope has not set targets for Scope 3.

Research about SBTs

Given that SBTi is still relatively new it has only been subject to a limited number of studies. An academic debate followed its initial launch in which Trexler and Schendler (2015) argued that it would be a "costly distraction" from the need for policy in the sense that it would only attract a small number of companies that would seek to reduce emissions by cheapest possible means. To this, Marland et al (2015) argued that private sector governance such as SBTi is needed as a complement to public policy and that the push for corporate action on voluntary grounds does not necessarily distract from the need for policy but could on the opposite push for new policies.

However, as pointed out by Walenta (2020), the literature on SBTs as of December 2020 (when the article was published) was not based on empirical data but rather on hypothetical scenarios.[13] In a first empirical evaluation of SBTs, Giesekam et al (2021) looked at the progress in terms of emissions reductions of 81 early adopters. In this it was found that the majority of the targets were likely to be achieved given present progress; 21% of the targets had already been achieved and 44% judged to be on-path to be achieved, while 35% were behind.[14] However, there was a statistically significant difference with targets including Scope 3 emissions, as targets including Scope 3 are more likely to be behind: Of the targets that did not include Scope 3, 75% are on-path to be achieved (or already achieved), while 52% of the targets that do include Scope 3 are.[15]'

The high degree of target achievement was however not only interpreted as a positive sign. Rather, as stated, it is uncertain "whether being on target, or having achieved a target, indicates strong action or poor ambition from a company" (Giesekam et al., 2021, p. 14). To this, cases were identified in which the companies had already achieved the target as of validation by SBTi as well as cases in which the progress previous to the validation made it clear that the target would be achieved quickly. They also underline that the requirements by SBTi in fact do provide room for flexibility to the adopting companies, because of different decisions of baseline year, target year, scopes, and "the unknown in terms of action of the company before the baseline year" (Giesekam et al., 2021, p. 15). This, it is further added, also makes it profoundly difficult to evaluate the ambitiousness of the SBTs. Further, Giesekam et al (2021) note that SBTi does not monitor or require disclosure of progress against the targets. Instead, this is left to the companies to perform on a voluntary basis through for example CDP. As they write, this means that there is no "penalty for lack of progress", which could result in "weaker corporate action where there is no financial or even reputational risk associated with non-compliance" (Giesekam et al., 2021, p. 15). These aspects point to the importance to recognize the risk of symbolic adoption and policy-practice decoupling and hence to the need to carefully examine not only the presence of targets but also the process to fulfill the targets.

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[13] With, firstly, the exception of Faria and Labutong (2019) who assessed the mathematical data behind the different methods. Above this, at least three Master Thesis have addressed different aspects of SBTi. Mnacakanjan (2017) investigated how SBTs are perceived by companies including perceived drivers and barriers, and identified nine such drivers, including easier communication on climate performance, cost savings, improved customer relations, higher CDP scoring, and improved investor relation (in general mainly corroborating findings presented in section 3.2.1 above on reasons to engage in voluntary practices). Further, Fink (2018) examined institutional factors that are likely to drive companies to set GHG targets and as such adopt SBTs. The findings indicate that "[h]aving sufficient information about costs and benefits of the necessary GHG reductions, being able to communicate to expert stakeholders, such as peers, suppliers, investors, and NGOs, as well as being informally monitored by those expert stakeholders, are structural attributes that are likely to drive" participation in programs such as SBTi (Fink, 2018, p. 74). Above this, it was found that reputation among customers of the companies did not play an important role for participating, due to the "intangibility" of the targets (Fink, 2018).

[14] It should be added that most companies have more than one target. When looking at a company level, it was found that 50% were on-path to achieve all their targets while 23% were behind on all targets. The rest were somewhere in between.

[15] Unfortunately, there is no data for targets that only include Scope 3.

2.3.1 Scope 3 Emissions and the GHG Protocol

Lastly, it should be noted that literature addressing companies' attention to Scope 3 emissions within the GHG Protocol framework seldom looks at targets or management for these emissions, the identified exceptions have already been presented above. Rather is it mainly focusing on the issue of data collection and conversion of activity data into emissions. There are good reasons for this, not least since effective carbon reduction strategies require accurate knowledge of a company's emissions (Downie & Stubbs, 2012). As argued by McKinnon (2010), the conversion factors also have a profoundly large impact on the emission data, exemplified with a study of a shipment of a single product between Eastern Asia and Sweden, in which the measured emissions could differ with as much as 129% depending on the method chosen. However, Scope 3 emissions have also gained increased attention concerning target setting, management, and actual emission reductions, not least driven by the fact that most companies have the largest share of their emissions in the Scope 3 categories (Patchell, 2018). As perceived by the author, these aspects have gained far from sufficient research attention.

2.4 Conclusions from the Literature Review

From the literature review, four research objectives are outlined that provides a proper operationalization of the overarching aims. These were presented in the Introduction chapter above. In this section, these objectives are motivated by the findings in the literature review:

- The first objective, concerning the background and intention to adopt SBTs, is motivated based on that the underlying intention to adopt targets and/or VEAs is argued to be important to understand decisions regarding its implementation (not least concerning *symbolic* or *substantive adoption*) (see Dahlmann et al., 2019). Further, the literature review point to that companies has a wide range of different motivations to engage in voluntary sustainability practices, which, logically, can influence decisions of what to include in the SBTs.
- The second objective, concerning the selection of Scope 3 categories, are motivated on basis of that the literature reveal that companies often prioritize addressing other emission sources than freight transports (both from own operations (e.g., Scope 1 and 2) and from value chain (e.g., Scope 3)) (see Evangelista et al., 2012; Jazairy & von Haartman, 2020b; Wolf & Seuring, 2010). It is as such important to investigate if there are aspects that make freight transports less feasible to include in the SBTs, and also to in general investigate why companies chose to include it in the SBTs or not. This, it is argued, is preferably operationalized by looking at the process of defining a Scope 3 boundary.
- The third objective, concerning the management of freight transports, is motivated on the basis that companies are found to often put low importance on environmental impact in their freight transport purchases (see Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010). As such is it important to investigate how the companies manage their purchased freight transports, what type of management that are implemented to correspond with targets, and if this indicates that the companies put sufficient importance on environmental (climate) impact.
- The fourth objective, concerning the impact from SBTs, is naturally important as it reveal whether or not the SBTs have resulted in any impacts, and if so which. As the research point to that *policy-practice decoupling* often is a risk in VEAs (or MSIs) (see de Bakker et al., 2019), it cannot be taken for granted that the SBTs are different. Findings specifically for SBTs also point to that even though target achievement seems to be common, the requirements do enable symbolic adoption (see Giesekam et al., 2021).

3 Theory – Framework for Integrated Assessments of Corporate Carbon Strategies

To investigate the four objectives of the strategies based on the SBTs (as defined in section 2.4 above), it is important to apply an understanding of *components* of a carbon reduction strategy. Such understanding is provided by Damert et al (2017), who has formulated a novel *framework for integrated assessments of corporate carbon strategies*. In this framework, a corporate carbon strategy is defined as "a complex set of actions to reduce the impact of a firm's business activities on climate change and to gain competitive advantages over time" (Damert et al., 2017, p. 124). It is composed of three "strategic objectives" (or, as defined in this study "*components*"): i) carbon governance, ii) carbon reduction, and iii) carbon competitiveness. These three components are important to suggest an analytical lens for each of the four objectives.

The first component, *carbon governance*, is understood as the managerial capability of a company to handle risks and opportunities regarding carbon reduction (Damert et al., 2017). It is composed of two objectives: i) organizational involvement, and ii) risk management, in which the first refers to how influence and responsibility for climate reduction are distributed within the organization and which internal governance mechanisms are implemented to engage carbon reductions. Risk management refers to assessments of both risks and opportunities related to climate change, such as natural changes, possible regulations, and changed consumer behavior (Damert et al., 2017).

The second component, *carbon reduction*, encompasses activities such as implementing carbon measurement, setting carbon reduction targets as well as implementing management practices to reduce emissions (Damert et al., 2017). The latter activity is in the framework restricted to product improvements, process improvements, and carbon compensation, which might be reasonable when evaluating corporate carbon strategies that only address Scope 1 emissions, but as the thesis looks at Scope 3 targets and management, it requires a broader understanding. Hence, the carbon reduction activities are not restricted to any specific type of activities, but to all activities that are implemented (or not implemented) to achieve the SBTs (besides this change, *carbon targets* have also been added as an activity).

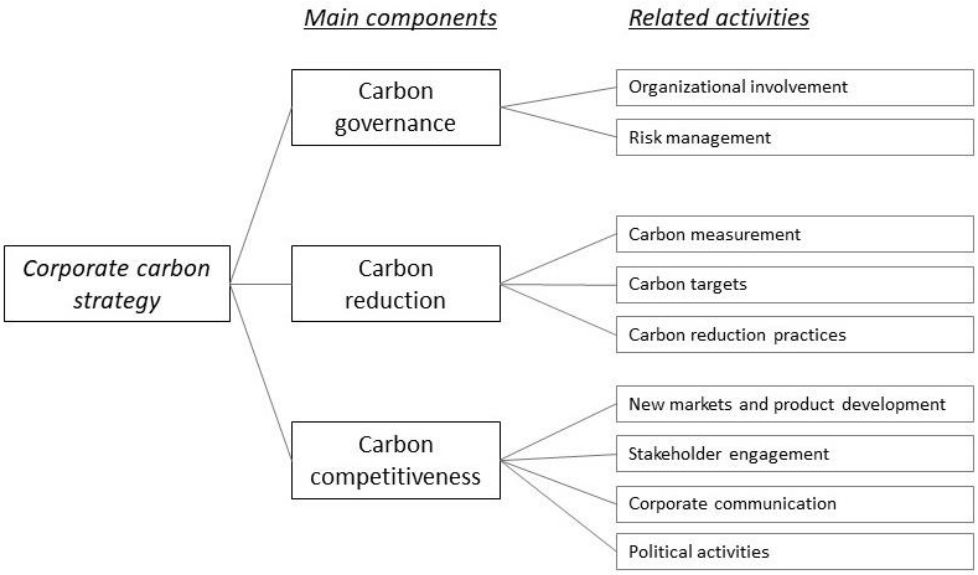
Lastly, *carbon competitiveness* refers to the activities in which the strategy is utilized, including communication, identifying new markets, and stakeholder engagement (Damert et al., 2017). In many ways, these activities mirror the underlying intention of developing a carbon strategy and can thus seem both symbolic and substantive (as discussed in the literature review) and are further an important research focus in an investigation of a corporate carbon strategy.

The framework is firstly used to set research focus in the sense that it stipulates that all of the three components are of relevance for understanding the full carbon reduction strategy. It must be stated that the framework both helps to analyze the research objectives that concern the background and formulation of the SBTs (e.g., research objective 1 and 2), as well as the objectives that concern the management and impact responding to the SBTs (e.g., research objective 3 and 4), as findings within the three components can suggest explanations to *decision relating to the formulation of the SBTs* as well as to *decisions and impact responding to the SBTs*. This means that the three components both are understood in how it *has influenced* the SBTs and how it has *been influenced* by the SBTs.

A major advantage of this framework is that it offers a broad understanding of carbon mitigation strategies without limiting it to a specific analytical reference. For example, several studies have been found that offers frameworks for a narrower analysis, such as focusing specifically on carbon reduction *practices* (see Cadez & Czerny, 2016), the influence of carbon management

and targets on firm value (see Shen et al., 2020), and influence of internal and external pressure on carbon management and disclosure (see Herold & Lee, 2019). However, a broad understanding of carbon reduction strategies is also suggested by Backman et al (2017) but as this is based on the *resource-based view* of the companies, it is less suitable for this thesis compared to the framework suggested by Damert et al (2017). Lastly, a benefit of this framework compared to others is that it is suitable for analyzing strategies for Scope 3 emissions as well as Scope 1 and 2. However, even with these benefits, no other studies have been identified that use the framework in investigations of corporate carbon strategies (except by Damert et al (2017), who use it to explore determinants of performance from corporate carbon strategies identified in a quantitative analysis).

Figure 3. Framework for integrated assessment of corporate carbon strategies.



Source: after Damert et al (2017)

4 Research Design and Methodology

4.1 Research Design

Given that the research design overall means that learnings and insights from the reference literature are applied in a novel setting (e.g., in a context in which transport purchasers has joined a VEA for carbon reduction) with the purpose to understand the decisions by the companies, it can be said that the thesis by its nature is both descriptive and explanatory and aims at making *generalized propositions*. For such a purpose, case study research is argued by several scholars to be well appropriate (see Eisenhardt, 1989; Evangelista, 2014; Voss et al., 2002; Yin, 2018).

A case study is according to Yin (2018) suitable for research concerned with "how" and "why" questions, which require an in-depth description and understanding of a research subject. It is further argued that "you would want to do a case study because you want to understand a real-world case and assume that such an understanding is likely to involve important contextual conditions pertinent to your case" (Yin, 2018, p. 15). As such, it is argued that that the benefit of case studies is that it does not separate the phenomenon from the context, but rather "investigates a [phenomenon] in depth and within its real-world-context (Yin, 2018, p. 15). Further, it also provides a flexible method in which insights from reference literature and findings in interviews can be utilized in an iterative process of designing each step of the research and in analyzing the findings (Eisenhardt, 1989; Yin, 2018). In other words, the benefits are, as clearly formulated by Voss et al (2002, p. 195): "Unconstrained by the rigid limits of questionnaires and models, it can lead to new and creative insights, development of new theory, and have high validity with practitioners – the ultimate user of research". Three different categories of case studies are generally defined: explanatory, explorative, and descriptive (Yin, 2018). In one sense, it could be argued that the thesis is of an explorative nature, as it builds upon previous knowledge to explore a novel setting. However, as the research is more concerned with describing "a phenomenon in its real-world context" and explaining "how some condition came to be (e.g., how or why some sequence of events occurred or did not occur)" (Yin, 2018, p. 287), it is rather characterized as a descriptive and explanatory case study research.

Even if theory-building is not per definition the aim of the thesis, it is important to note that the ultimate goal of doing case study research is not to gain a deep understanding of the particularity regarding the specific cases. Rather, which is well in line with the purpose of this thesis, is the purpose of case study research to "expand and generalize theories" (or "*analytical generalizations*") into propositions (Yin, 2018, p. 21). In this sense, theory building in one view concerns to "identify/describe key variables, identify linkages between variables, [and to] identify 'why' these relationships exist" (Voss et al., 2002, p. 198). In a similar view, it can seek either "corroborating, modifying, rejecting, or otherwise advancing theoretical concepts that you referenced in designing your case study", or to identify "new concepts that arose upon the completion of your case study" (Yin, 2018, p. 38). With this perception of theory-building does the thesis aim at making *generalized propositions*, that are identified among the case companies but can suggest explanations to the general problem addressed in the thesis.

It is important to note that case study research often is criticized because of the, as some argue, small amount of empirical data it is built upon. As such, critiques argue that it is not possible to suggest any scientific answers to research questions with such an approach (Flyvbjerg, 2006). Especially, this critique point to that case study research is not suitable for making generalizations, as it can be difficult to compare cases as each of them has too many unique aspects (Blaikie & Priest, 2019; Yin, 2018). As such, it is important to consider the external validity of a case study (Yin, 2018). This involves several issues, including the type of research questions, as it is argued that *why* and *how*-questions are most suitable for this purpose, the

methods for case selection (which is discussed below), as well as to compare the cases with previously developed theory (Blaikie & Priest, 2019; Yin, 2018). In order to strengthen the validity, these aspects have been reflected upon in each step of the research design.

4.2 Case Selection

A case study research can be designed either as a single-case study or a multiple-case study (Yin, 2018). While single-case designs may have strengths as it enables the research subject to be studied in a high level of detail, it is emphasized that multiple-case designs, in general, provide substantial analytical benefits and are less vulnerable to an individual case (Yin, 2018). With this in mind, the thesis has been designed as a multiple case study research. For case selection, the goal has been to select companies that enable a broad analytical basis suitable for making comparisons and generalizations. The selection has been guided by what Flyvbjerg (2006) calls "information oriented selection", which mean that cases "are selected on the basis of expectations about their information content" and are argued to "maximize the utility of information from small samples and single cases" (Flyvbjerg, 2006, p. 230). As noted by Eisenhardt (1989), such an approach requires that the researcher starts with collecting background information of the potential cases in order to be able to take active decisions on case selection.

The starting point of case selection was to make a catalog of companies within the research scope (e.g., Swedish companies with SBTs in the relevant business sector categories) together with information about the SBTs, especially if Scope 3 and purchased freight transports are included or not (an anonymized version of this catalog can be seen in Appendix D). With this catalog, it was found that among the companies that have not included freight transports, several belong to freight transport intense industry sectors, which pointed to the relevance to include both a group of companies that have included freight transports and a group of companies that has not. To select companies for these two groups, general estimates were made of the companies' freight transport intensity, business setting (B2B/B2C), geographical coverage of operation, size, and overall environmental/sustainability reputation (or of the business sector).[16] Even though the purpose is not to find statistically significant correlations, a variation of these characteristics is beneficial for the analysis and to make generalized propositions. As such, the intention was to have a variation of all of these categories besides size (as all companies that have been asked for participation are large), which was partly achieved but the intention was to include at least one more company without a good sustainability reputation (or that operates in such an industry), as well as more companies operating in B2C-setting.[17] It was also generally more difficult to get approval from companies without freight transports included. As a consequence, there are more case companies with freight transports than without. The final cases selected are shown in Table 4.

[16] As most companies within the research scope are either significantly or relatively well-known, this could be done without extensive data collection and interpretation.

[17] Two things should be noted here: 1) It would have been beneficial with more companies that only have operation in Sweden, but no more have adopted SBTs. 2) Since the thesis does not focus on the ambitiousness of the targets, the target level, target type, and time frame were not considered in the case selection.

Table 4. List of case companies.

Case company (nr)	*Geographic coverage of operation*	*Setting*	*Industry*	*Position interviewed*	*Freight transports included?*
C1	Multi-national	B2B	Manufacturing	Vice president Sustainability	No
C2	Multi-national	B2B and B2C	Manufacturing (forest based raw materials)	C2-1 –Director, Sustainability department C2-II – Director, Supply chain department	Yes
C3	Multi-national	B2B	Manufacturing (forest based raw materials)	Sustainability manager, Sustainability department	Yes
C4	Multi-national	B2B	Telecom	C4-1 – Program manager for Climate Action C4-II – Sustainability manager, Sustainability department	Yes
C5	Multi-national	B2B	Manufacturing of heavy duty-vehicles	Sustainability manager, Sustainability department	No
C6	Sweden	B2C	Retailing chain	Sustainability manager, CR Logistics	Yes
C7	Multi-national	B2B and B2C	Manufacturing of home electronics	Director of global energy strategies, Sustainability department	No
C8	Multi-national	B2B	Manufacturing and processing (forest based raw materials)	Sustainability manager, Sustainability department	Yes

4.3 Data Collection

In order to gain a deep understanding of the cases, the research design relies upon qualitative data collection methods. However, as stated by both Eisenhardt (1989) and Yin (2018), a combination of both qualitative and quantitative data collection methods can improve case study research by for example using quantitative data to indicate relations, and qualitative data for "understanding the rationale or theory underlying relationships revealed in the quantitative data" (Eisenhardt, 1989, p. 538). However, with the two data types collected as stated below (e.g., general information about the companies and the targets as well as the interview data), this objective has been somewhat achieved in the sense that the interview data can be compared to the other data. Further, another motivation to using qualitative methods is that both Evangelista (2014) and Jazairy (2020b) underlines that research within logistics on transport purchasers (and transport service providers) have dominantly been based on quantitative methods, which means qualitative methods have a potential to contribute with new insights.

The first step of data collection was to create a structured catalog with the companies included in the research scope together with information on the SBTs (especially if/if not the companies have targets for Scope 3 and freight transports). The method for collecting this data varied depending on which type of Scope 3 target the companies have: For companies with specific targets for different Scope 3 categories (accounting for around 3/5 of the companies), this information was available on SBTi:s website. For the remaining 2/5 (e.g., companies with one

target for either all Scopes or for all Scope 3 categories[18]), the information had to be collected either on the company's websites or by making contact.

The second, and primary, activity for data collection was to conduct interviews with representatives from the companies, which according to Yin (2018) are a suitable method for allowing in-depth studies of a case. To contact the companies, the author contacted either the reception or someone working with sustainability issues to ask for contact information to someone working with the company's climate strategy. This is in line with the door opener approach suggested by Voss et al (2002), and in all cases, it helped the author to get in contact with relevant representatives. The criteria for deciding interviewee were that the person should either work or have worked with the SBTs and as such be able to answer questions about the four overall research objectives. Detailed knowledge about logistics was not a requirement as the focus rather is on the climate strategy, but for one company a representative working with logistics within the supply chain department participated together with a sustainability representative. Out of 11 companies asked, 8 agreed to participate.

The interviews were structured as semi-structured interviews, which enables in-depth discussions about the different topics (Blaikie & Priest, 2019). Overall, the questions were structured according to the four research objectives as seen in Figure 2 (on page 3), which are in line with the understanding of a corporate carbon strategy based on Damert et al (2017).[19] All interviews were conducted online (partly because of the COVID-19 pandemic but also because of geographical distance). They were conducted either on Swedish or English, lasted between 45 minutes and 1 hour, and were all recorded (with permission) and transcribed by the author. Further, before conducting the interviews, the majority of the literature review had been conducted, which meant that a developed analysis of the subject was deductively embraced for the interviews.

4.4 Data Analysis

In the selection of methods for data analysis, the ambition has been to use an approach that does not risk shading the meaning of the data by requiring too extensive coding (see Eisenhardt, 1989), as this is seen to make the analysis of the in-depth case data difficult. Hence, thematic analysis was considered to provide a suitable approach for the research design as it, according to Braun and Clarke (2006, p. 78) "provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex, account of data". Thematic analysis is a method for "identifying, analysing and reporting patterns (themes) within data" (Braun & Clarke, 2006, p. 79). Braun and Clarke (2006) provide guidance of how such themes can be identified, which overall builds on admitting that a theme "might be given considerable space in some data items, and little or none in others, or it might appear in relatively little of the data" (Braun & Clarke, 2006, p. 82). This means that a theme cannot be identified based on the amount of space it is given, neither can it be said to "emerge" out of the data, as it is the researcher who actively decides what the themes are (Braun & Clarke, 2006). In other words, they argue against the idea of 'objective' methods for identifying themes, and rather stress that the "researcher judgement is necessary to determine what a theme is", and that it "need to retain some flexibility" (Braun & Clarke, 2006, p. 82). Even though this approach can be combined

[18] It turned out that for companies with one target for all Scope 3 categories, all companies have defined Scope 3 targets that are considered to be included, meaning it is possible to define which has included freight transports and not.

[19] The two interview guides used (one for companies with freight transports included in SBTs and one for companies without) are seen in Appendix E.

with both quantitative and qualitative methods, it does, in the views of the author, suit a qualitative approach well.

Further, thematic analysis can be both inductive and deductive (Braun & Clarke, 2006). In the case of this thesis has the theoretical perception of the author shaped the overall research focus, which has in turn influenced both the literature review, interview questions, and the overall structure of the analysis. In this sense, the *overall* coding is deductive. However, the case reports in section 5.1 below focuses both on what the theoretical perception points to are important and what is found to be of relevance in the interviews. To operationalize this, the definition of what is considered as a theme, is that a notion is considered as a theme if it is understood by the author to be important to i) describe a decision by the companies relevant to the four research objectives, ii) to explain a rationale, reason, and/or logic behind a decision relevant to the four research objectives, independently if it originates from the interview or theoretical perception, and iii) describe and explain impacts from the SBTs.

4.5 Reflections of Research Design and Methodologies

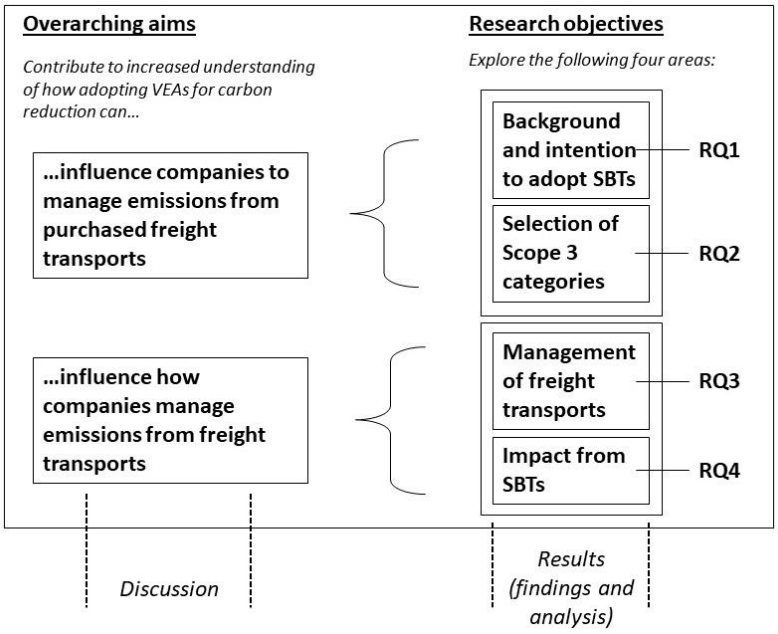
A few aspects concerning the data collection methodologies are relevant to explicitly address:

- It could be argued that a combination of more data types would have benefited the thesis. It was, in fact, considered to complement the interviews with a questionnaire sent to more companies. However, of reasons stated in section 1.3 above (mainly because of the limited number of Swedish companies that has SBTs), it would likely not have offered any analytical benefits to the thesis.
- In two cases (C3 and C6), the interviewees could not respond to all questions as they had started their positions after the SBTs had been adopted. However, this has not been considered a problem as they firstly could provide general answers to some questions while for other areas it was sufficient with answers from the other case companies.
- Out of several reasons, details on logistics (such as regarding the companies' non-environmental demands, collaboration with transport service providers, and climate consideration in the transport purchasing process) were not covered to a thorough extent even though such aspects were found to be important in the literature review. The two main reasons were lack of time in the interviews and that the interviewees (with one exception) did not specifically work with logistics (but on the sustainability department) and did as such not have knowledge on this level of detail. This however is not only seen as a limitation but is considered in the analysis and discussion.

5 Results

In this chapter, the findings from each case company will be presented in the first section and subsequently analyzed. As illustrated in Figure 4, the analysis will be structured according to the four research objectives, in which each sub-section will discuss each of the research questions. The results from the analysis will in the next chapter be subject to a discussion of what it reveals about the overarching aims as well as its contribution to previous knowledge.

Figure 4. Outline of results (findings and analysis) and discussion, according to the overarching aims and research objectives.



5.1 Findings

5.1.1 Case Company 1 (C1)

Table 5. Synthesize of findings from C1.

Background and Intention to Adopt SBTs	No history of strategic carbon management. SBTs used to set priorities as well as for internal and external communication. Internal decision, no external influence.
Selection of Scope 3 Categories	Freight transports not included. Decided based on relative significance of emissions; combination with cost-reductions also considered essential. Have not included more Scope 3 categories than required. External influence directed towards general GHG emissions, not specific Scope 3 categories.
Management of Freight Transports	No global company-wide strategy for freight transports; decided locally on plant-level.
Impact from SBTs	*Not discussed*

The overall reason to why the industrial manufacturing company C1 adopted SBTs was that it was in the process of setting strategic decisions on its climate work. Just prior, it had conducted its first GHG screening and was considering how to use the results. In this context, the

interviewee described that the approach by SBTi, to rely on climate science and to base targets on carbon budgets that are allocated to different industries, created a good narrative for the company to use for two main reasons: Firstly, it helped to identify emission sources in need of reduction in order to align the company *with science*, and through this set priorities and direct management attention. Secondly, it was perceived as a good narrative for communication, both internally to motivate engagement and externally towards different stakeholders.

The decision to adopt SBTs was based on internal discussions only. No external pressure to specifically adopt SBTs were perceived. As described, since C1 committed to SBTi early, there were no discussions about SBTs at the time. However, the interviewee has perceived that there today are more discussions around SBTs and also more external pressure, not least through increased pressure from investors. This has been felt by the company through that one of their largest customers, operating in the renewable energy generation industry, has adopted SBTs, which according to the interviewee not least is driven by that investors want to label that industry as low-carbon. This has pushed the customer to reach out to its suppliers, among them C1, in order to reduce its Scope 3 emissions.

Scope 3 categories are not specified in C1s target formulation. As described, this is not because of any specific reason, there was no discussion to do that during the time of adopting the SBTs. However, internally, the boundary is well-defined and covers *Purchased Goods and Services* and *Fuel- and energy-related activities*. The factor that has influenced which Scope 3 categories to include is its relative climate impact. The two categories just mentioned, according to the interviewee, account for roughly 90% of all emissions in the value chain. Other Scope 3 categories, with relatively small impacts, freight transports included, were as such not seen to be relevant to include. Further, considered when choosing Scope 3 categories is also the potential to combine emission reductions with cost reductions, which is considered to be a necessary criterion for managing an emission source. This is seen as a central benefit with managing emissions from purchased products and fuel- and energy-related activities, since a key measure for reducing emissions from both, are to use the energy and the products more efficient. However, the interviewee also stated that this factor, potential for cost-reductions, in fact, make freight transports feasible to manage, as many measures to reduce emissions from freight transports also result in cost reductions.

The interviewee described that stakeholder pressure was not an aspect influencing the selection of Scope 3 categories. It is described that the pressure they perceive for reducing its emissions, both regarding its SBTs and also in general, are not directed toward specific emission sources, but rather toward the company's total emissions. Regarding their customers who have SBTs, it is described that these companies are primarily interested in reducing its Scope 3 emissions, which means that they are not interested in exactly which types of emissions C1 is reducing. Further, neither data quality nor emission calculations were seen as an obstacle that has made it less feasible to include freight transports in the SBTs. C1 reports on upstream transports, meaning the transports they pay for, but not transports from the factories to their customers.

It is further described that C1 does not have a company-wide global strategy for management of freight transports. Decisions on transport purchases are taken locally at plant-level, and as the company has operations in several locations around the world, the top management (to which the interviewee belongs) has no overview of how decisions are taken. However, there have been internal discussions to start addressing freight transports strategically because of the potential cost-reductions, but for various reasons has this not been done. In such process, the interviewee believes the climate impact would also be addressed since reductions of costs often result in reductions of GHG emissions, but it is also emphasized by the interviewee that compared to the two included categories, freight transports accounts for a small amount of the

total emissions which mean that it would not be relevant to prioritize freight transports from a climate point of view. Further, on the question of what would increase the likelihood for the company to include freight transports in its SBTs, the interviewee responded that CO_2 taxes, especially EU-wide, would likely contribute to that given that it would result in higher costs for the transports and as such larger potential cost reductions.

5.1.2 Case Company 2 (C2)

Table 6. Synthesize of findings from C2.

Background and Intention to Adopt SBTs	History of strategic carbon management, based on LCAs. SBTi well-known; effective for stakeholder management
Selection of Scope 3 Categories	Freight transports included. Decided based on requirements, previous targets, relative significance of emissions, and possibility to influence. External influence directed towards general GHG emissions, not specific Scope 3 categories (although freight transports described as "visible").
Management of Freight Transports	Main measures: clean vehicles, transport optimization (including localization of production), and "lighthouse projects". Other measures (among others) include intermodal transports and eco-driving. CO_2 of equal importance as cost when purchasing transports (but after transport service quality); new KPI for CO_2
Impact from SBTs	Impact concerns the internal engagement and inter-departmental collaboration rather than how they work; have lifted climate on the internal agenda. Main reason is that top management is responsible for target fulfillment.

The main reason why C2 decided to adopt SBTs was, according to C2-I, firstly that climate is considered as an important sustainability area. Further, it was described that SBTi were seen as the climate initiative that is most well-known, has the best reputation, and also has the most advanced organization. No specific external pressure to adopt SBTs was mentioned, but it is described as a part of a wider stakeholder management strategy, in which C2 considers the importance its stakeholders (customers, consumers, and investors mentioned) put at different sustainability areas.

Scope 3 categories were firstly chosen on the basis of the requirements by SBTi. The criteria to cover 2/3 of the Scope 3 emissions meant for C2 that *purchased products and services* as well as *end-of-life treatment of sold products* had to be included. Besides these two was *waste generated in operation* included because the company already had a target concerning this that could be incorporated into the SBTs. Up- and downstream transportation and distribution were further added because it was large enough to fulfill the requirement, but also because it would be possible for the company to influence. By producing high volume and low weight products from forest-based raw materials, the company has large inbound and outbound transports and hence high emissions. External pressure was not described as a factor influencing the Scope 3 category selection, the external pressure or interest C2 perceive are rather directed toward their total emissions. However, it was added by both the interviewees that freight transports at the same time gain more and more public attention, not least because of growing online shopping and the visibility of trucks performing home deliveries, even though this did not influence the category selection.

For fulfilling the freight transport target, they generally focus on three overall measures. The first and most important measure according to C2-II, are clean vehicle technologies, which

overall means moving to gas and electric trucks. As described, however, electric trucks still account for a small share of the total fleet, which means that they have to work together with their transport service providers towards it. Other requirements they use are euro-classes in Europe, in which Euro 6 is the standard (but given certain conditions, they often have to accept Euro 5-trucks), and fuel consumption in the US. The second overall measure is to optimize the transports. This is described to include both measures that reduce the need for transport, such as moving production closer to markets and to improve the efficiency of transports, such as improving the load factor and reducing empty miles. These measures are described to not least be driven by cost reduction potentials, as freight transports are a large cost compared to the value of C2s products. The third measure is to run locally so-called lighthouse projects, in which new ways of working are tested together with customers and transport service providers (such as using longer trucks, packaging more effectively, testing new technologies, and try new solutions for city distribution). Even though C2-II describes that the results from this are not seen in the total emission reporting as these are small projects, it can both be visual locally and offer the potential to scale.

C2-II further describes that on top of these three measures, they continuously work with other types of practices as well. Regarding changing transport mode, it is described that they are increasing their intermodal share, but two obstacles experienced for shipping more with trains is lack of infrastructure (especially rail connections to warehouses) and non-environmental demands by customers. Eco-driving is described to be something they set as a requirement, but it is emphasized that follow-up is very difficult. For alternative fuels, gas (such as CNG) is the most interesting according to C2-II,[20] while biofuels are seen as a smaller niche solution. Further, C2-II describes that a challenge that has been enforced by the pandemic is that online shopping with home deliveries is growing, which means more trucks are used with lower load factor. A second challenge that C2 put attention to is the future of last-mile distribution, as it is perceived that many large cities, Paris mentioned as one example, will ban diesel transports. This has pushed C2 to start collaborations with other transport purchasers and transport service providers to find alternative means.

It is described that how C2 works with these practices have not directly been influenced by the SBTs, as the practices were in place also before. Not least is this said to have been driven by the fact that many of the practices combine CO_2-reductions with cost-reductions. But, as C2-II explains, the SBTs have created more "focus" around the targets. And further, compared to before, the climate impact is now a more important factor for decisions on freight transport purchases (and other aspects that impact freight transports, such as localization of production). Before the most important factor was transport service quality followed by price, but today transport service quality is followed equally by cost and CO_2-emissions. In line with this, the supply chain department, which C2-II is leading, has three KPIs to balance related to service, cost, and CO_2. It is noted that it is difficult to say if this change is only because of the SBTs, but it is described to have "helped". Regarding C2s own non-environmental demands for inbound transports, C2-II said they strive to balance CO_2 reductions and, for example, increased cost of inventory, and it is said that this balance has changed recently.

Further, it is described by both interviewees that a major impact from the SBTs is that it has lifted the climate agenda within the organization, which has generally created a strong focus. A reason for this, according to C2-I, is that the ownership of the targets is within the executive management team, which makes the top management responsible for achieving the targets. C2-I further added that the impact they have experienced regarding internal governance and on

[20] Which, it should be mentioned, are cleaner compared to diesel but offer small reductions of GHG emissions.

creating a focus on the included emission sources were not experienced from the previous internal climate targets. To this, C2-II added that the SBTs have created cross-function engagement for the included emission sources, and as such have helped break the "silo"-governance around the issues, which is considered very positive for reducing emissions from sources that are included. It is exemplified that C2-II today can discuss transport emissions with the market department, which has not been possible before. Lastly, it is said by C2-I that the SBTs have reinforced what they were already doing rather to push them to work in completely new ways.

5.1.3 Case Company 3 (C3)

Table 7. Synthesize of findings from C3.

Background and Intention to Adopt SBTs	History of strategic carbon management, based on LCAs. SBTs considered to give external credibility; internally used to structure carbon management. Internal decisions, but CDP said to have made it more feasible to adopt.
Selection of Scope 3 Categories	Freight transports included. Decided based on relative significance of emissions. External influence directed towards general GHG emissions, not specific Scope 3 categories
Management of Freight Transports	Previous climate targets for freight transports. Main measures: demands and collaboration on transport service providers as well as transport optimization. Accepts higher costs for transports "marginally", in some extent.
Impact from SBTs	Has increased "degree of structurization" and made it more important to work towards the targets; but have had small impact on how they work.

By being a company that is self-described to have had high climate ambitions for a long time, the decision to adopt SBTs was described as feeling natural and uncomplicated.[21] SBTs were, and still is, seen by C3 to be a valuable proof of credibility and quality for their climate agenda, which proves that they report and manage relevant emission sources and that they have followed a rigorous process to set the priorities. Mainly, the decision to adopt SBTs was described as internal without any notable external pressure. Although, one external influential factor mentioned is that CDP includes it in scoring, which contributes to making it more feasible. The SBTs are used for both external and internal purposes. Externally, it is described to be a good quality certificate to use for various purposes. Internally, the targets are used to structure the carbon governance, through that the targets are broken down in order to make responsibility for the different targets clear.

The selection of Scope 3 categories to include was based on the relative impact in terms of GHG emissions from the different categories. As described, C3 has conducted LCAs over a long period of time and did as such already have knowledge on which categories that were important. On basis of this was up- and downstream transportation as well as purchased goods and services included.[22] The interviewee described that no stakeholder pressure is perceived regarding which Scope 3 categories to work with, rather is it directed toward C3s total emissions.

[21] It must be noted, that the representative of C3 started its position after the SBTs were adopted, but says to have a good perception of the aspects that have been answered. Other aspects, which the interviewee felt less certain about, have been excluded.

[22] Beside these was also business travel and employee commuting included, which the interviewee explained was motivated by that everyone in the company should be able to contribute to goal achievement.

However, it was also added that the interviewee has noticed that investors are starting to ask for more specific information on reporting, which is interpreted as that it could eventually result in a higher interest in which type of emissions companies are managing. Further are not access to emissions data described as an obstacle, and even though it is described to be complicated it is not described to be more complicated than other Scope 3 categories.

By operating in a freight transport intense industry, with inbound transports consisting of raw materials from forestry and outbound transports with wood-based packaging materials, freight transports account for a large part of its total emissions. It is exemplified that annually; the company ship out more than 3 million tons of products. If up- and downstream transports are combined, it constitutes the largest Scope 3 category in terms of emissions. Given these conditions, C3 did already have climate targets for freight transports when adopting SBTs, which were incorporated and modified into the SBTs. Based on this, and the fact that the large transport volumes result in high costs, the company also had management striving to reduce costs and emissions from freight transports in place when adopting SBTs.

The roadmap, it is described, includes working with the transport service providers, both through setting environmental demands (such as on euro-classes) and through collaboration mainly with the larger ones, to reduce emissions. Secondly, in order both to reduce emissions and costs, it has focused on transport optimization, meaning to improve load factors, avoid longer routes than necessary, and other similar means. However, concerning transport optimization, it was described that cost reduction already constituted a sufficient driver: "route optimizing, increased load factor… you don't need climate targets to be interested in that".[23]

A common barrier mentioned for implementing these practices is non-environmental demands by the customers of C3. If they for example require a specific lead time, it might be that only one alternative exists which is not the most climate effective. On the question of if the company has changed its own non-environmental demands to create more flexibility for their transport service providers to optimize the transports and reduce emissions, the answer is that the interviewee does not know in detail, although do know that this is at least considered. Further, the interviewee answered that they accept higher costs for freight transports "marginally" but adds that this is difficult to answer as they do not have as specific decision on if and how much this is the case. It is also described to be complicated as Scope 3 measures cannot be quantified similarly to Scope 1 and 2 investments, which means that they cannot calculate the cost-efficiency of emission reductions from paying more for transport service (e.g., they cannot know how much emission reductions they get from each more spent money).

Regarding the other carbon reduction practices listed in section 2.1.2, the interviewee firstly said not to be in a position to be able to answer it in detail, but it was described that the company does work with all of the practices to some extent. Regarding supply chain changes, it was described that there is continuous work done to evaluate the transport need, but this has not been influenced by the SBTs nor the previous climate targets but are rather driven by cost reductions. The interviewee did not know exactly which type of environmental demand they use, but euro classes for trucks were mentioned. It was also added that to some extent, they do continuously work with changed transport mode, energy-efficient vehicles, and alternative fuels (beside transport optimization as mentioned above). However, it is mentioned, how they work with these practices has not changed notably because of the SBTs.

[23] Translation from Swedish by the author.

Even though the actual practices to reduce emissions from freight transports have not changed notably because of the SBTs, it is described that the targets do make it more important to work with it, especially the part of the road map that does not have large cost reduction potentials. Further, it is described that the "degree of structurization", has increased. This is in line with the general impact of having SBTs, which is described to be that they rather do more of the same, with a more structured and impact-oriented governance, than work in completely new ways.

5.1.4 Case Company 4 (C4)

Table 8. Synthesize of findings from C4.

Background and Intention to Adopt SBTs	History of strategic carbon management, based on LCAs. Had prior climate targets which were not substantially changed when adopting SBTs. SBTs considered effective for stakeholder management. Internal decision without notable external pressure; CDP considered but not primary factor.
Selection of Scope 3 Categories	Freight transports included. Scope 3 boundary decided based on LCAs (not only climate impact); decided when setting prior climate targets. Have included more Scope 3 categories than required (use of sold products would have been sufficient).
Management of Freight Transports	No transport-intense value chain; small and light products. Main measure: change air transports for "surface transports", which surface transport not strategically prioritized. Other measures: regionalization (supply chain structure changes), transport optimization.
Impact from SBTs	Impact comes from that SBTs have been communicated from top management. Creates pressure on whole organization to fulfill the targets. Shows that climate experts influence business model rather than work in a "corner" at sustainability department.

The telecommunication company C4 adopted SBTs mainly because it was seen to be a good initiative that could be used to show customers and supply chain actors that they take the climate challenge seriously and strive to reduce its emissions. As described by C4-II, the fact that SBTs can improve CDP scoring was considered as one aspect, although it was not the primary reason. It is further described as an internal decision without external pressure. In general, SBTs are perceived as a standardization method for corporate climate actions, which offers a suitable carbon reduction path to follow, but it is added by C4-I that it could just as well have been an ISO standard. However, the interviewees describe that they have been critical of some of the criteria, which are perceived to be too flexible. For example, C4-II noted, are the lack of standardized emission factors a problem as it means that companies can report emissions and emission reductions differently, which could enable greenwashing.

The selection of Scope 3 categories was described to have been decided before adopting the SBTs. C4 has had climate targets since 2008, and since 2012 has the targets also included value chain emissions, covering downstream transportation, business travel, and use of sold products. When formulating these targets, an LCA method was used in which downstream freight transports and business travel was considered to be part of the company's own activity, even though it is not according to the GHG Protocol. Because of this, the categories have been included also in the SBTs even though it is not formally required by SBTi (use of sold products, accounting for around 80% of all emissions according to C4-I, would alone fulfill the

requirement to cover 2/3 of the Scope 3 emissions). Another factor mentioned to make it feasible to include freight transports in the targets is that it is "in the hands" of C4 to influence. They plan the logistics and can thus decide to do it with lower emissions. Lastly, it is also mentioned that for both freight transports and business travel, they want to enable everyone in the company to contribute to the target.

The main activity implemented to fulfill the target is to replace air transports with surface-based transport modes.[24] Exactly which surface-based transport mode it is replaced with (e.g., ship, trucks, or train), is described by C4-I to not be important but rather depends on the supply chain. An important background to this is that C4, in comparison to the other case companies, has a significantly less freight transport intense value chain. The products are further small and light, as most of them, according to C4-I, in the end, are manually carried up in masts, which mean they are able to transport by airplane. Besides to fulfill the climate targets, an important driver for this activity is to reduce costs, as air transports according to C4-I can be 11 times more expensive per kg freight compared to ships. As such, the supply chain department (who are the driver of the target) have KPIs both on cost and on CO_2 and are required to decrease both.

It is described by C4-II, that as they plan their logistics, it is possible for them to plan for longer lead times and as such enable usage of slower transport modes. It is further described by C4-II that air transports have reduced from 40-50% in 2012 (when the first climate target for transports was adopted) to 25% today. However, common obstacles experienced for this relates to non-environmental demands concerning time which necessitates air transport, either from customers (which is described to be difficult to influence even though they strive for it) or from project managers within C4. For the latter, the sustainability department strives to push for change, and it is described that with the climate targets, they have gained a stronger mandate from top management to do it. Other practices stated to be used to reduce emissions from freight transports are firstly regionalization of supply chain activities, meaning to locate production close to markets when possible. Further, C4 continuously works with transport optimization, for example by collaborating with transport service providers that can offer effective routing and by striving to improve load factors.

Generally, the impact from the SBTs comes according to both interviewees from the fact that the targets have been publicly communicated, and especially from that the CEO has communicated them. The SBTs themselves are not perceived to drive, as SBTi does not monitor target progress. In line with this is it described that the impact from the SBTs is not very different from the impact from the previous climate targets, given that these were also publicly communicated. The main impact, from both targets, is described to have been that it creates pressure on the entire organization to work with the targets, as it is important for the top management to be able to show investors that the communicated targets are being fulfilled. According to C4-II, it is as such further important for the top management that climate experts are not only working in a "corner" at the sustainability department, but that climate consideration is a part of the business model. This, it is described, have given the sustainability department a larger mandate from the top management to influence other departments.

[24] Regarding this, it is stated by C4-I that they are currently considering developing the SBTs, which means that they describe how they have worked with the targets since it was first adopted.

5.1.5 Case Company 5 (C5)

Table 9. Synthesize of findings from C5.

Background and Intention to Adopt SBTs	History of strategic carbon management Used to set strategy and for internal and external communication purposes. Internal decision but influenced by attention SBTi has gained.
Selection of Scope 3 Categories	Scope 3 boundary exclusively cover Use of Sold Products. Decided based on relative significance of emissions, possible impact, and lack of data for other Scope 3 categories. (Freight transports excluded partly because it accounts for low share of emissions)
Management of Freight Transports	Separate climate targets for freight transports.
Impact from SBTs	SBTs important for business strategy; equal importance as targets for sales and finances. Influence on company-wide governance; comes from that top management has decided that target achievement is of high priority.

The reason why the manufacturer of heavy-duty vehicles, C5, adopted SBTs, it is described, was that it aligned well with the strategic climate vision for the company. It is described that they already tried to work based on science, for example by basing main decisions on the *Carbon Law* (e.g. to achieve a halving of CO_2 emissions every decade). It is further described that they perceived that it would be beneficial as it would both help to set internal priorities and to identify areas in need of investments, as well as that it would be a strong statement both internally and externally. Even though it is described as an internal decision, it is said that the attention SBT has gained naturally influenced their decision to join.

The Scope 3 target exclusively cover *use of sold products*. Four main reasons for this were mentioned. First, by producing heavy-duty vehicles, use phase-emissions accounts for a dominating majority of the total emissions (around 96% of all emissions and 98-99% of Scope 3 emissions, according to the interviewee). Second, it was described that the company strives to work impact-oriented, meaning to put attention where they can impact most. As use phase-emissions is the by far largest emission source, they wanted to focus on it. Third, it was described that compared to other Scope 3 categories, they can access reliable emission data. This is because all their sold products since 2011 automatically calculate fuel consumption, and that they have access to the data. As such are data access to other Scope 3 categories, relative to use phase-emissions, complicated. Forth, it was also added that by the requirements of SBTi, it was mandatory to include use of sold products.

That freight transports specifically are not included is further explained by three main reasons. First, when adopting the SBTs, C5 already had a climate target for freight transports. It was further another department within the company that was responsible for this target. Second, since freight transport accounts for roughly 0,4% of the total emissions, according to the interviewee, it is perceived to be more impact-oriented to focus on use of sold products. Third, access to emission data is described to be a problem, as they not only purchase freight transport services conducted by vehicles they have produced. However, it is described that there are ongoing discussions to include freight transports as new targets, starting in 2025 when the current expires, are being formulated. Further, it is said that something likely would have pushed the company to include freight transports in its SBTs likely would have been if SBTi required companies to include more than one Scope 3 category, or all with relevant emissions.

The target for use of sold products is described to be planned to be fulfilled with three overall practices. It includes first to optimize the engine in new products, including moving to electrification, second to reduce emissions from existing vehicles through driver education programs, and third to increase the share of renewable fuels and energy used by their customers (especially are biogas seen as an important fuel). To calculate the emissions, the well-to-wheel (WTW) approach is used, meaning all emissions from the life-cycle of the fuels, in difference to the tailpipe approach, which looks at the fuel consumption. Average emission factors for different types of renewable fuels and countries are as such used to monitor progress. To find business models in which C5 can contribute to the usage of renewable energy, for example by partnerships or investments, is described to be an ongoing project. Further, it is described that compared to the EU regulation for CO_2 emissions in new trucks, is the SBTs more ambitious. However, as the EU regulation are based on tailpipe fuel consumption, it is difficult to compare.

By selling trucks (among other heavy-duty vehicles), it is emphasized that C5 influences emissions from freight transports in other means than through its freight transport purchase. This, it is described, could potentially become a problem if freight transports were included in the SBTs, as all transports performed with trucks produced by the company is already included. Further, it is added, does C5 also have internal targets to contribute to high load factors in their customer's transports, among other by offering assisting technical devices, which means they also influence the efficiency of transports (although they are not allowed to monitor this towards their targets according to SBTi).

The SBTs, it is said, have become a particularly important part of the overall business strategy, and are described to be of equal importance as targets for sales and finances. Not least, this come from the fact that the top management has decided that it is important that the targets are fulfilled. A strong benefit is further said to be that the SBTs are company-wide, which means it involves and engages employees in several departments, and that it is easy to break down and allocate responsibility to different departments. Generally, it is said to have had large impacts on the overall corporate governance, as it influences a wide range of decisions, not least regarding priorities and investments. However, it also said that the company likely would have formulated similar targets even if it was not for SBTi, but the fact that it is SBTs give more credibility to the targets, which enforce the statement of it both internally and externally. And, it is lastly mentioned, does the fact that the targets are publicly communicated as ambitious targets make it even more important that it is fulfilled.

5.1.6 Case Company 6 (C6)

Table 10. Synthesize of findings from C6.

Background and Intention to Adopt SBTs	History of strategic carbon management; SBTs one of three climate targets. SBT provides internal and external credibility as well as expertise for setting relevant targets.
Selection of Scope 3 Categories	*Interviewee started after SBTs were adopted.* (but freight transports largest emission source).
Management of Freight Transports	Main measures: a fuel strategy is currently formulated, including measures on renewable fuels and electrification. Broader scope than SBTs. Include target for zero emissions from all freight transports latest 2030. Other measures: change trucks for trains (although said they can do more for it), transport optimization, influence policy.
Impact from SBTs	Large impact for how they manage freight transports; Sets higher environmental demands on transport service providers. Pays more for freight transport to achieve the targets (not only SBTs).

For the retailing company C6, the SBTs are one of three targets relating to climate. One of these, stating that the company is to have net-zero emissions from its own activities latest 2030, is planned to be aligned with the SBTs as SBTi launches the standard for net-zero targets. As the interviewee has worked at C6 for two years, and hence started after the targets were adopted, the interviewee cannot explain the actual background to why the company adopted it. However, three main aspects that make SBTs feasible were provided: First, SBTs are said to provide credibility both internally and externally, as SBTi relies on science and are a result of collaboration between credible organizations. Because of this, it is said to become clear that the climate targets are not just made up within the sustainability department but rely on actual science. Second, SBTi offers expertise for setting relevant targets. As it is described that C6 operates within a complex industry with many suppliers, this is much needed as a single company cannot, according to the interview, sit on the same competence level internally. Third, it is said that SBTs do give a push for the climate ambition in general. Regarding external pressure, it is said that it mainly influences C6 to have high climate ambitions, not specifically to adopt SBTs.

Since the interviewee started after the targets were adopted, the interviewee cannot explain the details on factors that influenced the selection of Scope 3 categories. It is however added that it is natural that freight transports are included, as this is, according to the interviewee, the largest emission source after having passed both energy and refrigerants. For the freight transport target, it should first be mentioned that only downstream transports are included. This covers all transports between warehouses are stores, as well as between warehouses and customers for online shopping. Further, C6 includes both purchased transports and transports performed by the company's own transporting company in the target (although the latter is not formally a Scope 3-activity), yet, it is added, does the latter only account for a small share of the total transport work.

The roadmap to fulfill the target firstly includes a fuel strategy that is still being designed. The scope of the fuel strategy is larger than in the SBTs, as it also includes inbound transports (e.g., upstream). Further are specific targets formulated within the strategy, stating first that all freight transports (purchased and internal) in larger cities in Sweden are to be fossil-free latest 2025, and further that all freight transports in Europe are to be fossil-free latest 2030. All functions within the company group (e.g., functions that sell different types of products and services under separate names) are designing their own roadmaps, which are internally coordinated. To achieve the targets within the fuel strategy, they both set environmental demands on their transport service providers and collaborate with transport service provides as well as truck manufacturers, for example regarding electrified trucks. Further, it is described that it is important to consider changes in the biofuel market. Today, they use different kinds of biofuels (biogas, HVO, and rapeseed-based mentioned) but the current dependency on HVO is said to be problematic and they thus strive to use less of it. The reason for this, it is described, is both that the current usage of PFAD (a rest product from palm oil production) result in large sustainability concerns related to deforestation, and that there are risks of low supply and as such cost increases. Lastly, they also strive to move to electrification, but even though the technical progress is said to go faster than expected, it will still take at least 6-7 years before it is an alternative for heavy transports (although for smaller vehicles delivering in cities, it will likely change faster, it is added).

Other measures that are said to generally be used to reduce emissions from freight transports is firstly to use trains to a larger extent. However, it is added, since C6 to a large extent sells food, the modal choice must be balanced against increased lead times, as this can result in more food waste. Although it is said they work with this, it is also said that this is something that the interviewee perceives they could do more around. Further, they work with efficiencies and transport optimization, for example by increasing load factors, optimize routes and test longer

trucks. To summarize, it is said they collaborate internally, with transport service providers, truck manufacturers, and fuel companies, participate in the *transport challenge* (described in section 1.3 above), and they strive to influence important regulations.

Overall, it is said that the SBTs have had a large impact on how C6 manages its freight transports. As described, the targets set the level for how to work, out of which they structure their work. It has, more precisely, meant that they do put higher environmental demands on their transport service providers compared to before. And further, it is said, that in order to achieve the targets, they do higher costs for their transports, exactly how much is said to be difficult to say but they do pay more for their transports today. A question which the interviewee cannot answer is if and how they have changed their own non-environmental demands for inbound transports, as the logistic department are responsible for those aspects (although it should be noted, inbound/upstream transports are not included in the SBTs). It is further emphasized that freight transports are a particularly challenging sector to reduce emissions from. An experienced impact is also that the SBTs allows them to compare themselves with competitors in Sweden and other retail chains abroad, which motivate engagement as they strive to be "best".

5.1.7 Case Company 7 (C7)

Table 11. Synthesize of findings from C7.

Background and Intention to Adopt SBTs	History of strategic climate targets, based on LCAs; SBTs identical to previous climate targets. SBTi perceived feasible as it provides expertise and third-party validation; replaces "gut feeling".
Selection of Scope 3 Categories	Scope 3 boundary exclusively covers Use of Sold Products. Decided based on relative significance of emissions; preferred to focus on one category to focus effort; data for other Scope 3 categories considered problematic (especially freight transports). Considers adding more categories.
Management of Freight Transports	Separate climate targets for freight transports. Perceived it would be positive to include freight transports in SBTs.
Impact from SBTs	SBTs have "sharpened" the effort on the targets, but as the targets are the same as the previous targets, it has meant no concrete changes.

The manufacturer of home electronics, C7, has a strategy to be a leader within the field of sustainability. This is said to be a position their stakeholders and owners consider to be important for them to keep. On basis of this, C7 is described to have several sustainability targets with strong support in the organization, among them regarding climate. In 2015, the first climate targets were set, based on LCAs, which included Scope 1, 2, and use of sold products within Scope 3. It is described that it was perceived to be difficult to choose a suitable ambition level for the target, as they had to rely on a "gut feeling" rather than actual science. In that perspective, it is described that the launching on SBTi was perceived very positive, as it functions as a third-party validator that a company's way of working is in line with science. The decisions to adopt SBTs are described as taken internally. However, it is said that since SBTs are included in CDP and other rankings, it did become easier for the sustainability department to get top-management approval. Among the benefits that were perceived with SBTs was that it would validate that the ambition level aligns with science, in line with what was just mentioned, and that they as such can point to the targets to say that they do what is necessary. This possibility, it is described, has been found to be very positive in dialogues with stakeholders and owners as it provides credibility.

Adopting the targets are described to have been an easy process. The company hired external help to formulate the climate targets they already had as SBTs. After submitting the targets, it took roughly one month to reach approval (without any notifications) from SBTi. Because of this, it is described, has the SBTs not led to any notable new ways of working, although other benefits are described.

For Scope 3, C7 exclusively have included use of sold products, which means that they focus on improving the energy efficiency in their products. A few main reasons to this are mentioned. First, as described, use phase-emissions is the by far largest category as it accounts for over 90% of the total value chain emissions. As such, it is said, would it more or less not "make sense" to focus on the other categories. The second described reason is that they preferred to focus on one category where they could make a significant difference, instead of including several categories with the risk of not fully delivering on them. It is also described that every included category is an administrative burden, which makes it less appealing to include more. A third reason is that they can access reliable data on use phase-emissions, as they know the energy efficiency of their products. This is described to differ significantly from freight transports (and other categories), in which they consider the dependency of estimations and lack of real-world data to be a problem.

However, as also added, the fact that the other categories are not included in the SBTs does not mean they do not focus on it. For several other categories, including freight transports, they have both climate targets and strategies in place. To achieve the target for freight transports, C7 mainly focuses on biofuels, electrification, and transport optimization. Besides this, it is also described that they are looking at including the freight transport targets into the long-term incentive programs for senior executives (which the climate targets already are), to push for more engagement.

Further, it is said that the interviewee perceives that it would be beneficial to have logistics included in the SBTs, as it provides a credible "third-party frame" of the issue, which is seen to put more pressure on it internally. Not least, this come from that they disclose progress on the targets. By including it in SBTs, it is further said, they could also be confident to have sufficient ambition levels, not too low and not too high. They are also discussing adding more Scope 3 categories as the SBTs are to be developed. However, it is also said that the interviewee considers the principle to start with large emission sources and later add more is correct. Generally, it is said that the SBTs have not had any specific impact as they have mainly been a new "stamp" on the old climate targets. But at the same time, it is perceived that the SBTs have "sharpened" the way they work with the targets, and because of this as well as other reasons mentioned, it is perceived to be positive to have SBTs.

5.1.8 Case Company 8 (C8)

Table 12. Synthesize of findings from C8.

Background and Intention to Adopt SBTs	History of strategic climate targets, based on LCAs; SBTs identical to previous climate targets. External validation by SBTi seen as a proof of substantiate targets. SBTs considered effective for meeting expectations from costumers (including well-known consumer brands).
Selection of Scope 3 Categories	Freight transports included. Scope 3 boundary same as prior climate targets All relevant Scope 3 targets included; decided based on significance of emissions, ability to influence, and how it impact business value.

	External influence directed towards general GHG emissions, not specific Scope 3 categories.
Management of Freight Transports	No previous sub-target nor company-wide strategic management of freight transports. Are currently being formulated. Freight transports considered as one of the most complex emission sources to decarbonize.
Impact from SBTs	No concrete changes but pushes the agenda internally.

For C8, the decision to adopt SBTs is said to be based on that they want to be seen as leaders within sustainability and climate. It is described that they have a long history of working with climate targets, the first was adopted in 2005 and the first covering Scope 3 emissions, based on LCAs, in 2011. When committing to SBTi, the company submitted the targets from 2011 without any changes and had them approved. This decision is said to have had both internal and external drivers. Internally, it is described that it was seen to be right to have the external validation *based on science* that SBTi provides. Not least was this the case because, as described, corporate climate targets can be very symbolic. As such, to have SBTs was seen as a mean to prove that the targets are ambitious Further, it is said that because they are based on science and externally communicated, the SBTs are helping to push the climate agenda internally. Externally, it is described that many of their customers, including globally well-known brands, expect that their suppliers are contributing to reducing their value-chain emissions. As such does C8 put "the highest standard" on how this is done, for which the SBTs are seen to be effective.

The Scope 3 boundary has not changed since 2011, and as such has the formal requirements by SBTi have not influenced the selection. It is described that because they want to be seen as climate leaders, they want to take responsibility for their full value chain, and have hence included all Scope 3 categories with a few exceptions. Three factors have influenced the selection: The first two are the significance of the emissions and the company's ability to influence the emission. On basis of these two, it is said that for example employee commuting has been excluded. The third factor is how it impacts business value. This is exemplified with that they have included waste from their own operation, even though it is a very small emission source, on the basis that it is important for some of their customers, of which some has targets for zero land-fill in value-chain.

It is described that freight transports have been included on the basis of these three categories, even though it is not among their largest Scope 3 emission sources. Further, it is added that for freight transports specifically, it is very visible both internally and externally and that many people automatically think of transport when they think of climate. This has also added to the importance to include it in the target boundary. However, it is added, to not include freight transports was never considered as an alternative.

Regarding external influence, it is said that they in general have not perceived that stakeholders influence which of the Scope 3 categories to include or manage. It is described that the GHG Protocol and CDP (in which companies have to motivate exclusions of Scope 3 categories) set the "external expectations" Although, there are exceptions to this as the business value-factor mentioned above is based on the importance external actors put in specific categories, similar to the fact that freight transports are considered to be visible externally.

In difference to several of the other included Scope 3 categories, C8 does not have a sub-target for logistics. This is described to be because it so far has not been prioritized to strategically work with emissions from logistics. As the first value chain targets were adopted in 2011, it was decided to focus on the largest categories, and so far, that has been the priority. However, it is further said that they now are in the process to set sub-targets for logistics and have started a

project to decide both a suitable target level and a roadmap to fulfill it. The ambition in this, it is said, is to understand and visualize all trade-offs regarding logistics, to be able to set KPIs, that employees in the whole organization can use to make informed decisions. Furthermore, it is said that logistics is an extraordinarily complex sector to decarbonize, one of the most complex. For C8, it is described that this is because there are many decision points, taken by many employees within the company, that impact the emissions from logistics, and that they further have large volumes of goods being transported up- and downstream. In the roadmap, besides KPIs, the ambition is to have a strategic plan for which practices can be used to reduce emissions in different parts of the organization and the world.

A general background to why C8 has initiated this process is that they have realized that the actions now taken for logistics are not enough to contribute to the Scope 3-target. However, it is described, this is despite that there are many good initiatives going on. They have KPIs for supplier selection and they are for example striving to increase rail transports where possible (for example in Europe where rail infrastructure exists), reducing air transports and to optimizing the routing and load factors. Further, it is described that they have internal CO_2-fees to contribute to CO_2-effective decisions. It is further noted that the driver for this not always is reduction of CO_2, but rather to reduce costs.

It is described that they do not perceive any external pressure on how to reduce emissions from transports, as customers, in general, do not show interest in that level of detail. It is further said that the interviewee does not know if and how the company has changed its non-environmental demands to enable more efficient transports but adds that this will likely be addressed as they evaluate trade-offs. Further, the interviewee neither knows if the company, in general, accepts higher costs as a mean to reduce emissions from freight transports.

Generally, it is said that the SBTs have not had any *concrete* impacts on the company's carbon management and on how high on the agenda climate is internally, as they already before had the same climate targets which were high on the agenda. However, as described above, is it also seen to have helped to push the climate agenda internally, and it is concluded that it is difficult to define the exact impact from it, but that it, either way, is considered positive to have the SBTs.

5.2 Analysis

As stated in section 5 above, the analysis is structured according to the four research objectives:

5.2.1 **Background and Intention to Adopt SBTs**

The background described by the interviewees to why the companies have adopted SBTs clearly illustrate that the companies tend to have a history of working strategically with sustainability in general and climate in particular, with only one exception (C1) who described that adopting SBTs were a part of starting to work strategically with climate. This is in line with the suggestions by Kin and Lenox (2000), that companies known for high environmental performance are more likely to join VEAs. Further, several of the companies described that they have had climate targets prior to adopting SBTs, and others also described that they were doing LCAs prior to adoption. Among the companies that already had targets, two described (C7, C8) that they did not do any significant changes with the targets to get it approved by SBTi. This likely means that companies adopting SBTs tend to have a history of working strategically with climate issues, although exceptions exist.

The descriptions of the overall reasons to adopt SBTs are in many ways similar among all interviewees. One aspect mentioned in different ways in most interviews is that SBTs are

perceived to provide credibility and to be a quality proof for the climate targets and strategy. Especially the fact that it is validated by a third-party organization, and that this validation is *based on science*, is described to have been a major factor that made it feasible to adopt (and is also considered as an advantage to have SBTs). This, it is illustrated in the interviews, is perceived to be beneficial for both internal and external communication. Further, a reason described by several of the companies is that the SBTs either have helped to set priorities and/or ambition levels or that it has provided legitimacy to the prior priorities and ambition levels.

All interviewees described the decision to join as taken internally, without any requests or pressures from stakeholders to specifically adopt SBTs. The descriptions by the interviewees further illustrate that SBTs tend to be seen as effective for meeting stakeholder expectations, not least from owners, investors, customers, consumers, and suppliers. C6 (a retailing company in B2C setting), for example, described that pressure from its consumers necessitates ambitious climate action. C8 (in B2B setting), further, described that it is important for their customers (including well-known consumer brands) that their suppliers work proactively with climate issues, why they have chosen to act in a way that is interpreted to be most ambitious. The fact that CDP includes SBTs in its scoring and as such impact access to capital is also described to have influenced, for example by making it easier to convince top management to adopt SBTs (C7), although is not described as a primary driver by any of the interviewees. It can as such be said that SBTs are used for stakeholder management and that companies are more likely to adopt SBTs if they consider it effective to meet stakeholder expectations.[25]

Generally, the findings indicate that for many companies, the purpose of adopting SBTs is not to implement large overall changes in the companies' prior climate strategies, for example in regard to which Scope 3 categories to manage strategically. Rather do the descriptions illustrate that many companies already have a strategy, or an idea of how they work with climate issues, often based on LCAs, which are incorporated into the SBTs. This finding is important as a background to the remaining objectives.

5.2.2 Selection of Scope 3 Categories

General approaches to Scope 3 boundary

For the setting of Scope 3 boundary, the findings firstly illustrate that there are three overarching approaches used by the companies. A first approach is to stick to the minimum requirements of how large share of the Scope 3 emissions to include (e.g., that it covers 2/3 of all Scope 3 emissions), which among the case companies has meant that one or two categories have been included. A second approach is to include a few more categories than the minimum requirement, and a third is to include all categories which are considered relevant (only used by C8). Generally, it seems to be both advantages and disadvantages with all three approaches.

Factors influencing

The findings indicate that the most important factor influencing the selection of Scope 3 categories is the relative contribution to a company's total CO_2 emissions (e.g., the *relative significance of emissions*). This means that it is not necessarily the transport intensity of a company's value-chain that influences if freight transports are included or not, as suggested by Martinsen and Huge-Brodin (2014) but instead its CO_2 contribution relative to other categories. In line with this finding, all three of the companies that have not included freight transports

[25] In a further note to this, C1 described to have perceived pressure from customers specifically directed toward SBTs after having adopted it and said this has become more common last 1-2 years, as companies with SBTs can have an interest in that its suppliers adopt SBTs (especially if the company has formulated its Scope 3 targets as supplier engagement targets). This could point to that external pressure directly toward SBTs is growing in importance for motivations to adopt SBTs.

(C1, C5, C7) are operating in freight transport intense industry sectors (industrial manufacturing) but does all have other Scope 3 categories that dominate total emissions (e.g., purchased goods and energy-related activities for C1 and use of sold products for C5 and C7). Among the companies that have included freight transports, it is described to either be a relatively large and dominating emission source and as such mandatory and *obvious* to include (C3, C6), a large but not dominating category and as such not mandatory to include (C2), or relatively small but included by other reasons (C4, C8). Considering the transport intensity and type of industry sector of the companies, it is clearly illustrated that emissions in absolute terms and transport intensity are not the primary influencing factors. This finding, that the relative significance are the most important factor, is perhaps not surprising as it is the rationale for using LCAs and/or emission screenings to identify impact hotspots, and it is, as seen in 2.3 above, also in line with the guidelines and intention by SBTi. The importance of this finding will however be further discussed as the aspect of influences to manage purchased freight transports are discussed in the next chapter.

Further, the findings indicate that a second important factor is the companies' ability to influence the emissions, which is also in line with the guidelines by SBTi. For this, it is indicated that it is not perceived as a barrier for including freight transports, rather, even though several companies described it to be profoundly challenging to reduce emissions from freight transports, it is described to be within their hands.

Continuing, the findings from the three companies that have not included freight transports suggest two further reasons why companies are not including freight transports. A first is that if a company already has a target for freight transports, it can be used as a reason not to incorporate it in the SBTs (at least not if it is not necessary to fulfill the requirement to cover 2/3 of the Scope 3 emissions). Second, as in the case of C1, can the lack of a strategic grip and overview of how decisions on freight transport activities are taken in a company make it less feasible to include it in the SBTs. This is in line with the suggestions by Wolf and Seuring (2010) that multi-national companies often do not have a strategy for freight transports, which puts up barriers for starting to address it.

External pressure

Regarding external influence and stakeholder pressure, the findings illustrate that this in general is perceived to be directed toward the companies' total emissions, and not toward specific emission sources within Scope 3. This means that external influence and stakeholder pressure is not a factor either increasing or decreasing the likelihood to include freight transports, which is not in line with suggestions in the consulted reference literature which point to that companies are more likely to face pressure to manage other emission sources than freight transports, especially from raw materials (see Huge-Brodin et al., 2020; Jazairy & von Haartman, 2020b; Martinsen & Huge-Brodin, 2014; Wolf & Seuring, 2010). However, two exceptions to this are described. A first is that freight transports by several (C2, C6, C8) are described to be "visual" for people in general. Even though this is not described to have influenced the selection of Scope 3 categories, it points to that freight transports are an activity that many companies perceive to be surrounded by external interest. The second exception is to consider how the Scope 3 categories influence the business value (only mentioned by C8), which was exemplified with the importance the company's customers put in different categories (however, this was not described to influence the inclusion of freight transports).

Companies with large use-phase emissions

Further, the findings clearly indicate that companies that has a dominating share of emissions within use of sold products tend to exclusively include this category. This, the findings illustrate, comes from the fact that these companies' chooses to focus effort where they can impact the

most, both in terms of size of emissions and influence over the emissions (and as use of sold products is mainly managed through product development, it is within the hands of the companies). Neither of the two concerned companies (C5, C7) describes that they have experienced any external pressure to specifically *only* include use of sold products (besides that it not possible to exclude it according to the requirements by SBTi), but by looking at the guidance for the transport sector by SBTi, it is clearly understood that SBTi expects that, at least manufacturers of road vehicles, mainly focus its effort on use phase-emissions (likely, this is also the case for other business sectors where use of sold products dominates) (see SBTi, n.d.). And by further looking at other companies than the case companies (in this case belonging to the business sector *automobiles and components*), it is found that it is most common for these companies to only include use of sold products (although several exceptions are identified) (see SBTi, 2021a).

Even though this finding might not be surprising, and further not necessarily negative (which will be discussed in the next chapter), it is interesting as it means that manufacturers of energy-intensive products (e.g., companies with large use of sold products-emissions) are unlikely to be pushed to address any other Scope 3 categories (including freight transports) by adopting SBTs, no matter the size of these emissions in absolute terms and relative to other categories beside use of sold products.[26] Interestingly, it is also only these companies (C5, C7) that described access to emission data for freight transport to be an obstacle for including freight transports in its SBTs. It is unlikely that these two companies experience this aspect to be more *challenging* compared to the other companies (who all described access to emission data to be a challenge), but *relative* to access emission data for use of sold products-emissions (which for both C5 and C7 are described to be unproblematic) it is seen as an obstacle.

5.2.3 Management of Freight Transports

Usage of the carbon reduction practices

Concerning how the companies with freight transports included in its SBTs (C2, C3, C4, C6. C8) either plan to or are already working to fulfill the freight transport targets, it should first be noted that the findings indicate that the companies not necessarily have a defined "plan" or "roadmap" for how this is done.[27] Rather do they have a set of actions that they have also previously been working with that they consider to be important for fulfilling the targets. As seen in the findings-section, all companies (besides C8, who are currently formulating a roadmap for freight transports) both describes practices considered to be the main means for fulfilling the targets and also other means the companies are using for reducing emissions from freight transports.

Looking at the practices described as *main means* to fulfill the targets, as can be seen in the findings-sections, does this include practices regarding efficient vehicles, electrification, transport optimization, renewable fuels, and changing air transport for "surface transports". A few interesting remarks to this are, firstly, that the only company mentioning biofuels as one of the main means (C6) is a well-known B2C company with Sweden as only geographical scope, which likely point to the specific context for biofuels in Sweden as described in section 2.1.2 above. Second, none of the companies consider supply chain structure changes or changing

[26] However, it should be noted that one company, C4, is an exception to this pattern as use of sold products is dominating the emissions but that they have still included other categories. This difference could be explained with that C4 (a telecom company), in difference to C5 and C7 (manufacturers of heavy-duty vehicles and home electronics) likely have a significantly less complex value chain concerning CO_2-emissions, both from use of sold products and other Scope 3 categories.

[27] To this, C8 is an exception both in the sense that they described not to have any company-wide strategic management of freight transports and through that they are currently formulating a roadmap.

modes of transport as one of the main means (beside from aviation to any other mode, which, although positive, cannot be said to be equivalent to changing trucks for trains and/or ships).

However, when looking at the other practices the companies described to be using, it becomes clear that all companies somehow work with more or less all of the five carbon reduction practices listed in section 2.1.2 above, although the level of strategic grip varies. Starting with supply chain structure changes, the findings indicate that this is something the companies tend to work with continuously, not least in order to avoid high transport costs. Both companies such as C2 and C3, with high transport costs compared to the value of the products, and C4, with small high-value products, described it to be important. However, even though the findings indicate that supply chain structure is somehow considered from a climate perspective, it seems that it is not perceived as one of the most important aspects to work with. Continuing with changed transport mode, the findings indicate that although it is something that all companies work with, it is not a major priority. C6 for example, with an extensive strategy for fuels and electrification, said this is something they could do much more to ship more on trains. C2 said they are increasing the share of intermodal transports, but it is not considered one of their three main means for fulfilling the targets. C4, who are prioritizing changed transport mode in the sense that they are reducing air transports, also said that the issue of which surface-based transport mode it is substituted with is not of strategic importance. The interviewees also illustrated barriers for changing transport mode, and not least was this seen in non-environmental demands regarding time from customers of the companies as well as in lack of infrastructure. For C6, also, are increased lead times a barrier as it can result in increased food waste.

It is further clear that the carbon reduction practice that attracts most attention among the case companies is transport optimization, which is in line with suggestions by McKinnon (2015c). However, even though some of the companies say the SBTs and efforts for CO_2 reductions have impacted the effort they put on this (which is further discussed below), it is clear that the major driver for this is cost reductions (as was also suggested by McKinnon (2015c)). As said in the interview with C3, "route optimizing, increased load factors… you don't need climate targets to be interested in that". All companies also said it is considered important to use energy-efficient trucks and to strive for using electrified trucks. For energy-efficient trucks, euro classes and eco-driving were mentioned. Although, it was also said that it is difficult to only use for example euro 6 trucks as there are not enough in all markets. Using electric vehicles was also said to be in the main priority, especially by C2 and C6, but as it is still a small market it is not used to a large extent yet. Interestingly, neither of the companies mentioned the energy efficiency or operation of vessels as generally considered. Lastly, for changed fuels, it was only C6 who described that renewable fuels are something they work strategically with, who has targets to only have fossil-free transports latest 2030. C2, on the opposite, stated that renewable fuels are perceived as a small issue, and rather sees gas (CNG) as the major aspect regarding changed fuels. It should be noted, that for the other companies with freight transports in the SBTs (C3, C4, C8), it is not clear if the lack of clear answers about changed fuel type is due to that they are not working with it or if it is not considered as a strategically important issue (and as such not dealt with by the sustainability departments).

As a general reflection, it is difficult to evaluate how the SBTs have impacted how the companies use the specific carbon reduction practices, not least is this because the companies have not necessarily implemented intentional changes in how they work with it. Rather, as will be further discussed in the next chapter, does the SBTs seem to have a more overall impact on the company's governance, which seems to influence the *intensity* of how they work with the practices. As such, when looking specifically at the carbon reduction practices, it must be concluded that the companies, in general, do not have specified plans for how to fulfill the

targets more than that they have pointed to one or two activities they were already working with to be most important (two exceptions could be C8, depending on how the roadmap in the end are formulated, and C6, who are formulating a strategy for fuels and electrification). Although this might sound to be negative, the analysis of impacts in the next section point to that this is not necessarily the case.

Other management approaches

Looking at intentional changes implemented by the companies not specifically concerning the carbon reduction practices, the findings point to several such. One important such was by C2, who said that a new KPI for CO_2 had been adopted and are now of equal importance to cost, which after transport service quality factors (such as lead time, delivery precision, etc.) are the most important KPIs (C4 also described to have implemented a new KPI on CO_2, although this mainly is said to steer toward reducing air transports). This is clearly not in line with suggestions from the literature review as it points to that companies in general not have KPIs on environmental impact for freight transport purchases (Bahr & Sweeney, 2019) and that environmental aspects are prioritized after transport service quality and cost (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010). Even though several interviewees said it is difficult to talk about cause and effect, C2 said that the SBTs at least "had helped" to adopt the new KPI (similar stances was implicitly said by other companies as well). Further, both C2, C6, and partly C3 said they in some degree accept higher costs for transports. C6 said they already in general do pay more, while C3 said they sometimes pay more but that it is difficult to specify how much and to which extent.[28] These findings point to that the companies are not only looking for cost reductions when fulfilling their targets, and that the ambition to fulfill the SBTs can challenge the pattern in which companies often engage insufficiently in emission reduction from purchased freight transports.

Looking at the companies' own non-environmental demands, which are shown in the literature review to often have a substantial impact on the environmental performance of purchased freight transports (see Björklund, 2011; Eng-Larsson & Kohn, 2012; Rogerson, 2017), the findings do not provide any clear suggestion of how the companies tend to handle it. On the one hand, it seems that some companies have at least considered it (such as C2 who stated that it strives to balance CO_2 and warehouse costs, and C8 who said this will be an issue to analyze in the process of setting a sub-target and roadmap for logistics), while on the other hand, it seems that these aspects are not lifted to a strategic level as it seems that it is up to the logistics department to handle it. If this indicates that these issues are not sufficiently addressed or that it is but not by the interviewees can unfortunately not be answered.

5.2.4 Impact from the SBTs

Impact concerning if purchased freight transports are targeted and/or managed

Looking at the impacts from SBTs identified in the findings, a first important aspect regards whether SBTs are found to have pushed companies that have not previously had targets for freight transports to include it in their SBTs. To this, it is found that it is only one company (C2) among the companies that included freight transports in its SBTS that did not already have a climate target for freight transports (however, as discussed below, C2 in fact had *strategic management* of freight transports despite lack of target). This points to that companies adopting

[28] C3 also mentioned that collaboration with transport service providers is a core activity for fulfilling the target. But as the interviewee did not work specifically with logistics, no more information could be provided and are as such not included in the analysis.

SBTs tend to include the Scope 3 categories that they have already prioritized. Likely, this can be explained with that companies adopting SBTs are found to in general have a history of working with its climate impact (at least in the sense of setting targets) and have as such already identified relevant emission sources within Scope 3 to address through LCAs.

A second important aspect is if adopting SBTs has pushed companies that have not had strategic management for freight transports to implement it. To this, it is found that all companies but C1 and C8 described having had strategic management for freight transports prior to adopting SBTs. Of these two, C1 did not include it in its SBTs and are as such not relevant for this aspect, while C8 did have targets for it but no strategic management. This means that it is in fact only C8 that has been in a position to be able to *start* managing freight transports strategically while adopting SBTs, and as described, they have just now started to formulate a sub-target and roadmap for freight transports, meaning that the SBTs could have contributed to this although not initially.[29] These aspects point to that adopting SBTs, in general, do not push companies to implement strategic management of new Scope 3 categories, at least not for freight transports, which likely also can be explained with that companies adopting SBTs tend to have a history of working with its climate impact. At least, this seems to be the case for the initial impact from adopting SBTs, as seen in the findings (and in the case of C8), are some of the companies discussing if and how to expand the targets and/or strategic management.

Impact concerning the management of purchased freight transports and carbon emissions

To answer the research questions, it is important to analyze *how* SBTs have impacted. To this, the findings clearly illustrate that for most of the companies, the SBTs have in fact not influenced how they overall manage freight transports. C2 and C4 for example, who both described three priorities for how to achieve the targets, also added that the priority was the same prior to the SBTs.[30] This is in line with the general impact described by most of the companies: the SBTs have not impacted their *concrete* management of the different emission sources.

This does however not mean that the SBTs have not had any impacts. On the opposite is it described by all companies that it is perceived to have had notable and positive impacts, both for freight transports and in general. Even the companies that did not change the previous targets when adopting SBTs and were also described by the interviewees to have had advanced carbon management, said they perceive notable impacts from the SBTs (C7, C8). This is the case even if most of the interviewees implicitly or explicitly said that it is difficult to point to the exact impacts from the SBTs (but as said in the interview with C2, for some of the changes, the SBTs *have definitely helped*).

To discuss the impacts from SBTs the theoretical framework by Damert et al (2017) is helpful, which separates *carbon governance* from *carbon reduction* (the latter including among other actual management practices). What is clear is that the main impacts described by the interviewees concern carbon governance rather than carbon reduction. This is described in terms of that it has contributed to "focus" around the targets, to have challenged the "silos" on

[29] It should also be mentioned here that C8 is also the only case company that has included all relevant Scope 3 categories in its SBTs, while the other companies have kept it to one or a few categories. This could naturally explain why C8 and not the other companies are found to have targets for categories they are not strategically managing.

[30] C6 and C8 are, potentially, exceptions to this, as both companies are currently formulating roadmaps for freight transports (C6 only regarding fuels and electrification, and C8 for freight transports in general)

the management of the emission sources, and to have resulted in higher intensity of how they work with the management practices (even though the management practices are essentially the same). It was further described to have given the sustainability department a larger mandate from top management to influence other departments (e.g., in C4; to influence the non-environmental demands regarding lead times by project managers within the company), and also to put more focus on practices for freight transports that not necessarily result in cost reductions. The changes described in the previous section concerning acceptancy of higher costs, increased importance to CO_2 in transport purchases, new KPIs on CO_2, and – at least to some extent – the consideration of climate impacts from non-environmental demands concerning time, also point to that the SBTs impact more structural governance aspects rather than precise carbon reduction management practices. This finding is also contrary to the assumptions by the author, which was that the companies would rather have plans for concrete carbon reduction practices.

The findings also indicate aspects which has contributed to that the SBTs have had these impacts. This can firstly be attributed to what Damert et al (2017) call *organizational involvement*. It is clear among most case companies that top management, in general, has the ownership of the SBTs and has decided that target achievement is of high priority (such as in C5 who described that the SBTs are of similar importance as targets for sales and finances). This has in turn resulted in that the emission sources covered by the SBTs have gained a high position on the corporate agenda, and that several departments have gotten involved in the fulfillment of the SBTs (rather than only the directly concerned department(s)).[31] This, the finding indicates, not least is due to that the SBTs often have been communicated by the CEOs and other representatives in high positions, which makes it important to deliver on the target. The fact that the SBTs are based on *science* also seems to be important for both internal and external communication, and further to push internal engagement for the targets. As such can it be said that aspects belonging to *carbon competitiveness* (according to the framework by Damert et al (2017)) have contributed to the influence the SBTs have had on carbon governance. The question is, however, if this, in the long run, can have more concrete influence on aspects belonging to *carbon reduction*.

[31] It should be added that for the activity related to carbon governance suggested by Damert et al (2017), risk management, no findings have been made as neither of the interviewees lifted it.

6 Discussion

As seen in Figure 4 (page 35), the subject of this chapter is to discuss what the results from the analysis (according to the four research objectives) reveal about the overarching aims, meaning if and how adopting VEAs for carbon reduction (such as SBT) can influence companies to manage emissions from purchased freight transports. For this purpose, the results will be discussed in relation to the findings in the literature review and will as such point to the knowledge contributions from this thesis. The discussion is firstly structured according to the two overall overarching aims: i) the influence on companies' decision to manage emissions from purchased freight transports, and ii) the influence on *how* companies manage emissions from freight transports. These two sections will firstly be followed by a more normative discussion of whether or not SBTs seem to be enough for aligning the freight transport sector with the Paris Agreement, and secondly will the fact that the Scope 3 requirements by SBTi are found to not be science-based per se be discussed.

6.1 Influence on Companies' Decision to Manage Emissions from Purchased Freight Transports

As seen in the literature review, previous studies reveal that transport purchasers for many reasons, often tend to not focus on environmental impact from freight transports or not put sufficient importance on it. In this, it is concluded by Huge-Brodin (2020) that not even companies with high environmental awareness tend to address the environmental impact from freight transports to a sufficient extent. Both Jazairy and von Haartman (2020b) and Abbasi and Nilsson (2016) also finds an example where green logistics are seen as "luxury" and not contributing to business value. One main reason for this, as described in the literature review, is a general lack of external drivers for transport purchasers to put importance to the environmental impact from purchased freight transports. In this context, the findings in this thesis complement the previous studies in two main areas:

First, the thesis illustrates that most of the companies have strategic management for freight transport emissions. In fact, all companies that have a history of strategic carbon management (e.g., all but C1) either have included freight transports in their targets or has a separate target for it, which could possibly be explained with that the literature point to that this is more common among Swedish companies (Jazairy & von Haartman, 2020b; Touratier-Muller & Andersson, 2020). However, it is possible that that the companies in fact not put *sufficient* importance on climate impact. As the thesis does not investigate the ambitiousness of the targets (by reasons stated in section 1.3 above), it could be that further layers would be added if this was investigated, more in line with the findings by Jazairy (2020b) and Abbasi and Nilsson (2016). [32]

Second, a main contribution of the thesis is that adopting SBTs is found to be a *possible* driver (or facilitator) to address climate impact from purchased freight transports. This is because companies, when choosing Scope 3 categories are found to (mainly) base it on the relative significance of emissions from the categories, and if it is necessary, it seems that companies can choose to include freight transport.[33] This finding adds to the previous knowledge also beyond the context of SBTs, as none of the identified studies have looked at the relative climate impact (through lifecycle assessments and/or Scope 3 screening) as a driver for managing purchased freight transports.

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[32] This is further discussed in *suggested further research* below.

[33] However, there are factors that hinder this as well, which will be further discussed below.

Although the second finding above can seem small and not surprising, it does complement a few aspects found in the literature of factors that increases the likelihood to manage emissions from freight transports. A first aspect is that transport intensity is not necessarily the main factor influencing if freight transports are managed (as suggested by Martinsen and Huge-Brodin (2014)), at least not when such carbon management is a part of a climate strategy based on relative climate impact. Even though a high transport intensity logically increases the likelihood that it accounts for a significant share of the total emissions, it is not necessarily the case. This is found firstly in that all three of the case companies that have not included freight transports are operating in transport-intense industries, but relative to other Scope 3 categories (especially use of sold products, for C5 and C7) does freight transports account for a small share.[34] Second, it is found in C4, which has included freight transports without having a transport intense value-chain.

A second aspect it has implications for is a proposition by Jazairy and von Haartman (2020b), that the proximity to the consumers influences the likelihood to manage freight transports. The findings in the thesis do not contradict this, but it adds a layer in the sense that all but one (C6) of the case companies with freight transports in the SBTs operate in B2B-setting (with one, C2, operating both in B2B and B2C setting). Looking at C6, the only case company fully in B2C-setting and also a well-known retail store in Sweden, it is clear that what distinguishes it from the other companies is *how* they work with their freight transports, in the sense that they are the only case company with a thorough plan for renewable fuels. This could point to two aspects, i) that the proximity to consumers influence *how* freight transport emissions are managed rather than *if* (at least when comparing companies with high environmental ambitions, which the research scope in practice is limited to), and 2) that it is more common to have thoroughly strategies for renewable fuels among companies in near proximity to consumers (especially in Sweden, where, as stated in section 2.1.2 above, biofuels is much more common). However, as this is based on findings from one company, it should be further studied.

Further, looking at stakeholder pressure as a driver to manage purchased freight transports, these findings also complement the previous knowledge. This is in the sense that the findings firstly indicate that companies adopt SBTs as a tool for stakeholder management (among others), which could be interpreted as that they adopt it because of stakeholder pressure (even though it is not directed explicitly to SBTs). And further, it is in the sense that the stakeholder pressure the companies face is directed to the companies' total GHG emissions (including Scope 1, 2, and 3), and not specifically toward Scope 1 and 2 or to any specific Scope 3 category. This means that if companies adopt SBTs for the purpose of stakeholder management and further include freight transports because of its relative significance of emissions (or other factors), it could be said that stakeholder pressure has, indirectly, pushed them to manage emissions from purchased freight transports.

This finding, too, has implications for the previous knowledge. As written in the literature review, Jazairy and von Haartman (2020b) found that transport purchasers face neither regulatory, market nor competitive institutional pressure to manage its freight transports emissions. However, the findings in this thesis mean that a possible *indirect* market and competitive pressure are identified. This is in the sense that adopting SBTs can be a result of both market pressure (e.g., as a response to pressure from customers and consumers) and competitive pressure (e.g., as an element of differentiation that may contribute to the competitive position of the firm') and can further result in that companies strategically manage

[34] However, it must be noted that given that two of these companies have separate climate targets for freight transports, this finding is more theoretical traced than empirically proved, which will be discussed below.

freight transport emissions. This means that SBTs can be said to be a *possible* facilitator of market and competitive pressure to manage purchased freight transports.

However, it must be noted that the findings that indicate that SBTs could function as a driver or facilitator for managing freight transport emissions are to some extent theoretical. This is because, among the case companies, most of them already had strategic management of freight transport emissions, which means that the SBTs has not *per se* pushed any company to manage freight transport emissions strategically (with the possible exception of C8). However, the logic and rationale behind their decisions could very well be said to be generalizable also to other companies, for example, companies without previous strategic management of freight transport emissions. As such, this analysis provides significant evidence that adopting SBTs *could* function as a driver. However, a few factors are found to potentially hinder this:

The first such factor is that freight transports, despite the challenge with growing global emissions, are a relatively small emission source for many companies, meaning that it is questionable how many companies adopting SBTs it is that are required to include freight transports.[35] To this it should be added that naturally, it is not negative that companies chose to focus on Scope 3 categories with the largest impact, to the contrary, this is the purpose of using LCAs to identify emission hotspots. However, it can be questioned if it is legitimate in the long run not to manage its freight transport emissions for the pure reason that other Scope 3 categories account for a larger share of a company's total emissions, given the growing importance to globally cut emissions specifically from freight transports.[36]

The second factor is that there seem to be factors constraining companies without strategic management for freight transports to start managing it. Among the case studies, this is illustrated by C1 who described that they do not have a company-wide global strategy for freight transports and that decisions on freight transports are rather taken by managers locally at plant level. This is firstly in line with the proposition put forward a decade ago by Wolf and Seuring (2010) who point to that global companies often do not have an explicit strategy for environmental impact from purchased transports, and that they in general are uncertain of how to cooperate with transport service providers within complex supply chains. Further, it points to that it is a risk that companies without strategic management of freight transport emissions may be reluctant to include freight transports in its SBTs (and further to manage it) unless, perhaps, it is unavoidable according to the requirements by SBTi (which not necessarily is preferable, which will be discussed below).

A third factor is also that it seems that companies with climate targets for freight transports may not necessarily incorporate these targets in the SBTs if it is not required (such as in the case of C5 and C7). But as SBTs are found to be able to motivate further engagement, this is potentially negative.

6.2 Influence on How Companies Manage Emissions from Purchased Freight Transports

The results clearly reveal that the overall impact of SBTs on the management of purchased freight transports (as well as other included emission sources) seems to be that it reinforces

[35] This is the case for C8, who mentioned the relative significance of emissions as a reason why they have until now not implemented strategic management of freight transport emissions.

[36] In this context, a comment by the representative of C8 is also interesting, as it was said that employee commuting was excluded on the basis that it is a significantly small emission category compared to all other categories. This shines light on the problem that aspects that can be major challenges for the society at large (which employee commuting for certain can be said to be), end up as small impact categories for individual companies.

internal engagement and that it has the ability to motivate cross-functional collaboration around the targets. As such, it concerns *carbon governance* rather than *carbon reduction* according to the framework by Damert et al (2017). This is in line with the findings by Touratier-Muller (2017), that the French governmental program FRET 21 "boosts team-building and networking inside the company [and influences] the intra-organizational collaboration" (Touratier-Muller, 2017, p. 6). However, as the FRET 21 program is a governmental program and exclusively addresses freight transports (both transport purchasers and carriers), this thesis also complements existing knowledge in the sense that it reveals that SBTs, by being a (non-governmental) VEA for carbon reduction that addresses companies' full value-chain emissions, also seem to reinforce internal engagement and inter-organizational collaboration.[37]

Looking at the identified impacts, the results indicate several aspects that are of relevance for the issue of how SBTs (and other VEAs) can impact companies' management of freight transport emissions and as such complement the existing knowledge. First, the previous literature points to a view that transport purchasers, in general, tend to prioritize environmental impact after cost and transport service quality (especially regarding time) as they purchase transport services (Abbasi & Nilsson, 2016; Bask et al., 2018; Jazairy, 2020b; Lammgård & Andersson, 2014; Large et al., 2013; Wolf & Seuring, 2010). It also points to that transport purchasers tend to look for cost savings and are often not prepared to pay extra for higher environmental performance (Bask et al., 2018; Huge-Brodin et al., 2020; Touratier-Muller & Andersson, 2020). In general, the findings in the thesis are in line with this as most interviewees have emphasized the importance of cost reductions in the management of freight transport emissions. However, the analysis indicates that the SBTs could have challenged this pattern, as several of the interviewees describe that they either are paying more for transports in order to fulfill their climate targets (C3, C6) or, as in the case of C2, have decided that the KPI for CO_2 are of equal importance as the KPI for costs (and both after transport service quality). This finding differs from Touratier-Muller (2017), who did not find any notable changes in the priority order. While it is difficult to evaluate if the SBTs are the main driver for this, the findings clearly indicate that the impacts on internal engagement and cross-functional collaborations have contributed.

Further, the findings in the literature review also indicate that non-environmental demands (especially regarding time) by transport purchasers often are a barrier for transport service providers to improve the environmental performance (Björklund, 2011), but that transport purchasers at the same time seldom considers the environmental impact of these demands (Bask et al., 2018). The findings in this literature add important knowledge to this as it indicates that SBTs *could* push companies to reflect over this. In particular, this is identified from C8, who described that this is something that will be addressed in an internal assessment of the logistic management for formulating a roadmap to reduce emissions. Above this, the findings indicate that the sustainability department can receive a higher mandate from top management to influence other departments on issues that impact emissions from logistics (at least, this is the case for C4), which can challenge what Jazairy (2020b) refer to as "inter-departmental misalignments". However, as this was not found to be a general pattern among the case companies (e.g., to consider and/or challenge climate impact from non-environmental demands) the findings also support the view that it seems that the companies could do more in

[37] The findings in the thesis differ from Touratier-Muller (2017) in the sense that it has not found anything similar to what was found regarding collaboration between transport purchasers and transport service providers (which was described as that the transport service providers had become "strategic partners" of the transport purchasers' because of the FRET 21 program). This could be potentially explained with that that FRET 21 only addresses freight transports and concerns both transport purchasers and transport service providers, but, as will be discussed in the suggested further research below, it could also point to a need for more research.

this regard, but at the same time that the SBTs create better conditions for doing this because of the impact on internal engagement and cross-functional collaboration.

6.3 Is it Enough?

As the research subject is motivated by that freight transports constitute a substantial yet growing challenge for fulfilling the Paris Agreement and that policies so far are not sufficiently contributing to align it with necessary emission reductions, it is important to ask if the identified impacts from SBTs seem to be enough. To this, it must first be stated that the impact SBTs seem to have on overall governance appear to be highly positive. This is the case both for the "intangible" impacts such as internal engagement and intra-organizational collaboration, and also for the more concrete impacts regarding new KPIs, changed priority between objectives, and (to some degree) acceptancy of higher costs. Naturally, it is impossible to quantify potential emission reduction from this, but if this contributes to increased efforts, this thesis underpins a view that it is very positive that companies adopt SBTs and that they include freight transports in the Scope 3 boundary.

Regarding the carbon reduction practices as described by the interviewees, the thesis reveals a partly different picture. This thesis has clearly shown that the companies mainly put focus on practices surrounding transport optimization, vehicles, and fuels. Even though it is unquestionable positive that these aspects gain engagement (especially since the two latter not necessarily result in cost reductions and as such would perhaps not gain sufficient attention), it is, as written in section 2.1.2 in the literature review, important that *all* of the five areas of actions mentioned[38] are addressed. And although most of the companies describe that they, to different extents, work with supply change changes and changed transport mode, it is clear that this is not a primary focus and that more could be done. This is also in line with the literature that suggests that companies tend to focus on the *less strategic* practices while more engagement is needed for the *more strategic* (McKinnon, 2016a). However, with the identified governance impacts, it could very well be that a better structure is created for companies to address these issues more thoroughly.

Looking more generally at the contribution to emission reductions from SBTs, the findings in the thesis indicate that the initial critique by Trexler and Schendler (2015), that SBTs would only be a "costly distraction" from the need of policies, do not seem to be correct. Rather, as (also hypothetically) argued by Marland et al (2015), it seems that SBTs are a positive complement to public policies, as it does seem to result in increased efforts to decarbonize value chains. In line with this can it be said that the findings do not indicate that any of the case companies have adopted SBTs by symbolic motivations, as warned by for example Dahlmann et al (2019). As such can SBTs be said to support the proposition that the complexity of climate change necessitates poly-centric governance, in which it seems that privately operated voluntary agreements for carbon reduction, such as SBTs, fill a legitimate purpose.

A question concerning this is also whether or not this is generalizable beyond SBTs, to other VEAs for carbon reduction. Even though it is not possible to provide a certain answer to this, it could be the case *if the other VEA is as well-known as SBTi, has a comparable reputation, and tends to attract top management attention to a similar extent as SBTi*. If any such VEA exists is not known by the author.

[38] E.g.: 1) Stimulate societal transition towards fewer and more effective transports, 2) infrastructure measure and changed transport modes, 3) more efficient vehicles and more efficient operation of vehicles, 4) biofuels, 5) electrification of road transports" (see page 25)

Lastly, given that both this thesis as well as Giesekam et al (2021) illustrate that SBTs can have a substantially positive contribution to emission reductions, it is important that the debate of SBTs surrounds questions of *how it can contribute better* rather than *of its existence is legitime or not*. This, in other words, is because SBTs seem to have the potential to be *too good* to waste on weak requirements. Because, even if it is not identified among the case companies, it is still found in the literature review and among other companies included in the research scope that there is possible room for, what is referred to as, policy-practice decoupling. This is especially the case for Scope 3 emissions, for which the requirements by SBTi, as was written in the literature review, are in fact not *Science-Based* (see SBTi, 2020).

6.4 Science-Based Scope 3 Requirements?

Looking at the results, it is clear that one of the major benefits of SBTs as perceived by the case companies is that it is said to be, and broadly interpreted to be, *based on science*. Through this, it gives an external validation that the companies are doing what is required to align with either the 1.5°C or well-below 2°C pathways. This, it is found, is both perceived to be effective for communicating the targets internally and externally as well as to provide assurance that the companies have set the correct priorities. Considering that the Scope 3 requirements are in fact not Science-Based, this points to a misalignment between how the adopting companies (and likely other audiences) perceive the SBT-standard and the actual requirements. It also raises questions of whether or not company representatives tend to be aware that Scope 3 requirements differ from Scope 1 and 2 requirements in this fundamental aspect.[39]

Further, even if this is not identified among the case companies, it can be seen regarding other companies in the research scope (as seen in Appendix D) that several of them have included a rather long list of Scope 3 categories in the Scope 3 boundary. Even though it is not impossible that these companies have strategic management for at least some of these categories, it does seem that some of them have added categories without plans to strategically manage them. At least, it seems logical that this is a risk. And given that there further are no requirements to disclose progress on the targets, this method may very well be used when the underlying motivation is symbolic, at least for Scope 3 emissions.[40]

Considering that Scope 3 often accounts for the majority of companies' total value chain emissions (see Patchell, 2018), which is also the case for several of the case companies, it can further be questioned how reasonable it is that Scope 3 emissions are not science-based (especially for companies with over 90% of the emissions in Scope 3, it can be questioned how Science-Based the requirements are if it is only the less than 10% that is covered by science-based requirements). Possibly, this could be explained with that it could be a discrepancy between the initial design of the SBT-standard and the companies committing, in which it was designed with the lenses mainly on Scope 1 and 2 while Scope 3 has become important for both companies committing and its stakeholders.

With the findings in this thesis, it is not possible to assess if the lack of Science-Based requirements for Scope 3 has had any implication for how Scope 3 is being targeted and managed. But the findings, both among the case companies and the other companies in the research scope, indicate that Scope 3 emissions are approached significantly differently by

[39] However, it must be noted that the Scope 3 targets very well still can be *science-based* according to the definition used for SBTs overall (as seen in section 2.3).

[40] The attempt was to use one of these companies as a case, but neither of the two asked agreed to participate.

different companies. Likely, by raising the requirements for Scope 3, SBTi could hinder approaches that are less suitable for the purpose of carbon reductions.

While this thesis does not seek to provide any clear guidelines of how the Scope 3 requirements could be formulated based on science, it is possible to point to a few guiding principles that could be considered in such an attempt:

First, it is argued that this analysis supports a position that the requirements should strive to push companies to address all Scope 3 categories in which companies have significant emissions. This is because it can be questioned how reasonable it is that companies can exclude categories where they have large emissions (such as freight transports) on the only basis that they have one or two categories that are dominating. Especially, this is the case for companies with large use phase-emissions, as SBTs for these companies are found to mainly be a tool for targeting product development and not to address emissions in the supply chain. However, such change needs to balance between pushing companies to address all significant emission sources on the one hand, and on the other hand not forcing companies to manage too many sources as this could result in lower engagement.

Second, it seems that SBTi would benefit from requiring a more explicit relation between targets and management in the sense that it should be able to assume that included Scope 3 categories are being managed. Likely, it is best if the companies are clear on which Scope 3 categories are included, and that it is not too many. This seems to be important both for creating engagement for the targets and to provide transparency to stakeholders. This would be in line with the suggestions by McKinnon and Piecyk (2012) that GHG reduction targets are most effective if they are formulated specifically for specific functions.

Third, however, it is essential that more strict requirements are balancing the interest to push companies that adopt SBTs to further engagement on the one hand, and the potential threshold the increased demands create for companies to commit on the other. Because increased effort and engagement among companies that adopt could very well be balanced out if fewer companies commit.

Supported by the findings in this thesis, it is the strong belief of the author that SBTi by implementing changes in line with these suggestions could contribute to an even further engagement for Scope 3 emissions among companies that adopt SBTs, which could have substantial positive impacts on aligning adopting companies' value chains with emission reductions required to fulfill the Paris Agreement. And given the strong position and reputation SBTi has gained within the business community, the author also feels confident that SBTi can seize the moment to tighten the requirements without implementing thresholds that restrain companies from committing.

7 Conclusions and Recommendations

With increasing emissions and challenges concerning sufficient technical advancements, it is clear that lack of attention to freight transports by both policy-makers and companies can pose a significant barrier to the possibility to fulfill the Paris Agreement. In this context, it is important to investigate if voluntary environmental agreements for carbon reduction (such as Science-Based Targets) can push transport purchasers to increase their efforts for emission reductions from freight transports. In line with this have the overarching aims of the thesis been to contribute to the understanding of how adopting VEAs for carbon reduction can influence companies to manage emissions from purchased freight transports as well as how this is done. For this, four research questions were defined, that cover both the SBTs in general and freight transports in particular, in line with the assumption that the SBTs must be understood as a full strategy rather than to exclusively address how freight transports have been dealt with:

RQ 1	Why have the companies adopted SBTs?
RQ 2	Why have some companies adopted targets for purchased freight transports as a part of their SBTs while others have not?
RQ 3	In what ways do the companies plan to fulfill the SBTs for purchased freight transports?
RQ 4	(How) has SBT-related work influenced the way the companies manage GHG emissions in general and specifically concerning purchased freight transports?

The answers to RQ 1 and 2 reveal, firstly, that adopting SBTs can function as a facilitator for stakeholder pressure to manage emissions from freight transports as companies often adopt SBTs as a response to stakeholder pressure and/or expectation without facing external pressure regarding which Scope 3 categories to include. As such, if freight transports account for a relatively significant share of total emissions, companies can include freight transports to fulfill the requirement to cover 2/3 of the total Scope 3 emissions. However, this finding is to some degree theoretical as it is observed in this study that most companies adopting SBTs have a history of working strategically with its climate impact (including Scope 3 emissions) based on life-cycle assessments, and as such have defined Scope 3 boundary to manage prior to adopting SBTs. Further, the study has found that many companies stick to the minimum requirement for Scope 3 and include one or two emission sources, to which freight transports often not belong. Especially, it is found that companies with large use phase-emissions tend to exclusively include these emissions.

The answers to RQ 3 and 4 reveal that the major impact from the SBTs relates to overall governance, mainly driven by that target achievement seems often to be of high priority by top management. Through this, it is found that SBTs often results in increased engagement and intra-organizational collaboration for the emission sources included in the SBTs (including freight transports). Regarding how emissions are reduced from purchased freight transports (with which *carbon reduction practices,* as categorized by McKinnon (2016a)), the answers reveal that companies tend to not implement intentional changes of how they work with the different practices as a response to the SBTs. However, examples were found where SBTs have (at least) contributed to the implementation of more structural changes such as new KPIs and changed priority between cost and CO_2 in transport purchases, which also indicate that SBTs tend to have more structural impacts than on specific management practices.

With these findings, it is possible to conclude that SBTs firstly can be a facilitator for companies to start managing purchased freight transports emissions, and secondly that it has high potential to result in an increased effort to emission reductions in general and for purchased freight

transports in particular., even though it is difficult to describe exactly how. However, as requirements for Scope 3 by SBTi, in difference to Scope 1 and 2, is not science-based, the work presents evidence of risks that the full potential for SBTs, at least concerning Scope 3, is not utilized.

7.1 Recommendations for Managers

The results point to four aspects that are of relevance to managers:

Looking at SBTs in general, a **first** recommendation is**,** as SBTs seems to be effective for reinforcing internal engagement and inter-departmental collaboration, it seems to be a good idea for companies that want to accelerate their carbon reduction commitment to adopt SBTs. The findings indicate that this is the case both for companies with a history of working with its climate impact and for companies that are about to initiate a strategic grip of it. **Second**, for deciding Scope 3 boundary, it seems to be a good idea for companies to set targets for all Scope 3 categories with significant emissions while avoiding including more than what is practical to implement strategic management for, as this can help to increase commitment for the Scope 3 categories that the company must manage in order to fully align with the Paris Agreement.

Looking at freight transports in particular, it **first** seems to be a good idea to incorporate previous climate targets for freight transports in the SBTs even if it is not required, as this seems to have the potential to result in increased engagement. **Second**, the findings from this study (as well as from the literature review) also indicate that it is a good idea to lift all trade-offs concerning freight transports to a strategic level in order to get the full picture of what corporate activities, policies, and habits it is that impact the climate performance of the purchased freight transports. Not least, it is important to understand how demands related to time (such as lead times, delivery windows, and delivery precision) impact and how this can be managed more oriented towards the climate targets, and further to make sure that the demands concerning time are not stricter than actually needed. This seems to be important not least to enable that more transports are conducted by other transport modes than trucks. The findings from the thesis further indicate that this is not necessarily sufficiently addressed today.

7.2 Recommendations for SBTi

For **SBTi**, in line with the discussion in section 6.4 above (*Science-Based Scope 3 Requirements?*), the findings from the thesis point to that the framework could be improved by re-formulating the requirements for Scope 3 target so that they, similar to Scope 1 and 2, are science-based according to the overall definition by SBTi. For this, the principles outlined in the same section could serve as inspiration.

7.3 Recommendations for Policy-Makers

First, it is important to note that even though SBTs seem to be able to reinforce engagement for managing emissions from freight transports (and other emission sources), the findings also indicate that several constraining factors are present, especially potential limitations for strategically strive to change trucks for other transport modes. An observation based on this is that VEAs for carbon reduction (such as SBTi) do not replace the need for policy but rather complements it. As such, the findings indicate that more policy focus, especially concerning changed transport mode, is needed. **Secondly**, however, as SBTs seem to be a possibly effective VEA for carbon reduction, governments at different levels could consider including SBTs as a requirement for tender, similar to how ISO-standards often are required. Preferably, this would be communicated by government agencies at least two years in advance of the actual implementation, to give concerned companies time to adopt.

7.4 Suggested Further Research

First, while this thesis illustrates how SBTs can impact a company's decision to manage emissions from purchased freight transports and the overall manner in how this is done, it does not address the details in the companies' logistics management, neither does it look at the ambitiousness of the targets.[41] With the findings in this thesis as a background, a suitable further research could be to look more carefully at the logistics management by companies with SBTs, to assess how they, among others, handle climate impact in the different steps of the transport purchasing process (as described in section 2.1.1 above) and how they consider climate impact in setting time-related demands. Such study would preferably not attempt to look at impacts from the SBTs, but rather see if companies with SBTs seem to have sufficiently considered the climate impact from various decisions in the logistics management. Such study could further contribute with knowledge on if the impact on *carbon governance*, as identified in this thesis, seems to result in that emissions from purchased freight transports are sufficiently managed.

Second, in line with the discussion in section 6.4 above concerning the lack of Science-Based Scope 3 requirements, a relevant research focus, if this is not initiated by SBTi, would be to look at how the Scope 3 requirements could be formulated science-based (e.g., according to the general definition of science-based as used by SBTi). For this, the reflections provided in the discussions could serve as a basis. Such focus could add important suggestions to SBTi of how the requirements can be both stricter and more in line with the Paris Agreement.

Third, the findings also indicate that the extent to which companies put effort into renewable fuels seems to be influenced by the proximity to consumers (although this is based on findings from one company). This complements previous research as this has mainly pointed to that the proximity to consumers influences the effort companies put on freight transport emissions overall but not concerning which carbon reduction practices the companies chose to use. It would as such be relevant to investigate what factors influence companies in which carbon reduction practices they focus mostly on, especially if external influence tends to mainly be directed toward renewable fuels (at least in Sweden). A possible research focuses could be to look at which type of companies have far-reaching strategies for renewable fuels, how this differ based on the proximity to the consumers, and if the focus on fuels influences how the companies address the other carbon reduction practices. Findings from such a study could, among others, indicate if more should be done to draw attention to how companies work with other carbon reduction practices, not least which transport modes are used.

Lastly, as only a small number of studies exist that look at impacts from SBTs, there still are a number of angles that need research attention. One suggestion would be to more thoroughly assess how companies with SBTs manage GHG emissions, which could possibly be evaluated by mapping the internal organizational involvement. Further, as there are many cases where several companies in the same value chains have adopted SBTs, it would be relevant to look at if and how this can impact the dyadic relations between suppliers and buyers (including between transport purchasers and transport service providers). Further, as it seems that many of the companies that have adopted SBTs as this thesis has been written (e.g., during the spring of 2021) have used the "streamlined target validation route exclusive to small and medium-sized enterprises" (see SBTi, 2021a), a relevant research focus would be to see if the same impacts on carbon management are identified when using this methodology as has been identified in this thesis. Such studies are important to make sure that SBTs lead to corporate action, and also to identify potential weaknesses in the framework before it has had major negative consequences.

[41] For reasons to this, see section 1.3 above.

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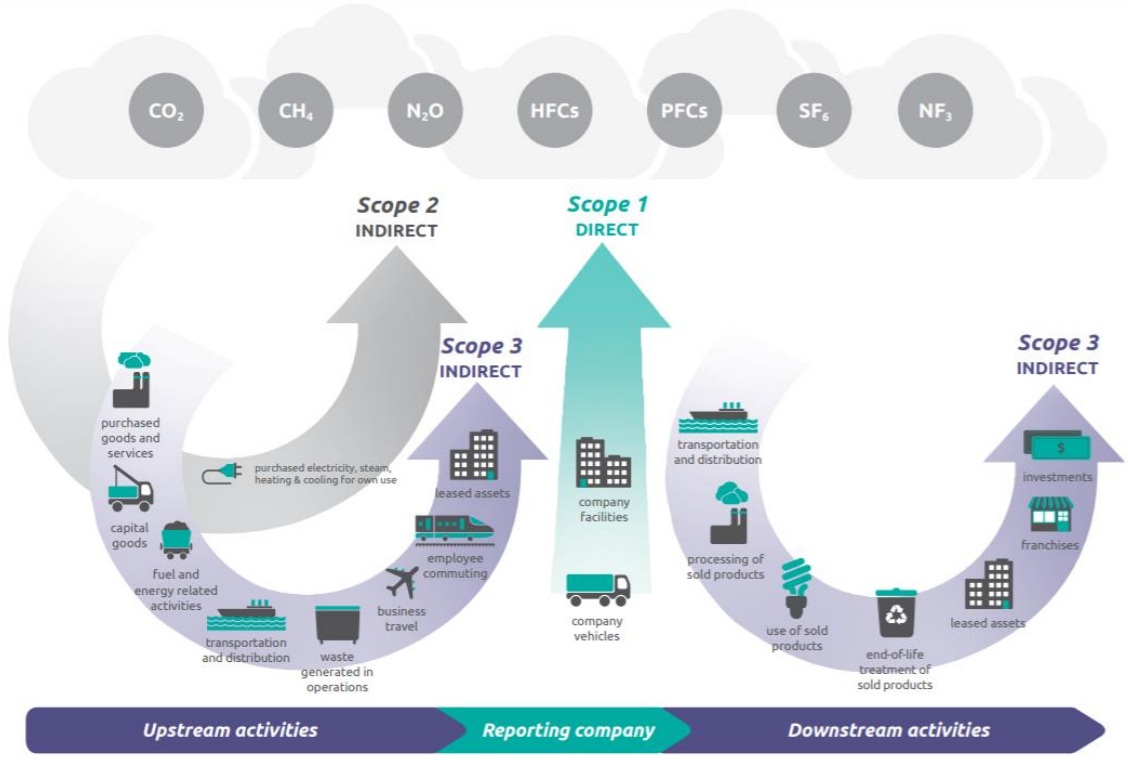
Appendix A – The GHG Protocol and Scope 3 Categories

Figure 5. Overview of emission scopes



Source: GHG Protocol (2011, p. 5)

Upstream Scope 3 Emissions

Category	*Category description*	*Minimum boundary*
1. Purchased goods and services	Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2 - 8	All upstream (cradle-to-gate) emissions of purchased goods and services
2. Capital goods	Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year	All upstream (cradle-to-gate) emissions of purchased capital goods
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, not already accounted for in scope 1 or scope 2, including: a) Upstream emissions of purchased fuels (extraction, production, and transportation of fuels	a) For upstream emissions of purchased fuels: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction up to the point of, but excluding combustion) b) For upstream emissions of purchased electricity: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction

	consumed by the reporting company) b) Upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company) c) Transmission and distribution (T&D) losses (generation of electricity, steam, heating and cooling that is consumed (i.e., lost) in a T&D system) – reported by end user d) Generation of purchased electricity that is sold to end users (generation of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users) – reported by utility company or energy retailer only	up to the point of, but excluding, combustion by a power generator c) For T&D losses: All upstream (cradle-to-gate) emissions of energy consumed in a T&D system, including emissions from combustion d) For generation of purchased electricity that is sold to end users: Emissions from the generation of purchased energy
4. Upstream transportation and distribution	Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)	The scope 1 and scope 2 emissions of transportation and distribution providers that occur during use of vehicles and facilities (e.g., from energy use) Optional: The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
5. Waste generated in operations	Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company	The scope 1 and scope 2 emissions of waste management suppliers that occur during disposal or treatment Optional: Emissions from transportation of waste
6. Business travel	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)	The scope 1 and scope 2 emissions of transportation carriers that occur during use of vehicles (e.g., from energy use) Optional: The life cycle emissions associated with manufacturing vehicles or infrastructure
7. Employee commuting	Transportation of employees between their homes and their	The scope 1 and scope 2 emissions of employees and

	worksites during the reporting year (in vehicles not owned or operated by the reporting company)	transportation providers that occur during use of vehicles (e.g., from energy use) **Optional**: Emissions from employee teleworking
8. Upstream leased assets	Operation of assets leased by the reporting company (lessee) in the reporting year and not included in scope 1 and scope 2 – reported by lessee	The scope 1 and scope 2 emissions of lessors that occur during the reporting company's operation of leased assets (e.g., from energy use) **Optional**: The life cycle emissions associated with manufacturing or constructing leased assets

Downstream Scope 3 emissions

9. Downstream transportation and distribution	Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)	The scope 1 and scope 2 emissions of transportation providers, distributors, and retailers that occur during use of vehicles and facilities (e.g., from energy use) **Optional**: The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
10. Processing of sold products	Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)	The scope 1 and scope 2 emissions of downstream companies that occur during processing (e.g., from energy use)
11. Use of sold products	End use of goods and services sold by the reporting company in the reporting year	The direct use-phase emissions of sold products over their expected lifetime (i.e., the scope 1 and scope 2 emissions of end users that occur from the use of: products that directly consume energy (fuels or electricity) during use; fuels and feedstocks; and GHGs and products that contain or form GHGs that are emitted during use) **Optional**: The indirect use-phase emissions of sold products over their expected lifetime (i.e., emissions from the use of products that indirectly consume energy (fuels or electricity) during use)
12. End-of-life treatment of sold products	Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life	The scope 1 and scope 2 emissions of waste management companies that occur during disposal or treatment of sold products
13. Downstream leased assets	Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in	The scope 1 and scope 2 emissions of lessees that occur during operation of leased assets (e.g., from energy use).

	scope 1 and scope 2 – reported by lessor	**Optional**: The life cycle emissions associated with manufacturing or constructing leased assets
14. Franchises	Operation of franchises in the reporting year, not included in scope 1 and scope 2 – reported by franchisor	The scope 1 and scope 2 emissions of franchisees that occur during operation of franchises (e.g., from energy use) **Optional**: The life cycle emissions associated with manufacturing or constructing franchises
15. Investments	Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in scope 1 or scope 2	See the description of category 15 (Investments) in section 5.5 [in *Technical Guidance for Calculating Scope 3 Emissions*] for the required and optional boundaries

Source: remade (with the original text) from GHG Protocol (2011).

Appendix B - Included and Excluded Business Sectors

Business sectors included and excluded in research scope as defined by SBTi.

Included Sectors	*Motivation (where needed)*
Automobiles and Components	
Building Products	
Consumer Durables, Household and Personal Products	
Containers and Packaging	
Electrical Equipment and Machinery	
Electric Utilities and Independent Power Producers and Energy Traders (including fossil, alternative and nuclear energy)	
Food and Staples Retailing	
Food Production - Agricultural Production	
Homebuilding	
Mining - Iron, Aluminum, Other Metals	
Retailing	
Technology Hardware and Equipment	
Telecommunication Services	
Excluded Sectors	
Air Freight Transportation and Logistics	This includes transport service providers, for which freight transport emissions are Scope 1 and 2 emissions.
Professional Services	Cover consultancy companies which are unlikely to have physical goods or raw material in need of transportation in their value chains.
Real Estate	Real estate companies are not perceived to have significant physical flows in the value chain, as their activities are concerned with trading and managing properties.

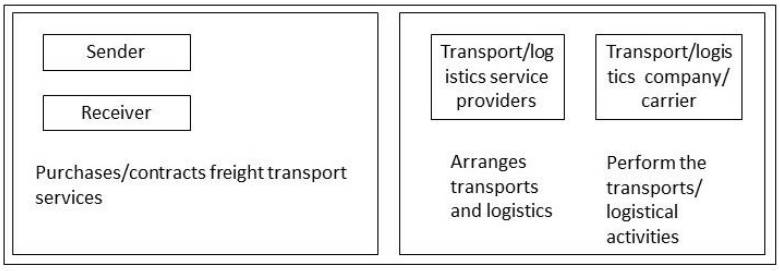
The remaining business sectors as defined by SBTi are not included as no Swedish company belonging to it had adopted SBTs as of January 26, 2021.

Appendix C – The Structure of the Freight Transport Market and Freight Transport Scope 3 Categories

In this appendix, the structure of the freight transport market is described to a higher level of detail than in the text. It is also described which type of freight transport belongs to which Scope 3 category.

First, the role of the different actors in the freight transport market is illustrated in **Error! R eference source not found.**. What is important to understand is that transport purchasers can either be the sender or the receiver of goods, and it can further be either the sender or the receiver who pays for the transport service (it was found in a survey of Swedish manufacturing and wholesaling companies that 62% of transport volumes were bought by the sending company and the rest by the receiver (Lammgård et al., 2013)). When transport service is outsourced, a transport company of any type is contracted. There are many different types of transport companies, but as it is out of the scope to look at transport companies, these are all referred to as "transport service providers" (meaning, companies that sells transport and logistical services to transport purchasers and perform it either with/in their own vehicles/facilities or contract carriers/other transport companies) (see Lindgren & Vierth, 2017).

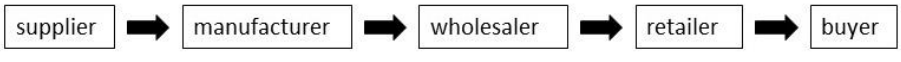
Figure 6. Role of different actors in the freight transport market.



(Source: replica of Lindgren & Vierth, 2017, with translation from Swedish by the author)

In order to further understand the freight transport market, it can be good to understand where freight transports take place and what type of transports it includes. In an exemplified supply chain, Royo (2020) illustrates the links in supply chains that require transports of goods and raw materials (see **Error! Reference source not found.**). These links can naturally occur anywhere in t he world, depending on the geographical scope of the supply chain. Further, it can be performed with any type(s) of transport modes, such as trucks, ships, trains, and aviation. However, where in the supply chain it occurs, and who it is that pay for it, impact which Scope 3 category it is included in.

Figure 7. Links in the supply chain requiring freight transports.



(Source: replica of Royo, 2020).

As seen in Table 13, the two different Scope 3 categories for freight transports mainly include outsourced transport/logistical services between first-level supplier and the reporting company and outsourced transport services between company facility (upstream) as well as outbound transports of sold products that the receiving company pay for (downstream). Transports beyond first level supplier (e.g., between the supplier and the manufacturer if the focal company

are the wholesaler) are not counted as the reporting companies freight transport Scope 3 emissions but are instead included in category 1 "Purchased goods and services" (GHG Protocol, 2011).

For the transport service providers (e.g., the company that performs the transports), the emissions are included in its Scope 1 even if a contracting company is paying for it.

Table 13. Description of Scope 3 categories concerning freight transports.

Scope 3 Category	Description
Category 4, Upstream transportation and distribution	Cover emissions from freight transport purchased by the focal company, such as transports from tier 1 suppliers to the company's own operations and purchased transports between the company's own facilities. Also covers emissions from other logistical activities, referring to storage of products in warehousing, distribution centers, and retail facilities.
Category 9, Downstream transportation and distribution	Cover emissions from transports and other logistical handling of sold products which is purchased by the receiving company. Also enable the focal company to include end-customers traveling to retail store (meaning not a freight transport-related emission).

(Source: GHG Protocol, 2011).

Appendix D – Catalog of all Companies

Overview of companies within the research scope:

Nr of companies within research scope[42]	19
Nr of companies with targets for Scope 3	18
Nr of companies with targets for freight transports	8
Nr of companies for which data on Scope 3 boundary has not been found	2

All Swedish companies with SBTs within the relevant business sectors as of Jan 26 2021:

Business sector[43]	*Scope 3 included in target boundary?*	*Freight transports included in Scope 3 boundary?*	*Targets adopted*	*Target description (and specification of Scope 3 categories where not included in description)**
Containers and Packaging	Yes	Yes	Jan 2018	"[COMPANY] commits to reduce its absolute scope 1 and 2 greenhouse gas emissions 59% by 2030 from a 2016 base year. [COMPANY] also commits to reduce its scope 3 emissions 30% by 2030 from a 2016 base year." *Specification of Scope 3 categories*: purchased goods and services, upstream transport and distribution, business travel, employee commuting, downstream transport and distribution (source: personal communication with company representative)
Homebuilding	Yes	Yes	Dec 2019	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 50% by 2030 from a 2018 base year. [COMPANY] also commits to reduce scope 3 GHG emissions 50% per production started living unit by 2030 from a 2018 base year." *Specification of Scope 3 categories*: (upstream) purchased goods and services, fuels and energy related activities, transportation and distribution, waste generated in operations, business travel, employee commuting, leased assets (downstream), use of sold products, end-of-life treatment of sold products and leased-out assets. (source: sustainability report)
Building Products	Yes	No	Sep 2018	"[COMPANY] commits to reduce absolute Scopes 1 and 2 emissions 35% by 2022 and 80% by 2050, from a 2016

[42] E.g., Swedish companies with adopted SBTs as of January 26, 2021 within the relevant business sectors (as seen in 1.3 Scope and delimitations above)

[43] Company names are left out to protect anonymity of the participating companies.

				base-year. [COMPANY] also commits to reduce absolute scope 3 emission 12% by 2022 and 49% by 2050 from the same base-year." *Specification of Scope 3 categories*: Purchased goods and service (source: personal communication with company representative)
Consumer Durables, Household and Personal Products	Yes	No	Mar 2018	"[COMPANY] commits to reduce its absolute scope 1 and 2 GHG emissions by 80% between 2015 and 2025. It also commits to reduce the absolute scope 3 emissions from the use of sold products by 25% during the same time frame, covering three-quarters of all products sold by [COMPANY]."
Technology Hardware and Equipment	Yes	Yes	Feb 2018	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 35% by 2022 from a 2016 base year. Within the same timeframe, [COMPANY] also commits to a 35% reduction in the scope 3 emissions from business travel and upstream and downstream transportation, and to a 35% reduction in the energy consumption of comparable sold products in 2016."
Consumer Durables, Household and Personal Products	Yes	Yes	Dec 2018	"[COMPANY] commits to reduce absolute Scope 1 and 2 GHG emissions 25% by 2030 from a 2016 base-year. [COMPANY] also commits to reduce absolute Scope 3 GHG emissions 18% by 2030 from a 2016 base-year. The Scope 3 target covers purchased key raw materials, transport, waste generated in operations and end of life treatment of sold products."
Retailing	Yes	No	Dec 2019	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 40% by 2030 from a 2017 base-year. [COMPANY] commits to increase annual sourcing of renewable electricity from 95% in 2017 to 100% by 2030. [COMPANY] also commits to reduce scope 3 GHG emissions from purchased raw materials, fabric and garments 59% per piece by 2030 from a 2017 base-year."
Consumer Durables, Household and Personal Products	Yes	*No data found*	May 2020	"[COMPANY] commits to reduce absolute scope 1, 2, and 3 GHG emissions 35% by 2025 from a 2015 base year" *No data on specification of Scope 3 categories found*
Food and Staples Retailing	Yes	Yes	Aug 2018	"[COMPANY] commits to reduce scopes 1, 2 and 3 GHG emissions 70% per square meter by 2025 from a 2006 base-year. The target includes Scope 3 emissions from franchises, downstream

				transportation and business travel. [COMPANY] also commits that suppliers covering 70% scope 3 emissions will set science-based targets by 2025"
Consumer Durables, Household and Personal Products	Yes	No	Jan 2021	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 72% by 2026 from a 2016 base year. [COMPANY] also commits that 70% of its suppliers by emissions covering purchased goods and services and use of sold products, will have science-based targets by 2025."
Electrical Equipment and Machinery	Yes	No	Mar 2020	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 50% by 2025 from a 2015 base year. [COMPANY] commits to reduce scope 3 GHG emissions from the use of sold vehicles 20% per vehicle km by 2025 from a 2015 base year."
Consumer Durables, Household and Personal Products	Yes	*No data found*	May 2020	"[COMPANY] commits to reduce absolute scope 1 GHG emissions 50% by 2030 from a 2018 base year. [COMPANY] commits to reduce absolute scope 3 GHG emissions 58% by 2030 from a 2018 base year. [COMPANY] also commits to continue annually sourcing 100% renewable electricity through 2030." *No data on specification of Scope 3 categories found*
Mining - Iron, Aluminum, Other Metals	No		Sep 2020	[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 35% by 2032 from a 2018 base year.
Tobacco	Yes	Yes	Mar 2019	"[COMPANY] commits to reduce absolute scope 1, 2 and 3 GHG emissions 41 % by 2030 and 75 % by 2050 from a 2017 base year." *Specification of Scope 3 categories: Purchased goods & services, fuel- & energy activities, upstream transportation & distribution, waste generated in operations, business travel, employee commuting, downstream transportation & distribution, use of sold products, end-of-life treatment of sold products, downstream leased assets* (source: personal communication with company representative).
Food Production - Agricultural Production	Yes	Yes	Jun 2020	"[COMPANY] commits to reduce absolute scope 1 and scope 2 GHG emissions 50% by 2030 from a 2018 base year, and to measure and reduce its scope 3 emissions." *Specification of Scope 3 categories: exemplified with freight transports, waste and business travel*

Telecommunication Services	Yes	No	Dec 2020	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emission 50% by 2025 from a 2018 base year. [COMPANY] commits to reduce absolute scope 3 GHG emissions from use of sold products 29% by 2025 from a 2018 base year. [COMPANY] commits that 72% of its suppliers by emissions covering purchased goods and services and capital goods, will have science-based targets by 2025."
Containers and Packaging	Yes	Yes	Sep 2020	"[COMPANY] commits to reduce absolute scope 1, 2 and 3 GHG emissions 46% by 2030 from a 2019 base year. The scope 3 target includes all relevant emissions including purchased materials, use of sold equipment and end of life treatment of post consumer cartons. [COMPANY] commits to increase annual use of renewable electricity from 69% in 2019 to 100% by 2030." *Note: confirmed by company representative that up- and downstream transportation & distribution are included*
Electric Utilities and Independent Power Producers and Energy Traders (including fossil, alternative and nuclear energy)	Yes	No	Sep 2019	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 38% by 2030 from a 2017 base year. [COMPANY] also commits to reduce absolute scope 3 GHG emissions from use of sold products 20% by 2030 from a 2017 base year."
Automobiles and Components	Yes	No	Aug 2020	"[COMPANY] commits to reduce absolute scope 1 and 2 GHG emissions 60% by 2030 from a 2019 base year. [COMPANY] commits to reduce scope 3 GHG emissions from use of sold products 52% per vehicle kilometer by 2030 from a 2019 base year."

Source, where not stated: (SBTi, 2021a)

Appendix E – Interview Guides

Guide for interviews with companies with freight transports included in SBTs:

Theme I: background and intention to adopt SBT

- Can you describe the background to why you have adopted SBTs?
    - What are the main reasons? Internal/external motives?
- Have you been affected by external stakeholder(s)?
    - If yes, which stakeholders? (customers, investors, owners, regulators, NGOs)
- Can you describe how the SBTs are/were planned to be used?

Theme II: Scope 3 category selection

- Why have you included the categories that are included? Which factors have influenced? *(Possible examples: risk of cost increases, regulations/expected regulations, communications, access to data, power to influence suppliers, complexity in value chain)*
- Did you experience stakeholder pressure regarding which categories to include?
- What are the reasons why you have included freight transports in your SBTs?
    - External pressure specifically for freight transports? Differences from other Scope 3 categories? (customers, investors, owners, regulators, NGOs)
- By who/on which level in the company has the decision concerning which Scope 3 categories to include been taken? Has the board/top management shown interest in the subject?

Theme III: Management of freight transports

- How do you plan to or how do you already work with fulfilling the Scope 3 target for freight transports?
- What are your perceptions of/how do you work with the following measures?
    - supply chain geographical changes to reduce transport volumes
    - changing transport mode
    - transport optimization
    - energy effective vehicles
    - low-carbon fuels/biofuels
    - other?
- Have you changed how you work with these measures because of the SBTs?
    - Do you have higher environmental demands on your transport providers because of the SBTs? If yes, which?
- Do you perceive external pressure regarding the measures above? Is there any difference between the measures? (How) has it impacted your decisions?
- Do you collaborate with your transport providers? If yes, how and in which extent?

- Have you changed your demands on transport service quality (transport time, punctuality, transport frequencies, delivery windows) to create better conditions for emission reductions?
- Would you say you accept higher costs for transports because of the SBTs?
    - If yes, how much more expensive do accept it to be?
- Which departments within the company influence how you manage your purchased freight transports? Are there different objectives/goals?
    - Is there any interest from the board/top management?
    - Have you done any changes in organization around transport purchase to work with the SBTs?

Theme IV: Impacts from SBTs

- Have the SBTs resulted in changes in how the company works with the different business areas/emission sources?
    - To which extent has it resulted in new way of working or confirm/reinforce what you were already doing?
- Have the requirements by SBTi impacted whether or not you have chosen to include freight transports?
- Would you have managed purchased freight transports differently today if you would have not had SBTs for it?

Extra theme: Calculations

- Did you experience any challenges regarding calculating transport emissions?
    - If yes, which? How were these dealt with?

Guide for interviews with companies <u>without</u> freight transports included in SBTs:

Theme I: background and intention to adopt SBT

- Can you describe the background to why you have adopted SBTs?
    - What are the main reasons? Internal/external motives?
- Have you been affected by external stakeholder(s)?
    - If yes, which stakeholders? (customers, investors, owners, regulators, NGOs)
- Can you describe how the SBTs are/were planned to be used?

Theme II: Scope 3 category selection

- Why have you included the categories that are included? Which factors have influenced? *(Possible examples: risk of cost increases, regulations/expected regulations, communications, access to data, power to influence suppliers, complexity in value chain)*
- Did you experience stakeholder pressure regarding which categories to include?
- What are the reasons why you have not included freight transports in your SBTs?

  - External pressure specifically for freight transports? Differences from other Scope 3 categories? (customers, investors, owners, regulators, NGOs)
  - What do you believe would have caused you to include SBTs?
- By who/on which level in the company has the decision concerning which Scope 3 categories to include been taken? Has the board/top management shown interest in the subject?

Theme III: Carbon management

- Are you working strategically with emissions from freight transports although it is not included in your SBTs?
  - If yes, how do you work with it? Why is it not included in your SBTs?
  - If no, why?
- How is the Scope 3 target(s) planned to be fulfilled?

Theme IV: Impacts from SBTs

- Have the SBTs resulted in changes in how the company work with the different business areas/emission sources?
  - To which extent has it resulted in new way of working or confirm/reinforce what you were already doing?
- Have the requirements by SBTi impacted whether or not you have chosen to include freight transports?

Extra theme: Calculations

- Did you experience any challenges regarding calculating transport emissions?
  - If yes, which? How were these dealt with?