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Measuring sustainability

On the creation of manageable and reportable objects in the context of sustainability accounting

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Abstract

This thesis explores the process of developing two sustainability targets in a global corporation, and the measurement and reporting apparatus surrounding them. Through a comparative case study and an application of actor-network theory (ANT), it aims to explore the construction of manageable and reportable objects in the context of sustainability accounting. Basing the analysis on a framework by Callon and Muniesa (2005) and the concepts of *objectification* and *singularization*, this study finds that the construction of manageable and reportable objects required major investment in socio-material arrangements, since these same arrangements were under constant influence from external sources. Its main contribution to the sustainability accounting discourse is that measurability, generally regarded as problematic in the setting of sustainability accounting, can be understood as the result of investment and effort rather than as an essential characteristic. From a practitioner's perspective, establishing targets within sustainability accounting as well as accounting in general is just as much an issue of enrolling important organizational actors, as it is an issue of constructing the "perfect" definition and measurement.

Keywords: Sustainability accounting, social and environmental reporting, ANT, socio-material arrangements, objectification, singularization, overflows, calculation, measurability, calculative apparatus

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1. Introduction

> *CO2, that is something we can measure*. (SVP Corporate Sustainability)
>
> *No, it's not possible to measure [CO2]*. (Director Energy Sourcing)
>
> *Also the social perspective, we have tried to find ways to measure our impact, and that is difficult. Setting the social criteria. /…/ Otherwise it's easy to say, we reduce our carbon footprint with x percent, or use this much less of resources. That's back on measureable, safe grounds.* (SVP Corporate Sustainability)

The classic opening sentence in articles on sustainability accounting in academic accounting journals such as *Accounting, Organizations and Society* refers to the growing concerns, in the business world as well as in society as a whole, for the potentially tremendous impact of climate change and environmental degradation (Hopwood 2009; Spence & Rinaldi 2012, in press). My starting point for this thesis is that there is reason, both from a managerial and an academic perspective, to move beyond this acknowledgement. Measurability and quantification is widely described as an important aspect of companies' sustainability ambitions. However, much of the existent reporting has been criticized for not being "measurable enough" due to inconsistent approaches to numbers and an ensuing difficulty of comparison and follow-up (Tuvhag 2013).

Years of research and scholarship have been dedicated to exploring and criticizing a (perceived) growing importance of numbers (Miller 1991; Porter 1996; Power 1997). Laying that, however intriguing, issue aside, one must also ask what makes the respondents above so sure about what can be measured and not. How come some aspects of sustainability are widely regarded as quantifiable, while others are construed of as in need of judgment?

This thesis is based on the idea that *measurability* is not an essential characteristic of some phenomena, but rather something that is created by effort and investment. Taking the importance of numbers as given, studying the creation of this - so sought after - measurability therefore is both practically and academically relevant. From the purpose of studying specifically sustainability accounting, the question of measurability also becomes a question of measuring sustainability. Accounting for sustainability entails translating *sustainability* into objects that can be arranged, compared and ordered, so that a result can be extracted (Callon and Muniesa 2005). From an external reporting perspective this implicates the creation of reportable objects. From an internal management control perspective, accounting for sustainability implicates the creation of manageable objects.

A theme emerging in the literature on sustainability accounting is the concept of measurability as a challenge (Durden 2008; Bowen & Wittneben 2011; Spence & Rinaldi 2013, in press). However, this measurability has not been examined in detail. Furthermore, the literature tends to treat the concept of sustainability as given, in the sense that it is viewed as some real thing "out there" which can be obtained if we only understand power relations (Archel et al. 2011), capitalism (Gray 1992; 2010; Tinker 1988; Tinker et al. 1991) or some other perceived obstacle dominating corporate life hindering "real" sustainability from being implemented (Larrinaga-Gonzalez & Bebbington 2001; Adams & McNicholas 2007). Also, much of the research focuses on an idea of integration of sustainability into management control (Albelda Pérez et al. 2007; Durden 2008; Gond et al. 2012). There have been many calls for studying accounting in general and calculation in particular, within sustainability accounting (Hopwood 2009, Barter & Bebbington 2013). More generally, several

calls have been made for more in-depth case studies within the field (Larrinaga-Gonzalez & Bebbington 2001; Adams & Larrinaga-Gonzalez 2007).

The purpose of this study is to problematize the idea of *measurability* as it has been construed of in previous research within sustainability accounting. By applying a notion of calculation formulated by Callon and Muniesa (2005) it aims at studying the *construction of measurability* in more detail. More specifically, the study aims at understanding how objects that can be accounted for, that is – managed and reported on - are created. The setting is that of sustainability accounting. Using Callon and Muniesa's theoretical approach (2005) entails suspending the dichotomy between that which can be measured and that which cannot. It also suspends the dichotomy between fact and judgment, and between the quantitative and the qualitative. Instead, it turns attention to why something ends up being described as one or the other. That is - what creates measurability?

Therefore, this study aims at exploring the following question:

> *How are manageable and reportable objects constructed in the setting of corporate sustainability accounting?*

The thesis employs a case study approach comparing two within-company cases. It explores the construction of two sustainability targets, one relating to CO_2 emissions and one relating to Sustainable Innovation. The case company, SCA, is a Swedish hygiene company with a background in pulp and paper. SCA has sales and operations all over the world, and is widely acclaimed for its sustainability practice, especially in the area of sustainability accounting. While the CO_2 target had a long history in the company, the Sustainable Innovation target was newly instated. While CO_2 was described as "measurable", Sustainable Innovation, entailing social aspects, was described as a measurement challenge. This difference in attribution of measurability was reflected in the above quotes. Studying both the targets allowed for comparison between an established and establishing target, targets which were initially described as essentially different in terms of measurability.

In accordance with an ethnoaccountancy approach (Chua 1995; Skaerbaek and Tryggestad 2010), the data consisted of interviews and artifacts. 23 interviews with case company respondents were held, including both corporate sustainability personnel and general management. Furthermore, artifacts such as reports, presentations, guidelines and e-mails were studied. The purpose is to provide an empirical account of how the two sustainability targets were constructed, and more specifically to explore how CO_2 and Sustainable Innovation were made into manageable and reportable objects for the purpose of sustainability accounting. Callon and Muniesa's (2005) framework is applied to understand the process of defining the object and the construction of a measurement apparatus.

A sub-theme of the study relates to the theme of *integration* emerging from the literature review. By closely examining the construction of manageable and reportable objects, the study aims to provide an account of integration (or non-integration) of sustainability into general management control, different than the schematic configurations and ideal types that the literature already has an abundance of (Albelda Perez et al. 2007; Gond et al. 2012). Furthermore, the study attempts at construing of sustainability as practice rather than as a concept with essential, desirable characteristics, which also separates it from the majority of the previous literature. As such, it

responds to several calls for more in-depth case studies of sustainability accounting (Larrinaga-Gonzalez and Bebbington 2001; Adams and Larrinaga-Gonzalez 2007)

This study finds that the construction of manageable and reportable objects required major investment in socio-material arrangements. The endeavor to set up, establish and maintain these arrangements was a demanding and continuous effort, since there were constant influences from external sources. These influences, emanating from connections with actors outside the frame, sometimes rendered the current arrangement inadequate, prompting re-arrangement. This leads to an understanding of *measurability* as not an essential characteristic but the result of this continuous effort to arrange and re-arrange. Establishing targets within sustainability accounting as well as accounting in general is just as much an issue of enrolling important organizational actors, as it is an issue of constructing the "perfect" definition and measurement.

1.1 Outline

Chapter 2 will provide an overview of the existing literature underpinning the construction of a theoretical framework using Callon and Muniesa (2005) in Chapter 3. Chapter 4 outlines important methodological implications of the theoretical approach and critical choices made in the design and execution of the study. Chapter 5 provides the case study empirics, which are then analyzed from the perspective of the construction of manageable and reportable objects using Callon and Muniesa (2005) in Chapter 6. Chapter 7 provides a concluding discussion of the findings from a theoretical, empirical and methodological perspective. Furthermore, the section discusses academic and managerial implications of the results and draws up some possible avenues for future research.

2. Literature overview

2.1 Introduction

Sustainability accounting research can be broadly divided into two major streams, the societal and the managerial perspective. The *societal stream* questions the underlying premise of sustainability accounting and often argues that it might even prove harmful to the sustainability agenda to attempt at mobilizing accounting. Scholars in this field generally employ a set of concepts and theories from the likes of Marx, Foucault and Habermas. The *managerial stream* aims at examining the possibilities for leveraging a sustainability agenda in organizations with the help of sustainability accounting. An emerging research stream exploring carbon accounting, which involves approaches from both the major streams, will also be discussed.[1]

The managerial stream consists of both functionalist and critical approaches. They are both, however, driven by an underlying belief that accounting can be mobilized to alleviate a sustainability agenda. The functionalist approach studies organizations to establish best practice and engage with practitioners to participate in what is described as a desirable change. Research in this field is to a large extent characterized by theorization, theoretical frameworks and to some extent normative case studies. The critical approach is characterized by the same theoretical tradition as in the societal stream. What distinguishes these scholars from those in the societal stream, however, is that rather than dismissing sustainability accounting per se, critical theory is used to analyze what is perceived as problems and hurdles in the implementation of sustainability accounting, with the purpose of facilitating new solutions.

Findings from these two general streams will be reviewed and discussed below.[2] The chapter is concluded by a discussion on general findings from the literature review and empirical observations underlying the choice to construct a theoretical framework for studying the creation of manageable and reportable objects.

2.2 The societal perspective: To account or not to account for sustainability – that is the question.

The societally oriented research stream within sustainability accounting aims at exploring and examining the role of the organization, especially the corporation, in relation to society. Concepts discussed and theorized are a) processes such as stakeholder dialogue and influence, b) search for legitimacy among corporations and c) the struggle to enforce accountability from the firm towards

[1] Although there are differences within the field when it comes to terminology, e.g. with scholars referring to environmental accounting, social accounting and sustainability accounting, for the purpose of this thesis the field has been treated as one and is referred to with the concept of ”sustainability”. A discussion on what this concept entails in terms of environmental and social concerns is beyond the scope of this study. There are theoretical reasons for that, and this will be elaborated on further in the theoretical framework.

[2] For further literature reviews in the sustainability accounting field, see also Burritt & Schaltegger (2010) and Larrinaga-Gonzalez & Bebbington (2001).

its external environment. The stream employs both quantitative and qualitative approaches, both with the prospect of examining "macro-issues" such as the possibilities of mobilizing sustainability concerns in society through accounting. A common narrative is that of corporate hegemony and capitalism "kidnapping" every attempt to alleviate sustainability issues because of what is construed of as a conservative bias towards maintaining the "status quo" in distributive conflicts and power relations (Tinker 1988; Tinker et al. 1991; see also Gray 1992, 2010). Finally, there are also researchers in this stream promulgating a view of sustainability as a "green business-case".

According to Cooper and Owen (2007), "accountability" occurs when the external stakeholders have the ability to actually influence decision-making in corporations. They study a number of award-winning sustainability reports, to examine whether there are any examples of consequences to validate corporations' claims of stakeholder accountability. Cooper and Owen (2007) construe of this dialogue as Habermas' so-called Ideal Speech Situation. In that ideal situation, all participating actors suspend their previous beliefs and engage in a fruitful and open dialogue, where everyone can participate equally, all assertions can be questioned and the ability for a participating group to exercise their rights is not inhibited by the coercive powers of other groups (for further explorations on Habermas from the perspective of sustainability accounting, see Baker 2010). The authors employ a method of content analysis but find very few examples of actual influence on decision-making, thereby arguing for the limited possibilities for accountability to be induced by sustainability accounting.

A similar analysis to that of Cooper and Owen's (2007) is made by Archel et al. (2011). They follow stakeholder dialogues between corporations and NGOs induced by a Spanish government initiative. They find that although the dialogues are characterized by plurality, the actual outcomes show a clear dominance of the perspectives advocated by the corporate participants. They go further than Cooper and Owen (2007) in concluding that stakeholder consultation processes might actually counteract the intentions of the participating NGOs, since the dialogues can be used as symbolic involvement to legitimize current practices of the companies. The authors use Bourdieu's ideas of heretic versus dominant discourses to show how the discussion was captured by the voluntarism and business-case approach to sustainability promulgated by the corporate participants.

The legitimacy theory of sustainability accounting has been examined quantitatively, too, with mixed findings. Patten (2002) shows that there is a relation between worse environmental performance and the level of environmental disclosure, implying that the worst performers make the most environmental disclosures. This supports claims that the level of disclosure is a function of the social/political environment, that is, that companies use sustainability reporting to legitimize inferior sustainability performance. Cho and Patten (2007) examine whether environmental disclosure is utilized as a legitimacy tool. Examining only non-litigation-related environmental information, they show that disclosure rates are higher for worse performers, and higher for firms in industries with major environmental impact. Thus, they argue that firms do use sustainability disclosures in external reporting as a legitimizing tool. However, contradictory results are found by Clarkson et al. (2008). They test two competing predictions hailing from economics and socio-political theory respectively. The economic theory prediction is that the rate of sustainability disclosure by companies should relate to supreme sustainability performance, while the socio-political theory prediction, as discussed above, is that due to reasons of legitimacy-seeking, the level and rate of disclosure should be related to worse sustainability performance. They find a

positive association between sustainability performance (based on GRI guidelines) and the level of discretionary environmental disclosures. Thus, their findings contradict those of Patten (2002) and Cho and Patten (2007).

On the other side of the spectrum of the societal perspective on sustainability accounting, is a sub-stream conceptualizing the so-called "green business case" of sustainability, promulgated for example by Porter and Kramer (2011) (see also Figge and Hahn 2012; and Figge and Hahn 2013). Al-Tuwaijri et al. (2004) argue, based on a quantitative analysis, that "good environmental performance" and economic profitability go hand-in-hand, and that superior environmental performance is also related to more extensive environmental disclosures. They explain their results with the idea that economic performance, environmental performance and environmental disclosure are related to the quality of management – i.e. that the issue of sustainability is really an issue of good management. In a similar vein, Henri and Journeault (2010) provide a study on the effects of integration of sustainability and environmental issues into management control (eco-control). They construct a model to investigate firstly the direct effect on economic performance and secondly the indirect effect via environmental performance. They conclude that it does not have any direct effect on economic performance but that there are indirect effects via environmental performance in some specific contexts.

2.3 The managerial perspective: *How* account for sustainability?

The managerial research stream within sustainability accounting, explores how accounting can be mobilized for sustainability. It is within this research stream that the most detailed empirical accounts of sustainability accounting in organizations can be found. The focus is often on external reporting and how the introduction and implementation of that influences organizational behaviour. It has also more recently been extended beyond external reporting to examine the role of management control, and issues of integration and embeddedness of sustainability issues in management control systems and managerial accounting. The stream can be divided into two sub-streams. One is more practically and prescriptively oriented, extending to frameworks and construction of best practices, while the other employs a set of critical theory approaches, often to examine power relations at play. The underlying rationale, however, is that sustainability accounting does possess characteristics which makes it suitable for alleviating the sustainability agenda. The question, here, is *how*.

2.3.1 Implementing sustainability accounting to effect organizational change: Success or failure?

One type of research in sustainability accounting's managerial stream consists of case studies following the implementation of sustainability accounting systems, external as well as internal, in companies. The purpose is to explore the effects on the organization as a whole.

Larrinaga-Gonzalez and Bebbington (2001) examine what they describe as a "failure" of organizational change relating to sustainability accounting. They study a Spanish electricity company seeking to "green" itself in an initiative to introduce internal and external environmental accounting practices. The authors examine a theoretical divide in the literature (similar to that

discussed in the introduction of this literature overview) between the belief and the disbelief in the possibility for organizational change to come about from sustainability accounting. Using a framework of organizational responses to stimuli to change (Laughlin 1991) they examine whether an "altered understanding" of the organization and its environment had come about. The opposite to organizational change coming about is conceptualized as so-called *institutional appropriation*. This is described by attempts to either ignore or change the sustainability agenda, and attempts to avoid discussion on the "problems of capitalism". The research project, then, was to examine how the introduction of environmental accounting contributed to either organizational change or to this institutional appropriation. The authors conclude that the sustainability agenda had failed to give rise to substantive organizational change, and suggest that the overall conditions for change to take place were not present, for example due to the institutional framework of the firm. There were also problems, it was argued, relating to the underlying rationale of the organization, as this had not been altered by the adoption of a sustainability agenda. The most important reason for change not coming about, however, was argued to be a political struggle between the environmental management department and the accounting department, a struggle that the accounting department "won". The accounting proposed by the environmental management department did not reinforce, it was argued, the "underlying rationale" of the firm, and therefore they could not effect "change". The study clearly suffers from its normative stance, which is not very articulated (but evident in statements like the environmental managers being "only marginally green"). However, it brings up interesting issues of the internal power dynamics, and calls for more research examining the micro-processes of how sustainability accounting affects organizations (Larrinaga-Gonzalez and Bebbington 2001).

Adams and McNicholas (2007) also study the process of organizational change related to sustainability reporting. They work in collaboration with the managers in their case organization, in an action research approach, that is, an approach with a purpose of both taking action and creating knowledge or theory. By assisting in the production of a Sustainability Report, they were able to gain access to the processes of organizational change related to increased reporting on sustainability. In contrast to Larrinaga-Gonzalez and Bebbington (2001) they find that the "problem" was not a lack of interest in providing accountability towards stakeholders, but rather a lack of knowledge. This described lack of knowledge extended over issues like what constitutes "best practice", how to integrate sustainability goals and reporting practices and how to choose between different reporting systems.

2.3.2 Management control for sustainability: A question of "integration"

Another study examining the process of organizational change relating to sustainability accounting was conducted by Albelda Perez et al.. (2007). With a field research approach, they examine what they conceptualize as the interface between environmental management systems (EMS) and management accounting. EMSs are conceived of as entailing a possibility to embed environmental issues in the organization. They argue that the implementation of sustainability accounting gives rise to catalysts of change, for example because of the need for employee training and awareness building, integration of stakeholders' interests and organizational learning needed. These catalysts for change, in turn give rise to what they conceive of as intellectual capital, such as employee awareness, skills, environmental knowledge and integration of sustainability issues in strategic planning. They conduct a study of ten Spanish companies that had to implement a European

framework for sustainability management and audit (EMAS). Based on the idea of intellectual capital, the authors construct a framework of three levels of embeddedness. *Primary* embeddedness arises when employee awareness and environmental skills and knowledge has been attained. *Visible* embeddedness is when sustainability issues has further influence over organizational structure and strategy, entails the commitment of managers, cross-functional coordination and the integration of sustainability issues in planning processes. The third and final level, *advanced* embeddedness, is attained when full integration of sustainability, high commitment of managers and the advanced use of management accounting practices to deal with sustainability issues have been achieved.

A conceptualization similar to that of Albelda Perez et al. (2007) relating to the integration and interplay between management control for sustainability and "regular" management control was conceived of in a recent theoretical framework by Gond et al. (2012). This framework suggests making a more distinct link to corporate strategy. Using Simons' levers of control framework (1995) with its focus on the uses of management control systems (*interactive* and *diagnostic*) and combining this with a conceptualization of level of integration (*technical*, *cognitive* and *organizational*) they sketch up eight ideal-type organizational configurations for integration of strategy and sustainability. In this way the authors construct a framework to understand how different uses of the management control system for sustainability (SCS) and the traditional MCS, have different effects on companies' ability to perform on the so-called triple-bottom-line (TBL)[3]. One example of a configuration is "Strategy emergence through sustainability", based on a *diagnostic* use of MCS and an *interactive* use of SCS, together with low integration between MCS and SCS. This is contrasted for example with the "Integrated sustainability strategy" configuration where both the MCS and SCS are used interactively, paired with high integration between MCS and SCS, leading to a complete overlap and integration between "regular" strategy and sustainability strategy.

The authors furthermore hypothesize relationships between different configurations and firm TBL performance. The former is supposed to lead to medium TBL performance, since the authors expect firms configured like this will perform well on the non-financial side, but worse on the financial. The latter, on the other hand, is expected to perform well and long-term on the TBL, since the firm can derive innovations and development from sustainability concerns and include it in differentiation strategies. Although the conceptual framework constructed could be helpful in categorizing different configurations and levels of integration, the empirical basis for their conclusions is thin at best, being based only on four cases. Therefore, however, the study underlines the need for empirical accounts of integration of sustainability.

One of few examples of case studies of management control and sustainability is provided by Durden (2008). The study reflects a view that there is inconsistency between management claiming a focus on social and environmental aspects and no such measures included in the MCS. Durden (2008) concludes that the case company was lacking in terms of integration of sustainability concerns into management control. More interesting, though, were findings regarding a perception that especially the "social" aspects of sustainability were difficult to quantify and measure, and that there was a lack of external benchmarks to build from. Durden (2008) argues that the "lack of

[3] "Triple bottom line" (TBL) is a common concept in the sustainability accounting literature. It is based on an idea of corporations producing financial, environmental as well social benefits.

integration" was related to this lack of operationalization of sustainability. Unfortunately, the author does not delve into the issue deeper, however it does strengthen the case for more detailed studies of the creation of manageable and reportable goods in the context of sustainability accounting.

Simons' "Levers of control" (1995) framework was also used in a recent study by Arjaliès and Mundy (2013, in press). To provide a broader perspective on practices within organization, the authors employ a questionnaire among listed French companies, including questions on how MCS are used to facilitate change and strategic renewal in sustainability. In the same way as Gond et al. (2012), this study focuses on the use of management control systems rather than merely the existence of them. In contrast to Gond et al.'s (2012) typology of integration of MCS and SCS, Arjaliès and Mundy (2013, in press) aim at an investigation of the use of MCS for strategic renewal through sustainability. Basing their research on the notion that if MCS are instrumental in transforming practice, then they should arguably play an important role in the incorporation of sustainability into strategic plans and objectives. Although the study does provide a snapshot of a group of major companies at a point in time as to their views on sustainability and MCS, the questionnaire-based data collection fails at giving a more detailed image of actual practice in companies. The results are limited, by construction, to what companies *say* they do and how they *describe* their formal routines, systems and organization. This is potentially exacerbated by the fact that the research was conducted in cooperation with a Socially Responsible Investment (SRI) department of a French asset management company and that the questionnaire was sent out in the name of the asset manager. The authors claim that attempts of "greenwashing"[4] were counteracted through customization of the questionnaires based on knowledge of specific firm practice, as well as anonymization of the questionnaire responses. However, there is probably reason to be a bit skeptical about the attained results, especially in terms of the link between *walk* and *talk*, i.e. between formal routines and process descriptions and actual practice. Finally, since the questionnaire was sent to sustainability management, it runs the risk of only providing the perspective of those deeply involved in sustainability management, and not of general management. This approach could run the risk of providing a biased image of the importance and value of sustainability strategy and management within the company. These limitations aside, the study does give an image of the many diverse uses of MCS for sustainability implemented by companies today. All companies in the study had a sustainability strategy in place. Externally imposed guidelines, such as ISO standards and GRI reporting, provide operational boundaries for sustainability practices. Furthermore, many companies used sustainability management as a means of risk management, for supplier control, and to take externalities into account. The authors argue that no matter the initial objectives or motivations for engaging in sustainability, the actual implementation of sustainability management and control processes does facilitate strategic renewal and transformation.

Quantitative empirical approaches have also been employed in the study of management control and sustainability. Pondeville et al. (2013) examine the relation between contextual factors such as perceived environmental uncertainty and the development of environmental management control systems. The study contributes to management accounting literature by confirming a link between

[4] Greenwashing is a common concept in the sustainability discourse, generally describing an activity which aims at making the corporation seem more sustainable than it really is.

strategy and management control systems, and show that this can be transferred to issues like sustainability. While many scholars have discussed the role of the external environment relating to levels of disclosure (Patten 2002; Cho and Patten 2007), fewer have examined its influence on management control systems. Pondeville et al. (2013) find that the level of perceived uncertainty negatively influenced corporate environmental "proactivity", the development of an environmental information system and of a formal environmental management control system. A potential explanation discussed, was that managers who perceived the environment as unpredictable were unwilling to invest in these systems because the information provided would be unreliable.

Ferreira et al. (2010) go in the opposite direction from Pondeville et al. (2013, in press) in terms of causality, in asking the question whether the use of an environmental management accounting (EMA) lead to changes within organizations. This was operationalized more specifically in the question whether the use of such a system lead to increases in product and process innovations. This is one of the most common arguments brought forward by academics and practitioners promoting the so-called business-case of sustainability (see for example Porter and Kramer 2011). Ferreira et al. (2010) also examine the role of strategy in relation to EMA. What they find is that the use of EMA does not affect product innovation but that it could lead to an increase in process innovation. Relating to the issue of strategy and EMA, they hypothesize that companies following a prospector strategy would use EMA for strategic objectives, but conclude that no such effect was visible. They argue that the lack of clear relations between EMA, strategy and innovation could be due to organizations only recently having started this "evolutionary process towards sustainability accounting" (Ferreira et al. 2010).

Generally, the sustainability accounting field still lacks detailed case studies of accounting "in practice". Indeed, Hopwood (2009) argues for the need to study not only intentions, but also decisions and consequences. One exception is Spence and Rinaldi (2012, in press). They provide a detailed account of the implementation of sustainability, and manage to go beyond the notion of whether sustainability accounting implementation was a "success" or "failure" (see Larrinaga-Gonzalez and Bebbington 2001). They provide a case study investigating the implementation of the concept of sustainability in a supply chain of lamb meat, from the viewpoint of a British nationwide supermarket chain. The authors study how sustainability is enacted and embedded in decision-making throughout the supply chain. They use Foucault's concept of governmentality, a set of tactics and procedures allowing someone or something to exercise power, including both technologies used and underlying rationales. In this case, the purpose was to create a change in practice throughout the supply chain, encompassing actors from farmers via meat processors and distributors to the supermarket itself. They provide an interesting account of how the supermarket used calculative methods and technologies to influence the suppliers. There was an inherent tension described, between sustainability being presented as scientific and quantifiable, but often based on what was described as anecdotal and qualitative measures. Their research provides deeper understanding of how sustainability can be understood in the context of exercise of power. But more interestingly, it provides an example of how sustainability can be studied as practice, that is, focusing less on the "pros" and "cons" of accounting for sustainability and more on the implications an introduction of the sustainability concept has on management control. Spence and Rinaldi (2012, in press) therefore provide an empirical account on a higher level of detail than much of the previous research. Specifically, they show the complexities involved in translating an imprecise

concept like sustainability into what is perceived as "hard", quantifiable measures. They conceptualize this as a dichotomy between fact and judgment. This dichotomy was also described in the early interactions with the case company of the present study, and is reflected in the quotes by company representatives in the introduction.

2.4 Accounting for carbon: An emerging research stream

An emerging field of research which can be related to that of sustainability accounting, but which takes on a more detailed practice-oriented approach, is the study of carbon accounting. This field's emergence has been prompted by the rise of markets for emissions trading, such as the European Emissions Trading Scheme (EU ETS) that was instated in 2005 (see for example Cook 2009; Engels 2009; Lohmann 2009; Ascui and Lovell 2011). Within this field, two approaches can be distinguished. One is more functionalist in nature, examining the implementation of carbon accounting (voluntary as well as mandated by regulation) from a managerial and facilitative perspective. One example of that stream is Bowen and Wittneben (2011) who describe carbon accounting as a complex issue due to its extending over many organizational fields. In their perspective, carbon accounting is really three different things. Firstly, "counting carbon" is counting molecules in the physical sense. Secondly, "carbon accounting" is reporting on emissions. Thirdly, "accountability for carbon" is the idea of making emitters accountable for their emissions. Bowen and Wittneben (2011) discuss how these fields have different objectives when it comes to what is described as the trade-off between *accuracy, consistency* and *certainty*. The fields weigh these factors differently in accordance with their respective goals. Scientists in the field of "counting carbon" want measurement *accuracy*, while accounting professionals in the "carbon accounting" field aim for *certainty*. Government agencies and NGOs in the field of "accountability for carbon", on the other hand, aim for *consistency,* for the purpose of holding organizations accountable. Aiming for one, they argue, will reduce another. Although this is not an empirical account, it does provide an interesting framework for how to construe of the potential trade-offs involved in the measurement, accounting and reporting on carbon emissions, relevant to the present study.

Another stream of research on carbon accounting relates to the theoretical and empirical field of the sociology of markets (for a general introduction to this perspective to carbon accounting, see for example Callon 2009). This perspective, with its theoretical roots in actor-network theory (ANT)[5] evolves around the concept of constructing the object, the commodity. For a carbon market to be created, it is not enough just to make the political decision to do so. Carbon also has to be defined, made tradable and transferable. Emissions at different times and sites need to be made commensurable, i.e comparable and exchangeable with each other to be tradable on the same market. MacKenzie (2009) discusses how rules of thumb, exchange rates and conversion multiples are used to make carbon emissions "the same". For example, different types of emissions are often converted into "carbon equivalents". This is a mathematical function generated from a model, to make emissions of different types of greenhouse gases interchangeable. Using this "exchange rate" is necessary. The alternative, negotiating an exchange rate ad hoc, would make it impossible to

[5] Actor-network theory (ANT) is a research approach in sociology. It a set of tools and methods of analysis where everything in the social and natural worlds are seen as a "continuously generated effect of the webs of relations within which they are located" (Law, 2009). This research approach will be elaborated on further in the theoretical framework.

uphold liquidity in the market. These types of calculations are generally taken for granted after they have been established. From a market sociology point of view, they have been "black-boxed"[6]. The underlying assumptions, calculations and judgments involved in generating the model are not under dispute anymore, but are instead readily available for use by those who need them. Although Bowen and Wittneben (2011) built on both Callon (2009) and MacKenzie (2009) it is clear how they only manage to capture some of the complexity of Callon's (2009) and MacKenzie's (2009) respective theoretical approaches to carbon markets. While Bowen and Wittneben (2011) discuss the concepts of *accuracy*, *consistency* and *comparability* as given and self-explanatory, Callon (2009) and MacKenzie (2009) are part of a non-essentialist scholarly field, that is, they construe of these concepts as constructs rather than as possessing essential characteristics. Nonetheless, these concepts are commonly used, and therefore this perceived dilemma will be brought along in this study's analysis of the construction of two sustainability targets.

2.5 Discussion and potential avenues for research: Exploring underlying assumptions

This section has discussed sustainability accounting from the perspective of a societal stream and a more managerially oriented one, as well as the emerging field of carbon accounting. What has been found? Firstly, both the societal and the managerial track have one thing in common: The idea that *sustainability* is a concept "out there" which we can draw upon and either *fail* to take into account, or *succeed*, depending on the research stream. There are many concepts returning in the literature: *sustainability performance*, *accountability*, *progress* and *integration* are just a few of them. These concepts are operationalized to greater and lesser extent. Secondly, *measurability* and related issues have been identified empirically (Durden 2008; Spence and Rinaldi 2012, in press) and theorized to some extent (Bowen and Wittneben 2011). However, it has not been examined in detail. Thirdly, a theme which emerges, relating to management control for sustainability is that of integration. There is, however a lack of in-depth case studies of the integration process. The following section will discuss how these three findings boil down to the aim and problem of the current study.

Sustainability scholars like Adams and Larrinaga-Gonzalez (2007) suggest engaging in "micro-processes" on the inside of companies. Hopwood (2009) discusses how the concept of calculation will likely be a fundamental part of a world "committed to achieving a more harmonious relationship between the human and natural worlds". This concept of calculation draws partially upon Miller's (2001) call for applying a sociological approach to the study of accounting, and the study of the construction of markets and goods. This is highly relevant for the present study, because for *sustainability* to be accounted for, an object that can be managed and reported on must be defined and constructed.

An empirical finding in Spence and Rinaldi (2012, in press) was the dichotomy described between *fact* and *judgment*. This was described as a potential problem in the setting of sustainability accounting. Similar concerns were reflected in Durden (2008). Furthermore, Bowen and Wittneben

[6] This metaphor aims to describe how the initial disagreements and decisions underlying the model have now been forgotten – they have disappeared into a "black box". (MacKenzie 2009).

(2011) discussed the perceived trade-offs between *accuracy*, *consistency* and *certainty*. In essence, all three studies reflect a view that an imprecise concept like sustainability is difficult to translate into hard measures suited for the accounting setting.

Callon and Muniesa (2005) on the other hand, with their roots in ANT, suggest suspending the *fact* vs *judgment* dichotomy, as well as that between calculation and qualitative judgment, and to instead focus on *what creates calculability*. They construe of calculation as never merely judgment and never merely "rational" numerical operations. In the next section, Callon and Muniesa's framework (2005) will be adapted for the study of the construction of manageable and reportable objects in the setting of sustainability accounting.

To conclude, the approach in this study responds to calls for more detailed empirical case studies on sustainability accounting practice (e.g. Albelda Perez et al. 2007; Adams and Larrinaga-Gonzalez 2009). It also responds to Hopwood's (2009) call for an increased focus on calculation and calculative practice in the realm of sustainability accounting. In the same line of reasoning, Barter and Bebbington (2013) suggest applying ANT to sustainability accounting to pay more attention to the role of calculation. Indeed, Justesen and Mouritsen (2011) argued that ANT's contribution to accounting research has been that of bringing "back the role of calculations as central objects in the study of accounting phenomena". There has also, as was discussed above, been a rise of ANT and sociology of markets based approaches to the study of carbon accounting and carbon markets. Applying an ANT methodology to a case study of sustainability accounting, was also recently tried out by Lippert (2013). This theoretical approach could render a new view to sustainability accounting and the case in question, because it allows us to suspend the dichotomy between fact and judgment (and, also, that between calculation and qualitative judgment) and instead focus on what renders something to be classified as calculation/fact and something else as judgment. Another important aspect to this theoretical approach is that it does not aim at finding the "real" rationale behind or beneath a concept. This might prove fruitful, since much of the sustainability accounting research tends to end up in general programmatic explanations of the reason for the "failure" of sustainability accounting. If it's not a question of asymmetric power distribution it's a question of capitalism, and so on. In the ANT approach, instead, there is nothing *beneath* the socio-material arrangements enacting concepts like sustainability. This will be explained in further detail below, along with the theoretical implications of this approach.

In the following section, Callon and Muniesa's (2005) conceptualization of calculation will be discussed in further detail, and adapted to the study of the construction of manageable and reportable objects in the setting of sustainability accounting.

3. Theoretical framework

In this section, Callon and Muniesa's (2005) framework, where calculation is seen as a hybrid between rational calculation and qualitative judgment, will be adapted to the case study setting. The aim is to construct a theoretical lens for the understanding of the construction of manageable and reportable objects. First, however, a brief discussion of the theoretical and empirical roots of the approach is necessary.

The approach to calculation proposed by Callon and Muniesa (2005) comes from the sociological research approach actor-network theory (ANT). ANT has to a growing extent been applied in accounting research, and a thorough overview of this research stream and its contributions to accounting research is provided by Justesen and Mouritsen (2011). The next section draws up some major theoretical concepts from ANT and its implications and contributions when studying accounting.

3.1 ANT and accounting: Socio-material arrangements constituting reality

In contrast to the name, actor-network theory (ANT) is - rather than a *theory* - a set of tools and methods of analysis, as well as an approach to empirics. Within ANT, everything in the social and natural worlds is seen as a "continuously generated effect of the webs of relations within which they are located" (Law 2009). There is no reality and no phenomena with essential, irreducible characteristics outside of these networks. The name ANT describes how it is thus an approach to studying phenomena as socio-material arrangements; actor-networks[7]. The word "socio-material" denotes how these actor-networks are made up of both humans and material devices.[8]

ANT is an ontologically constructivist approach, meaning that it sees reality as a construct. It differs from epistemological constructivism, which sees *knowledge* as a construct. That is, ANT goes one step further. The socio-material arrangements constituting an actor – a phenomenon for example, such as an accounting method – is an enactment of reality. This implies there is nothing "behind" the phenomena we observe – they are enacted in socio-material arrangements, and there is not necessarily an underlying force driving the forming and re-forming of them. Therefore, ANT should be seen as descriptive rather than foundational, "[telling] stories about 'how' relations assemble or don't" (Law 2009). As such ANT and its application is void of - or free from, depending on your perspective - grand theories and explanations. This has important consequences from the perspective of studying accounting.

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[7] Humans and non-humans are intermeshed in actor-networks. These actor-networks are what constitutes agency and agency is distributed in the actor-network. The hyphen aims at accentuating that the actor is a network, and the network is an actor (Latour 2005)

[8] ANT is a so-called material-semiotic approach in that it treats both concepts and the material. It is to a large extent based on the work of Bruno Latour, Michel Callon and John Law (see for example Callon 1986, Latour 1987, 2005, Law 2009). Although a sociological approach, it differs from much sociological research in that it aims to suspend the social/natural dichotomy. In this concern it differs from e.g. social constructivism, which tends to view phenomena as social constructs (Law 2009). The ANT approach is to get into the field and study material devices, concepts, devices, technologies and humans symmetrically. In this sense, the social/natural divide is suspended, and phenomena are seen as consisting of both.

The approach has been applied in accounting research to study for example accounting change, accounting implementation and the emergence of specific accounting techniques (Justesen and Mouritsen 2011). While other sociological approaches in accounting research have tended to describe accounting phenomena as an effect of *something* else, such as an underlying rationale (e.g. power relations) or personal sense-making, an effect of ANT's ontologically constructivist position is that there is no "backstage". The dichotomy of appearance versus reality is rejected (Justesen and Mouritsen 2011). In the ANT perspective, accounting change does not come about because of linear improvements or rational adaptation to a changing environment. Instead, it is the result of efforts and investment, and of humans and non-humans coming together in a particular space and time to constitute an actor-network establishing the new practice. An example is Chua (1995), who applied an ethnographic approach in the study of accounting in public hospitals. Following human and non-human actors, and applying Latour's notion of translation (Latour 1987), she explored how accounting change in public hospitals came about through the establishment of a fragile actor-network. A more recent example is Skaerbaek and Tryggestad (2010), who studied how accounting shapes strategic options, using Callon (1998).

Approaching accounting from an ANT perspective brings back calculation as an important concept (Justesen and Mouritsen 2011). The calculation concept will be elaborated on further below, to construct a framework for understanding the construction of manageable and reportable objects.

3.2 Calculation as a socio-material arrangement: The construction of manageable and reportable objects

A recent development in the interface between ANT, economics and accounting is the sociology of markets. This research is based on the notion that economics are performed in the socio-material arrangements of markets (MacKenzie 2009). In this sense, there is no abstract *market* out there operating on its own according to some rational principle of neoclassical economics. In the field of economics, markets are often construed of as completely abstract and just "happening". In the sociology of markets, on the other hand, the concrete structures and configurations of markets are in focus. As such, markets are thought of as configured encounters between supply and demand. In this perspective, we do not see markets as the natural effect of supply and demand. Rather, it is a construction. How something is made into an economic good depends on the socio-material arrangements (involving humans and material devices) set up. This was covered briefly above in the discussion on the field of studying carbon accounting and the construction of carbon markets. As such, the concrete construction of a market takes the form of a configuration, in that it is a set of rules and a formal structure to organize the encounter between supply and demand.

Callon and Muniesa (2005) provide a theoretical framework aimed at understanding the process of creating markets through calculation. They construe of economic markets as consisting of three constitutive elements, i.e. economic goods, economic agents and economic exchanges. In order to be exchangeable, goods must be made calculable in the sense that market agents must be able to assess the goods and attribute some value to it. In giving this role of calculations to economic markets, they create a notion of markets as "collective organized devices that calculate compromises on the values of goods" (Callon and Muniesa 2005). For the purpose of this study, the first component - that of the economic good - is in focus. The reason for this, which will be

developed on further, is that this study is not examining a market per se. Instead it turns to an organization in the process of constructing manageable and reportable objects for the purpose of sustainability accounting.

The authors (Callon and Muniesa 2005) are deliberately avoiding two common interpretations of economic markets, one originating from neoclassical economics, and one from sociology and anthropology. Firstly, economists tend to argue that agents are calculative and rational by nature and calculate for profit maximization. On the other hand, sociologists and anthropologists tend to end up in a interpretation of calculation as merely a marginal activity. In reality, they argue, agents act on the basis of other factors (personal judgment for example). In this view, calculation is at best an ex-post rationalization of previous decisions. According to Callon and Muniesa (2005) the reason for this distinct separation between calculation and judgment is that there is no clear definition of calculation. To avoid the risk of ending up in any one of these two simplifications, they propose a definition of calculation as a hybrid between the quantitative and the qualitative. The issue, then, is not what is calculation and what is not, or what is fact and what is judgment, but rather how calculability is constructed through socio-material arrangements. This definition of calculation can deal with phenomena that are not pure, i.e. not either quantitative or qualitative, but a mix of both. The accounting device, for instance, is neither just an instrument in the hands of the human (implying only humans have agency) nor an agent that imposes its own rational economic logic on the humans using it. This serves to remind us that, in ANT and the sociology of markets, agency is distributed between humans and non-humans.

As the *calculation-judgment* dichotomy is suspended, along with those of *fact-judgment* and *quantitative-qualitative*, essentialist concepts like *measurability, accuracy* and *consistency* are rendered useless (c.f. Bowen and Wittneben 2011; Spence and Rinaldi 2012, in press). Indeed, the purpose of applying this framework to the present case is partly to explore this dichotomy and these concepts from another perspective, since they were previously identified as important in the context of sustainability accounting. Applying Callon and Muniesa (2005) we can, instead of framing one thing as measurable and something else as not, we can attempt to explore the reasons for how something ends up in one "box" or the other.

The proposed framework (Callon and Muniesa 2005) construes of calculation as a three-step process. Firstly, the entities that are to be taken into account must be "detached", that is, moved to a space (the account). This is not necessarily an account in the accounting sense, but could be an invoice, a trading screen or a shopping cart. The entities are arranged and compared according to some operating principle. Second, the entities are subjected to manipulations and transformations. Third, a result is extracted. This can be a new entity such as a sum, a list, a binary choice or a category. This new entity links the entities taken into account. A fundamental characteristic of this new entity is that it has to be able to leave the calculative space and travel without the whole calculative apparatus.

The purpose of this thesis is to gain understanding of the construction of manageable and reportable objects in the setting of sustainability accounting. The case company had sustainability targets relating to CO_2 and Sustainable Innovation. How then, to measure, compare and report on the progress towards attaining these targets? In the setting of accounting, numbers are generally called for and as such, this thesis examines this construction of numbers. An important difference between

the setting Callon and Muniesa (2005) imagine, that is, the creation of economic goods which can be traded on a market, is that the objects in the case company setting are not to be "sold" outside of the company. Instead, they are to be defined and accounted for internally and externally for the creation of numbers. Therefore, in the context of this case study, the recipient is not an agent on an economic market, but an actor within the organization who will make use of the objects in the form of numbers. This means that what we are dealing with, and why it is relevant to use Callon and Muniesa's (2005) framework even with this difference, is a process of economization. That is, a process of assigning value to something. The difference is important also in terms of vocabulary. This study will use the word "object" as opposed to "good", and "user" as opposed to "recipient". Adapting the framework is a consequence of moving the concept apparatus from the market setting to the intra-organizational setting of the corporation for the purpose of studying corporate sustainability accounting.

In the following sections, the components constituting Callon and Muniesa's (2005) framework; *objectification* and *singularization*; will be explored in further detail and adapted to the case study setting.

3.2.1 Objectification

Objectification (Callon and Muniesa 2005) is the process by which the object is defined. For the purpose of transactions, the object does not have to be physical, as long as it is a material *thing* in the sense that it "holds together". As an example, even something non-physical as a service is a thing, because it has material properties defining it. In this sense, Callon and Muniesa (2005) emphasize that "materiality and physicality must not be confused". The objectification process thus entails setting up rules, properties and characteristics defining the object.

How to understand this in the present setting of sustainability accounting and sustainability targets in the case company? For the purpose of, for example, producing a sustainability report providing

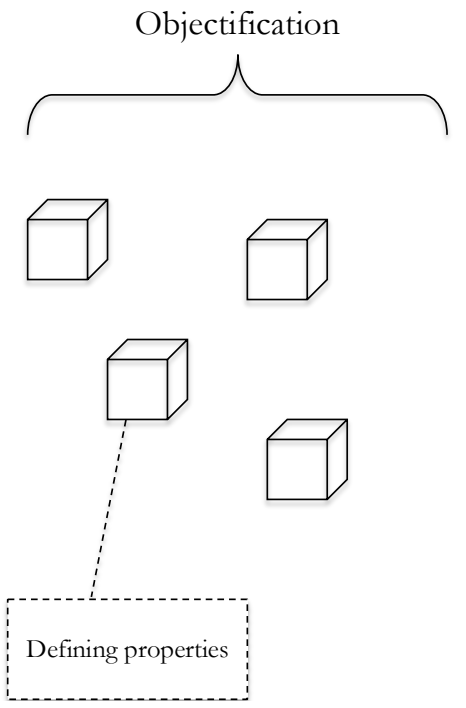

Figure 1: Objectification

an update on progression towards reduction of CO_2 emissions and an increase in Sustainable Innovation, CO_2 emissions and Sustainable Innovation must be "counted". And for them to be counted, in a numerical sense, we must establish what we mean by them – what to count. What is a CO_2 emission? And what is a Sustainable Innovation? Objectification in the context of the present study, then, is the process of defining a unit of CO_2 emissions and a Sustainable Innovation, respectively. Objectification is thus the first step in the construction of manageable and reportable objects in the setting of sustainability accounting.

3.2.2 Singularization

The next step is that of singularization (Callon and Muniesa 2005). Generally entailing more different components than objectification, this is the process where the object is transformed so that economic agents can assign value to it. It involves a range of operations and manipulations. A calculative space must be established and objects must be qualified or chosen, that is – taken into account. In the calculative space the objects are linked and compared to other objects. The objects are classified, clustered and sorted. The purpose is to be able to extract a result that can travel outside of the calculative space without the calculative apparatus. Thus, *calculability* has been produced in the form of a price, a classification, a choice, a ranking – i.e. something for economic agents to assess, estimate and choose from (Callon and Muniesa 2005). Not only is singularization obtained through interaction with the intended recipient, singularization also entails reconstituting the intended recipient. The manipulations are aimed at transforming the object so that it is adjusted to the recipient's world, and if necessary, the object will be adjusted to the recipient's world by transforming that world.

Again, in the setting of the case, this should be construed of as the process by which CO_2 and Sustainable Innovation, respectively, are taken into account, compared and manipulated. It is also how a standard is constructed so that progression towards the target can be established.

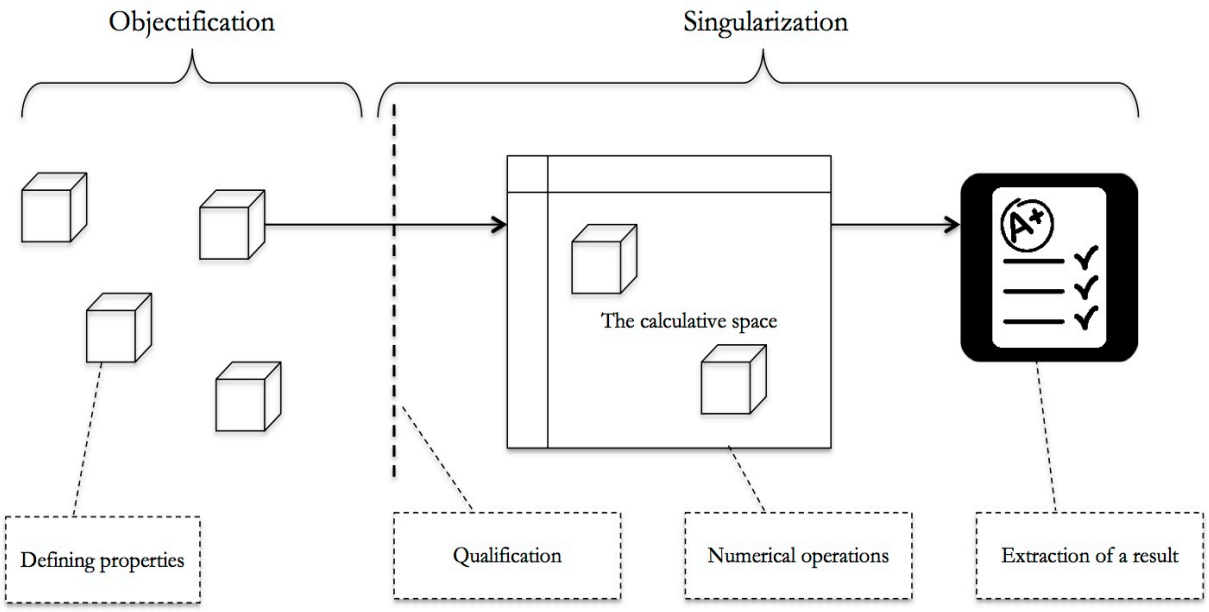

Figure 2: Objectification and singularization

Singularization therefore entails the construction of a whole measurement, accounting and reporting apparatus for the purpose of turning CO_2 and Sustainable Innovation into manageable and reportable objects.

3.2.3 Framing and overflowing, externalization and internalization

The process of objectification and singularization described above is really a process of framing. It is a process of setting up boundaries: Who and what to include, what to take into account, how to compare that which has been taken into account, and to what? These frames are never stable (Callon 1998). They require investment (not necessarily monetary) and effort, not only to construct, but also to maintain. The framing process is discussed by Callon (1998, p. 247):

> *The actors are capable of agreeing (an agreement which does not have to be explicit) on the frame within which their interactions will take place and on the courses of action open to them.*

However, the interactions going on within the frame are never independent of the outside world. On the contrary, the framing process in itself would be "inexplicable if there was not a network of connections with the outside world" (Callon 1998, p. 247). In the ontologically constructivist perspective, actors are enacted through the networks of interdependencies in which they are enmeshed. And by definition, agents are enmeshed in more than one network. Therefore, when agents are enrolled in socio-material arrangements – frames – there are inevitable links to the outside world. To set up an arrangement is to "extricate the agents concerned from this network of

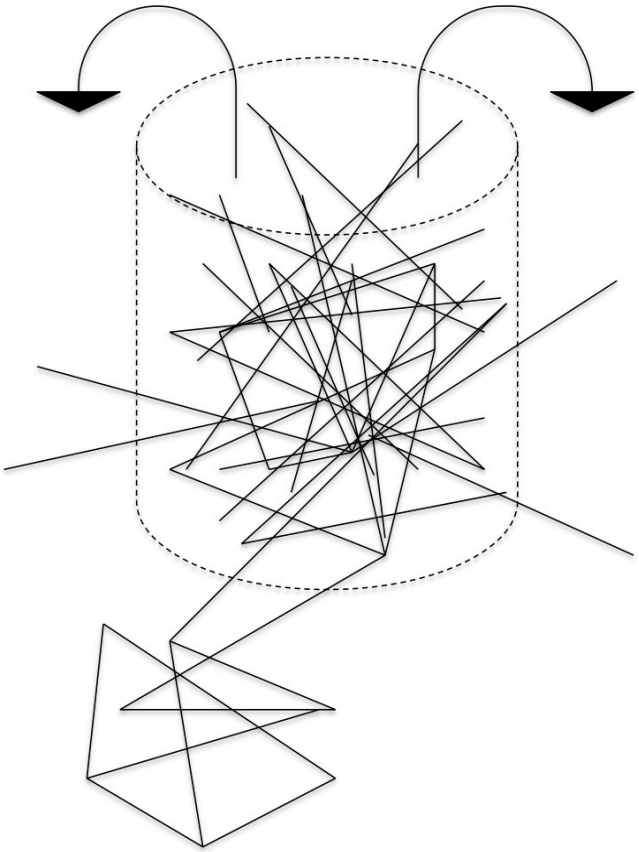

Figure 3: Framing and overflowing. Agents are part of many arrangements simultaneously. These connections outside the frame produce overflows.

interactions and push them onto a clearly demarcated 'stage'" (Callon 1998 p. 253). Because of the connections, there are constant impulses from the outside world. These impulses can render the frame too small, too big – or just the wrong "shape" (see figure 3). This is what Callon (1998) conceptualizes as overflows: issues emanating from the outside world that render the current socio-material arrangement inadequate. In figure 3, these overflows have been drawn as two arrows flowing out of the frame.

According to Callon (1998), overflows are the norm, because no socio-material arrangement can take into account all eventualities and issues in the outside world. Framing of socio-material arrangements therefore is a rare and expensive outcome requiring continuous effort. In the context of this study, these concepts are important to understand the construction of and development of the frames defining CO_2 and Sustainable Innovation, respectively.

Upholding a definition and measurement apparatus is a costly and ongoing process, and one that is constantly under influence from the outside world. Callon (1998) borrows the concept of externality from economics, to conceptualize the idea of that which is outside the frame. A related idea, thus, is that of externalizing and internalizing overflows, respectively. As was discussed, no definition or arrangement can internalize every possible externality and anticipate every issue or dilemma. When overflows occur, that which has been externalized can be internalized through re-arrangement. A new definition or a new arrangement might ensue to allow for the inclusion of the externality. In the same manner, overflows can also lead to the externalization of parts of the arrangements. Overflows are therefore both challenges to the existing arrangement and resources upon which can be drawn to effect re-arrangement (Callon 1998).

To summarize, overflows are issues and dilemmas emanating from the world outside the frame, which render the current arrangement inadequate. These overflows can either be internalized or externalized. Defining, accounting for and reporting on CO_2 emissions and Sustainable Innovation are activities taking place *within and outside* the complex socio-material arrangement that is SCA. Thus, we bring the concepts of framing, overflowing, internalization and externalization (Callon 1998) along for the analysis, together with Callon and Muniesa's (2005) concepts objectification and singularization. Together they will provide a toolbox to understand the process of constructing manageable and reportable objects in the context of sustainability accounting in SCA.

4. Methodology

This section outlines the main considerations and challenges in developing the research design and executing the study. The theoretical approach places specific requirements on both the data collection phase and the writing-up process, in addition to the analysis. These requirements, and how they have been attended to, will be covered in each section. First, the research design in parallel with the first dialogues with the case company will be covered. Second, the data collection in terms of interviews and artifacts will be discussed, and finally, the last section will cover a discussion on perspective, vocabulary and the structure of the empirics relating to both a certain amount of time asymmetry between the cases as well as the ANT methodological aspiration for so-called generalized symmetry (Callon 1986).

4.1 Choosing a research approach: An exploratory comparative case study

For the purpose of this study an exploratory case study approach was chosen. A major reason for this is the nature of the research question, as suggested by Silverman (2013) and Merriam (1994). The case study is a means to get "close" to the phenomenon, and is therefore an appropriate choice for studying accounting practice. As the aim was to study the construction of manageable and reportable objects, an approach facilitating *how* questions is suitable. The research design process, however, was not linear, and important considerations early in the design phase came from interactions with the case company. That will be briefly covered below, together with some arguments from the literature review as to the choice of research design.

4.1.1 The evolution of the research design: Theoretical underpinnings and case company preconditions

The design of the study took off from a general research interest in sustainability accounting. The case company SCA was particularly apt for this type of study due to its rather well known ambitions on the area of sustainability in general. It has a long history as a company, and compared to its competitors has an ambitious sustainability agenda, not least when it comes to sustainability accounting. SCA has been awarded for its sustainability reporting in Sweden (FAR 2012) as well as internationally, by the World Business Development Council (SCA 2013i). The company has implemented a structure of thirteen publicly announced sustainability targets that are followed up annually, and has a sustainability representative in the corporate senior management team, reporting directly to the CEO. To conclude, the company was deemed suitable to provide interesting insights into sustainability accounting.

The case company was made available through contacts with the Department of Accounting at the Stockholm School of Economics. After the first contact was made, a research design was suggested, and a first meeting with the SVP of Corporate Sustainability and the Acting VP of Strategy and Business Intelligence was held. The first idea had been to study SCA's CO_2 target, but after comments about that issue not being very interesting due to its being an established practice, a modification was made. Instead SCA representatives suggested studying a target which was under

development, that of Sustainable Innovation. The resulting research design was to combine the two targets into a comparative case study. From this first meeting and a follow-up with the Sustainability Reporting Director, several characteristics made this approach interesting. Firstly, the CO_2 target had been established several years ago, while Sustainable Innovation was new and in development. Second, and more interestingly, measuring CO_2 was described as "easy" and "quantitative" while Sustainable Innovation was described as "complicated" and "qualitative". The theoretical approach and the ensuing research question were developed in parallel to these first interactions with the case company. With the aim of studying the construction of measurability, the comparative case study approach was thus pertinent. It allowed comparison and contrasting between two distinct calculative practices and their respective *objects*: That of CO_2 and that of a Sustainable Innovation.

A detailed empirical account of sustainability accounting in practice also responds to several recent calls for research (, Albelda Perez et al. 2007; Adams and Larrinaga-Gonzalez 2007; Hopwood 2009). Although the overarching research question is not the concept of "integration", attempting at studying the process of constructing manageable and reportable objects for the purpose of sustainability accounting could also provide an approach to understanding the interface between management control systems for sustainability and general management control systems.

The comparative case study approach is also theoretically relevant. ANT, and its application in accounting research not the least, has to a large been used either to study the establishment of practice (for example accounting change and implementation studies), or the examination of how already practice came to be established. The two cases at hand provide an opportunity to compare and contrast an establishing practice (Sustainable Innovation) to an established one (the CO_2 target).

Finally, a comparative case study approach is methodologically pragmatic, since it allows for comparing and contrasting case specifics and emerging themes so as for patterns to emerge.

4.2 Data collection: Ethnoaccountancy approach and an aim for symmetry

An important notion in the ANT methodology is that of generalized symmetry (Callon 1986). This implies treating humans and non-humans symmetrically in our description of the field, without ascribing certain characteristics to human actors.

Although the choice of the ANT approach implies a theoretical position that could prove fruitful in the study of sustainability accounting, it also poses specific challenges to the data collection. In the sense that ANT treats reality as enacted in socio-material arrangements, that is, networks of humans and non-humans, we must study practice rather than ideas. This calls for complementing the interview study with artifacts in the form of documents, presentations, e-mails, reports and so on. In this sense, this thesis follows an "ethnoaccountancy" approach (Chua 1995; Skaerbaek and Tryggestad 2009). It assigns weight not only to descriptions from human actors, but also follows document trails to trace decisions, trade-offs and dilemmas in the establishment of calculative practice in general, and the construction of manageable and reportable objects in particular. All in all, the empirical material amounted to approximately 500 pages of interview transcripts and more than 30 artifacts such as documents, guidelines, presentations and reports.

As will be discussed in more detail in the section on writing-up of the empirics, the time perspectives of the two cases differed significantly. Although this was one of the theoretically and empirically most interesting characteristics of studying these two sustainability targets, it also posed challenges in the perspective of achieving symmetry. For the purpose of data collection, particular effort was made to maintain symmetry in the interview samples. That is, it was aimed for interviewing a reasonably equal amount of respondents for each of the two cases. In the case of respondents having what was deemed as relevant input for both cases, an effort was made to treat the two cases symmetrically within the interview. This was sometimes a challenge, since the current and topically up-to-date nature of the case of Sustainable Innovation meant a somewhat bigger interest among the interviewees.

Another effort to uphold symmetry related to the fact that CO_2 is measured and reported in several different systems in SCA, as will be seen in the presentation of the case empirics. This could easily have constituted material for a thesis on its own, comparing the different "accounts of carbon" visible in the case. For the purpose of the comparative case study approach and its related need for symmetry, focus was put on the CO_2 target first and foremost. That meant putting less emphasis on for example CO_2 reporting for EU ETS purposes. However, the theoretical approach prohibits a complete exclusion of the other "versions" of CO_2. As will be shown, they are involved through an "absent presence" – their exclusion from the target is a presence in its own right. Nonetheless, an effort to keep the focus on the CO_2 target was necessary, from the perspective both of symmetry and of the size and breadth of the research project. A corresponding concern was that the business area Forest Products had gradually become less involved in the Sustainable Innovation target, as will be shown in the empirics. Access was not gained to respondents within Forest Products. This could of course have enriched the empirical account further, but in the ANT approach Forest Products can be seen as involved precisely because of this absence. Therefore, it would be argued that limiting the data collection to those now involved in the target is a reasonable solution.

4.2.1 Semi-structured interviews: A collaborative approach to knowledge-creation

Design & Preparation: A skeletal interview guide & exploratory interview sampling

A first interview was held with the Sustainability Reporting Director for an introduction to the two sustainability targets and to map relevant respondents for each of the two cases. A first list was drawn up in collaboration with him, attempting to provide as broad an account of the two targets as possible.

Although it could be argued that his involvement influenced the sample, it also provided crucial access to the respondents at that initial stage. Furthermore, as part of the aim was to "map" those actors involved in the practice surrounding the targets, this mapping in itself was relevant. The SVP of Corporate Sustainability helped in informing the first round of respondents about the study at hand and asked them to set time aside for an interview. It was attempted to achieve symmetry between the cases in the interview sampling. However, it became obvious early on that the targets had quite different origins and organizational trajectories, and thus complete symmetry would do more harm than good with respect to giving a relevant representation of the cases. In the end,

however, there were equal amounts of respondents for each of the two targets, although the respondents are to some extent on different organizational levels.

As a subordinate research problem was the issue of integration between management control for sustainability and that for financial results, efforts were made to gain access also to respondents outside of the sustainability organization. As the list of interviews shows (Appendix 1), interviews were held, in addition to corporate sustainability staff, with respondents from investor relations, environment and product safety, strategy, energy sourcing, R&D and business development.

The transcribing and coding of the interviews afterwards often lead to the identification of gaps and follow-up questions, and thus several follow-up interviews were conducted in a second round. Furthermore, a few of the interviews led to the identification of more people to interview, all in accordance with the ANT approach of following connections and actors in the field. A second round was thus held, after the identification of "technical experts". This was important, as the approach was to study practice. Thus, it was key to gain access and perspective from those actually *doing* the measuring, reporting, input of numbers, calculating and so on. This is a perspective arguably harder to get from executive management, as the technical details involved are generally not as visible to them.

A total of 23 interviews with 16 respondents were conducted. The shortest interview, which was a telephone follow-up, lasted 20 minutes. The longest lasted 1 hour and 48 minutes. In addition to these interviews a few follow-up questions were taken over e-mail with six respondents. All interviews were recorded and transcribed in their entirety. In two instances the recording device failed technically. In those cases quite detailed notes had been made during the interview, so the main arguments could be re-produced directly when the technical failure was discovered.

Nine of the interviews were held at SCA headquarters in Stockholm, while five were conducted at the Hygiene organization's main hub in Gothenburg. A further nine were conducted over telephone. These were interviews with respondents at other geographical locations such as Spain, Germany and Lilla Edet as well as follow-up with respondents located in Gothenburg.

The approval from the SVP of Corporate Sustainability and the help from the Sustainability Reporting Director gave access to meeting rooms at SCA HQ so that telephone interviews could be held in a calm environment while allowing for the use of conference phone equipment and recording.

The interviews were semi-structured in the sense that a skeletal interview guide was drawn up. This included general introductory questions, common to all interviewees, such as organizational role and main responsibilities. Furthermore it included important themes and areas of interest to be covered. An example with typical questions, depending on the characteristics of the respondent at hand, is available in Appendix 2.

While Kvale and Brinkmann (2009) distinguishes fact interviews from other types of interviews, I would argue that this distinction is dissolved with the application of an ontologically constructivist approach. Since we do not see the "truth" as something we can find beneath or beyond visible systems or devices, the distinction is irrelevant. The focus was on practice rather than ideas, and therefore it was continuously endeavored to ask for concrete examples of practice and "doing". This, however, is a challenge; everyone loves to talk about future plans and ideas. The interview

guide served as a reminder for the researcher to get back to issues of practice, concrete processes and important decisions.

Execution: Active listening and focus on counterfactuals

Inspiration for the interviews was taken from the "analytical interview" approach suggested by Kreiner and Mouritsen (2005). This approach emphasizes collaboration in the construction of knowledge in the interview situation. In the following section, some important notions and concepts from this are discussed, as well as how this was used in the present study.

The idea of the analytical interview (Kreiner and Mouritsen 2005) starts from an idea of redefining the respondent's contribution. The aim is to not treat their statements as final and privileged conjectures about current practice. There are reasons for this, they argue, two of which will be discussed in this context. Firstly, organizations develop ignorance over time regarding their own routines. Although something could have been a conscious choice stemming from some sort of historical dilemma, today it might have become so socialized that these initial concerns have been forgotten. Secondly, respondents might only know some parts of the organization, as loosely coupled organizations is a common way of handling conflicting views. These reasons would classically be seen as problems when it comes to the validity of the interview empirics. The purpose of the analytical interview, however, is not to treat the respondent's statements as final truths. Therefore, it is a way of working around that problem. Instead of seeing the interview as an arena for the interviewer to "reveal" the real truth behind statements, the analytical interview aims at producing new knowledge in collaboration between the interviewer and the respondent. Kreiner and Mouritsen (2005) suggest a few strategies to enable for an analytical interview. These will now be discussed with regards to their implications for the present study.

First of all, more emphasis was placed on active listening than constructing the "perfect" interview guide. The interview guide is constructed on previous knowledge, and Kreiner and Mouritsen (2005) argue that it might actually stand in the way of creating the active presence and thinking necessary for allowing the creation of new meaning. Instead, the interview guide was used as more of a checklist to be used by the end of the interview, making sure important themes and problems had been covered. Secondly, a lot of emphasis was put into the follow-up questions. As these constitute such an important part of the interview, this issue will be elaborated on further below.

Since the questions were not meant to "reveal" underlying truth, but to develop understanding collaboratively, the interview often took the form of more of a conversation. In Kreiner and Mouritsen's (2005) view, the interview might actually constitute a learning opportunity even for the respondent. For the purpose of this study, a conscious attempt was made to go into each interview situation with the approach: "We are going to learn, together, about the idea of measurability". Indeed, several of the respondents expressed contentment over having gained new perspectives on their own practice through the interview and were eager to hear about the coming findings of the study. Since the main risk of the analytical interview approach is non-participation – because it inhibits the collaborative creation of knowledge (Kreiner and Mouritsen 2005) - these expressions of contentment served as an indication that the interviews were somewhat going in the right direction in terms of participation and collaboration.

Of course, a semi-structured approach also allows for the interview to drift off in directions outside of the scope of the study. This was sometimes problematic due to time constraints, and the interview guide could often serve as a reminder that however interesting avenues the conversation was going down, some key concepts and areas had to be covered. Nonetheless, often these avenues "outside" the scope are relevant in the ANT approach, because what is left outside of current arrangements is relevant too, as the analysis will show. Thus, covering broad areas versus getting down to the real nitty-gritty details of practice was a constant balancing act.

Notes were actively taken during the interviews, in addition to the recording. This was firstly to keep track of interesting themes and issues that surfaced and the ensuing need to go back and explore statements without interrupting an ongoing discussion. Secondly, it proved crucial when the recording technology failed, as was discussed above.

Someone interested in the concept of sustainability could react to the empirical account not covering a lot of discussion of what sustainability *is*. Although an intriguing topic in itself, it was actively avoided in the interviews, as it was not the purpose of the study. This discussion could easily take up the full interview time if not avoided, and in a non-essentialist approach it is not relevant. The study was not after some underlying meaning of sustainability, but rather to map and explore the socio-material arrangements constituting it.

Effort was made to not only talk about decisions, but also to obtain detailed accounts of "doing" sustainability accounting. This entailed questions about input procedures, documents and processes and was reinforced by the use of artifacts that will be discussed below. This "doing" naturally differs between different levels of the organization. While a factory manager might perform inputs in computer systems, respondents at executive level generally use numbers on an aggregated level, if anything. The "doing" on that level arguably rather relates more to meetings than number exercises. These, however, were treated with symmetry in the sense that they were both seen as equally relevant to understanding the practice of sustainability accounting and in the construction of manageable and reportable objects.

In the quest for studying practice rather than ideas and rationales, two important phenomena were actively sought after in the interview process and the ensuing coding; dilemmas and counterfactuals (Kreiner and Mouritsen 2005). These will now be discussed from the perspective of the two cases.

Dilemmas are due to conflicting and competing concerns, for example in decision-making and the establishment of practice. In studying the development of two sustainability targets, it was crucial to gain an understanding of the dilemmas that had ensued in the construction of the measurement apparatus. Therefore, it was attempted to actively explore these dilemmas in the interview setting. When a decision was mentioned, follow-up questions such as *why* were important. But the decision made is interesting also because something else *could* have been chosen. This is the process of externalization so relevant to the establishment of socio-material arrangements (and discussed in the theoretical framework). Because of this, also the alternative routes had to be explored. *Counterfactuals* are the opposite of what is factually observable. That is, to understand current practice, we must also explore alternative practices that were not chosen; the roads not taken. Therefore it was attempted to ask follow-up questions not only in terms of "Can you give an example?" – as this only confirms current practice – but also "How could this otherwise (have) been done?" This aimed at challenging the established view and highlights the active externalizing

involved in the establishment of practice. As some respondents were surprised and intrigued by the idea of asking about that which was *not* chosen, it was often made explicit that the interviewer was "playing devil's advocate" – although avoiding using a confrontational tone. This also entailed attempting to unlock the "ignorance" discussed above that develops over time as practice becomes established, through asking for detailed accounts of who participated in meetings, how the "final" decision came to be, who initiated processes et cetera (see Appendix 2 for typical questions).

Implications of interviewing executive management

Kvale and Brinkmann (2009) discuss how interviewing "elites" poses specific challenges as the respondent's position can induce a power asymmetry in the interview situation. They further argue that elite and expert respondents might have clear "tracks" or scripts that they want to communicate, and that quite a lot of skill and effort is needed on the part of the interviewer to handle or counteract this. This was relevant for a large part of the conducted interviews since many of the interviewees were high-level managers on the level of Senior Vice President, Vice President and Director. Kvale and Brinkmann (2009) suggest preparation in advance of interviews both as a means to gain a certain amount of power symmetry with the interviewee, but also as a way to counteract "scripted" replies. Therefore, the interviews were preceded by studies of material relevant to the interviewees' area of work. This entailed reading of reports, presentations and other materials, depending on the position and role of the interviewee. Does this not contrast with the above discussion on not attempting to reveal some underlying "truth"? That is a relevant objection, but the purpose of avoiding scripted replies was first and foremost to ensure an active and collaborative approach to understanding measurability and the construction of manageable and reportable objects.

On the other hand, Kvale and Brinkmann (2009) argue, experts in their field might be so confident in their own expertise that they can stand being questioned. The researcher aimed for leveraging on this. This also relates back to the discussion on dilemmas and counterfactuals, the attempt to discuss choices not made and roads not taken, and the overall approach to the interview as collaboration.

4.2.2 Artefacts: Following document trails to study the material world

Following an ethnoaccountancy approach inspired by Skaerbaek and Tryggestad (2010) and Chua (1995), the data collection also involved the study of artifacts. Document trails were followed to gain an understanding of the evolution of the respective targets as well as current accounting practice. As the empirical account covers events that had occurred several years ago, using these artifacts was a means to follow the development of the two targets backwards. Methodologically, it is also a matter of symmetry between the social and material worlds to assign importance to visual and textual displays in documents, presentations and reports.

The documents examined consisted of annual and sustainability reports, PPT presentations, Excel spreadsheets, e-mails and guidelines. A full list of artifacts included in the empirical material is available in the reference list. To the extent possible and deemed relevant these have been included, sometimes anonymized in some sense, in the empirics for illustration. Furthermore, as many respondents took to the whiteboard or notebook in our interviews, these visual explanations were also to some extent digitalized, adapted and included in the empirics.

To some extent the availability of artifacts differed between the two cases since one had been established for some years while the other was establishing. On the other hand, as was discussed in relation to the interview sample, this was counteracted by a bigger interest among respondents due to the current nature of the dilemmas relating to Sustainable Innovation.

4.3 Data analysis and write-up process: Coding and organizing the empirics

Due to an initial effort to review existing literature both within sustainability accounting and in the sociology of markets/ANT approach to calculation, the design and execution of the interviews was to a large extent theoretically informed. The coding process thus focused on identifying important theoretical concepts, but patterns would also emerge over the course of the coding process. Additional theory was studied throughout the course of the research process. Thus, this study could be categorized as employing an abductive approach.

The interview transcripts were coded using the browser-based mixed methods research tool Dedoose[9]. A twofold code tree developed from the two sustainability targets. Statements relating to the development of the targets were coded specifically, as well as important choices, trade-offs and dilemmas made. Furthermore, effort was made to identify statements relating to *measurability*, *accuracy* and relating concepts.

4.3.1 Organizing the empirics: Implications of asymmetrical time perspectives

The empirics are organized starting from a current state, the version of the two respective targets that prevailed in the fall of 2013. From that starting point, it was elaborated on the development leading up to the targets' current version. The empirics follow a part-chronological and part-thematic structure, with the aim of giving justice to some of the complexity that appeared in studying how a big organization like SCA develops targets and measurements. This type of structure is also an attempt at handling an essential and inherent temporal asymmetry between the two cases. This will be elaborated upon further.

As the empirical account will show, there was a big difference between the two cases regarding the time perspective. While both of them, in some sense, could be traced back to measurement apparatuses established many years ago, CO_2 in its current form as a quantified target had undergone five years of development, while Sustainable Innovation had been in development for only around two years, and was still described as work in progress.

This asymmetry has implications both for the data collection and the writing-up of the empirics. Where the respondents, when it came to CO_2, more easily made references connecting one event to another in a timely an orderly manner, this was not as given when it came to Sustainable Innovation. Because the issues and challenges with the target were still present in another sense, it was not as clear exactly when something happened and what had led to what. It could be visible in a thematic sense, but not in a step-by-step chronological sense. A challenge, thus, was to get the

[9] http://www.dedoose.com

respondents to identify events in time, for example challenges that surfaced and were dealt with or decisions that were taken. However, many of the issues and challenges were still prevailing and ongoing. That meant that asking about a particular decision at a particular point in time would often lead to new discussions about the current challenges, as if they were still ongoing.[10]

This will be visible in the empirics in that the different themes link to each other. One thing might have led to another, but since a lot of things were going on simultaneously, it was hard to describe it as a logical and orderly process. Therefore, an important challenge in writing-up and organizing the empirics was to structure it thematically so that it would be accessible to the reader. The CO_2 empirics did have more of a chronological character than Sustainable Innovation, as many decisions, challenges and changes could be attributed to a certain year or a particular report. However, even in this case there were many parallel processes going on simultaneously in the organization. Accordingly, a strict chronological account would risk being incomprehensible to a reader in this case, too.

The solution opted for was, to the extent possible, to organize the empirics thematically, but also symmetrically. The idea was to facilitate for the reader to make ongoing comparison. However, it is also an attempt at dealing with the fact that even though the cases are different in some aspects, a strict chronological account would not give the complexity justice in either case. The result, especially in the case of Sustainable Innovation, is that some issues might end up in several sections of the empirical account. For example, the question about which innovations to take into account is not only a question about which *products*, but also which *business areas* would participate in the development. In those cases repetition was opted for, instead of risking obscuring important characteristics of the case.

4.3.2 Vocabulary and perspective: Implications of the ANT approach

ANT is a non-essentialist, ontologically constructivist approach, as was discussed in the theoretical framework. This means that no phenomena exist *beyond* the socio-material arrangements enacting them. It also implies that it does not ascribe certain essential characteristics to words or concepts. Nonetheless, studying practice involves interviewing people who are using certain words and endow them with characteristics viewed as "agreed-upon" and self-explanatory. The interviewees recurrently used words like *consistency* and - for that matter - *sustainability*, to describe e.g. measurement systems or underlying "rationales" of behavior. For the purpose of this study, however, they are not treated as possessing these essential characteristics. To deal with this recurring usage, however, it was elected to write them in italics whenever they appear in the empirics and analysis. This is to serve as a reminder of the active choice of not endowing them some essential meaning while not denying that they actually *are* being used. A similar approach can be seen in Callon (1986)[11] who denoted Society and Nature with beginning capital letters.

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[10] This is completely logical in the ANT approach, as socio-material arrangements are never completely stable.

[11] In one of the seminal ANT case studies, Callon (1986) presents a case study on the scallops and fishermen of St Brieuc Bay. The study of the scallops and how a group of researchers attempt at developing a conservation strategy. It provides an understanding of the establishment of power relationships, and the role of science and technology in the structuring of them; translation is the process by which the researchers create consensus around the necessity to save the scallops and the possibility to do it. Callon's study (1986) of the scallops in St Brieuc Bay laid the groundwork for what is called the sociology of translation and what ANT often refers to.

The ANT approach also brings about a need to stay "close" to the empirics. The ideal is to not be a distant, omniscient observer, but rather to be *in* the field (Callon 1986). An important aspect is to not interpret and explain empirical findings "beyond" those findings, that is, to not ascribe deeper meaning to phenomena beyond the visible and material world. In this, the ANT approach differs significantly from social constructivism, which describes the *social* world as distinct from the material and which generally finds social explanations to visible phenomena. Within accounting, this is most clearly seen in the interpretive approach, where accounting phenomena are generally construed of as signs of "something else". A way to deal with this is that the empirics consist of a lot of direct quotes from the interviews, as well as visible displays of artifacts such as spreadsheets and presentations. This was to avoid interpreting and searching for underlying meanings beyond the material.

Another important aspect of this is to not ascribe agency merely to humans. This also relates to the ANT methodological approach of generalized symmetry. Callon (1986) introduced the concept as an approach to studying the world, based on an idea about the establishment of scientific facts and its related controversies as a mixture of considerations concerning both society and nature. Since we know that controversies consist of both, we should refrain from using different vocabularies when describing them. This has important consequences for the vocabulary used in both the empirics and the analysis. Using words like "perceived", "argued" or "viewed" endows a certain type of agency to humans that non-humans cannot possess. Since e-mails and PowerPoint presentations have agency too, describing something related to human actors as "perception" automatically induces asymmetry, because e-mails and presentations cannot "perceive", "argue" or "view".

4.4 Implications of the research approach on judging the quality of the research

While qualitative approaches such as the in-depth case study are suited for detailed examinations of complex societal and organizational phenomena, a common critique is that the results lack generalizability (Merriam 1994). This line of reasoning has its roots in a positivist research tradition, where ideals such as validity and internal as well as external reliability are regarded as important traits of good research. Furthermore, applying ANT has specific implications beyond those of qualitative research in general, on how to view the results in terms of scientific ideals such as validity and reliability. Since an ontologically constructivist approach suspends abstract truth and reality, validity and reliability become problematic concepts. They hinge on an idea that the world is there *a priori* and that the role of the researcher is to correctly describe it.

Kreiner and Mouritsen (2005) suggest another notion of good research; that of plausibility. This is not to suggest that the findings are "un-scientific", but instead "that they make a lot of sense within the analytical world that has been constructed (through the interview)" (Kreiner and Mouritsen 2005). When knowledge is seen as being constructed and not discovered, the notion of verifying the results becomes problematic, although not irrelevant. We will return to the question of plausibility in the concluding discussion, as this is less meaningful *ex ante*.

Measures were taken to ensure the quality of the results and the possibility to trace them (which could be categorized as the internal validity of the study). One of the most important measures is

that the empirics consist to a large extent of quotes from the respondents and excerpts from artifacts. The aim, in addition to the theoretical reasons described above, was for the reader to be able to see what the ensuing analysis was built upon. In addition, all interviews were recorded and transcribed in their entirety, with the exception described in 4.2.1. To the extent possible, and especially relating to those issues and dilemmas described by respondents as crucial in the development of the two sustainability targets, several sources have been used ("triangulation" in Merriam 1994). These sources, then, were both human respondents and non-human artifacts. The strategy of doing follow-up interviews after some time had gone by was also a means to verify, to the extent possible, facts and processes described. Merriam (1994) also suggests verifying the conclusions drawn with the respondents (member checks). Because of the analytical interview approach described above (Kreiner and Mouritsen 2005), this was performed interactively already in the interview situation, as well as in follow-ups.

Reliability relates to whether the results can be replicated, and external validity relates to the notion of generalizability. Although problematic for all qualitative research because of the fluidity of the social world (Merriam 1994), these two concepts become even more so with the ANT approach. This relates back to one of the important underlying notions of ANT: that of being an empirical approach to the creation of new meaning and knowledge rather than a grand theory that will provide us with magnificent explanations. ANT does not claim to be the *only* account. Starting the inquiry from another actor, time or space would, by definition, create another result. This is an effect of the ontologically constructivist approach denouncing any abstract "reality" out there. Nonetheless, with the same methods as described in relation to internal validity, the researcher has strived for clarity as to what underlies the analytical and empirical account. Furthermore, a clear description of the case study setting should allow for the reader to evaluate the generalizability of the issues and challenges discussed.

5. Empirics

This section first provides an empirical account of the case company and its sustainability targets. Secondly, the two cases are described. Furthermore, as will be seen, both the targets had interfaces to other measurement and reporting systems, that of ESAVE in the CO_2 case and that of general innovation in the case of Sustainable Innovation. Two separate sections are devoted to these two interfaces. The empirics are thematically organized to provide a background, discuss the process of constructing the respective targets, issues on what to include in the targets and not, and lastly issues relating to presentation and reporting. Emphasis and focus has been put on those decisions, trade-offs and dilemmas that were described as major issues in the construction and development of the targets. First, however, a description of the case setting.

5.1 Introduction to the case company

SCA is a global hygiene company with 36,000 employees and sales amounting to SEK 85 billion in around 100 countries. Historically a pulp and paper company and still being Europe's biggest private forest owner, the company had during 2012 been reclassified on the Stockholm Stock Exchange and the MSCI from pulp and paper to a personal and household goods company. The years preceding this case study had been marked by structural changes, both in terms of organization and in terms of divestments and acquisitions. During 2012 the previous packaging operations had been divested, and a major acquisition in tissue operations had been made. Organizational changes of the hygiene operations had been ongoing for a few years, with a new re-organization taking place at the start of 2012 (SCA 2013a).

The company was organized in three business areas; firstly Personal Care, producing incontinence products, baby diapers and feminine hygiene, secondly Tissue, producing consumer and away-from-home tissue, and thirdly Forest Products, producing e.g. publication papers, pulp and solid-wood products. Personal care and Tissue together made up the so-called Hygiene operations. A matrix organization had been constructed with the implementation of the Global Hygiene Category (GHC), responsible for marketing and innovation for the hygiene operations, as well as the Global Hygiene Supply (GHS) responsible for supply chain and production (SCA 2013a).

5.2 The two case targets: CO_2 and Sustainable Innovation

Sustainability was described as a part of the business model in SCA, alongside the other priorities efficiency, innovation and growth (SCA 2013a). Furthermore it was described as important having a sustainability representative on corporate senior management level:

> *It is very valuable to have someone in the corporate senior management team driving these issues wholeheartedly. And who can actually talk directly to the CEO. Because that is where it happens.* (Director Sustainability Communications)

The company had been awarded for its sustainability reporting both in Sweden (FAR 2012) as well as internationally, by the World Business Development Council (SCA 2013i).

Common to all the respondents involved in sustainability in SCA was what was described as an ambition to increase the degree of quantification relating to sustainability.

Quantifying. To me that's the alpha and omega. If you are going to have a target, you have to have quantifiable targets. (Sustainability Reporting Director)

Because we have to be able to show the value with working with sustainability. We want to be good at it and be in the front line /.../. Why? Because we think it's a pre-requisite for being a successful company, and then we have to be able to prove that it really affects us. (Sustainability Communications Director)

I have been working a lot with the non-financial, and measurement and quantification of our targets. Not just targets, but processes around non-financial reporting. (Sustainability Reporting Director)

When the current SVP of Corporate Sustainability had taken on that role, a first process had been to implement a broader target structure relating to sustainability.

So what we did when I took this position, we already had our environmental targets. We had one targets on CO_2, water and fiber. These were the big targets we had and it was great that they were established. I wanted to come in and make the perspective a bit broader, I wanted to implement the idea of triple bottom line, or shared value creation. (SVP Corporate Sustainability)

After what was described as trend analysis and stakeholder identification, a new structure of thirteen sustainability targets was instated for the year of 2012. This had been signed off in the corporate senior management team, but the group level "owner" was the SVP of Corporate Sustainability. The targets were displayed in three categories: People, Nature and Financial targets.

The CO_2 target was to "reduce CO2 emissions from fossil fuels and from purchased electricity and heating by 20% by 2020, with 2005 as reference year." (SCA 2013b). The target was recurrently described as quantifiable and measurable, as the opening quotes showed.

The new Sustainable Innovation target was to "deliver better, safe and environmentally sound solutions to our customers" and furthermore "We strive to continuously improve resource efficiency and environmental performance considering the whole lifecycle for new innovations." (SCA 2013b). This target, on the other hand, was described as an immense challenge in terms of quantification and measurement. It was described as visionary and qualitative, especially because it entailed what was described as social aspects of sustainability.

And then we have Sustainable Innovation, which we are struggling a bit with. But I thought we should include it even though it is difficult to measure as innovation is a very important part of our strategy. You cannot always choose the easy path. /.../ And what we have done over time is that we have tried to measure innovation as a proportion of our sales over a time period. That is really difficult. What is an innovation, what criteria? (SVP Corporate Sustainability)

In the two following sections, 5.3 and 5.4, the development of the two respective targets will be described, leading up to what can be described as the most recent "version".

5.3 Case 1: The CO_2 target

The quantified CO_2 target in SCA can be traced back to the development of the so-called Resource Management System (RMS). This was an SQL based software for the reporting of resource usage, waste and emissions on factory level. The RMS had been developed in the late 90's. The purpose, it was described, was to measure SCA's environmental impact and to be able to produce an environmental report. The first environmental figures were mentioned in the annual report of 1997 (SCA 1998), and the first standalone environmental report was produced for 1998 (SCA 1999).

The RMS covers more than 73 production sites, covering virtually the entire company's environmental impact and resource utilization from production. Each unit reports the following data to the system:

- raw material consumption
- incoming and outgoing shipments
- production volumes
- energy consumption broken down by hydro-electric power, co-generation and power from the grid
- fuel consumption broken down by biofuels, fossil fuels and electric boilers
- air emissions, including data on fossil and biogenic carbon dioxide
- water emissions
- solid waste

Figure 4: Excerpt from Sustainability Report 2012 (SCA 2013b)

The RMS was used on a factory level and most of the data was input there, based on for example fuel invoices and fuel levels in the tank. At each year-end, emissions to air and water were to be reported, alongside production volumes, raw materials and waste, among other parameters. The management of the RMS was constituted by the RMS Manager and a network of factory reporters and end users. Each business area had someone in charge of making sure the production units compiled and reported all the figures in time for the Sustainability Report.

The RMS was widely described as a very important system, especially for the purpose of *comparability*:

> *But the interesting thing with the RMS, is that you've had the same system since [the late 90's]. So it's a consistent system, a consistent set of data. So you can actually see trends. /.../ What is interesting is the direction of the curves.* (Director Energy Sourcing)

5.3.1 Developing a CO_2 target

The first CO_2 target in SCA had been instated in 2001. At that time the target was formulated in general terms and not quantified, that is, to reduce emissions from the use of fossil fuels. This was displayed in the section about "Environmental and Social Responsibility" in the annual report of 2001 (SCA 2002a) and in the 2001 Environmental and Social Report (SCA 2002b), the precursor to the Sustainability Report.

The respondents attributed importance to a quantified CO_2 target because of the fact that the manufacturing was very energy consuming, and so it was described as "relevant" from an environmental perspective.

> *Energy is the resource utilization and the factor in our mills which I think it is fundamental to understand if you want to understand anything about our impact on climate and so on.* (VP Environmental Affairs)

However, there was also a described resistance towards instating a quantified target, due to restrictions on the types of energy available to source.

I: The energy guys… /…/ They weren't too happy about a target at all, they wanted to be free to trade and buy what they wanted, you know.
R: They focus on the cost and don't want to be tied to some sort of specific energy mix?
I: Yes, yes, exactly. And then I had the Environmental Committee on the other hand, where some people argued that we should reduce with 100%, or they didn't say that but some said 60-70%. (VP Environmental Affairs)

The quantified target, which was instated in 2008, was to reduce emissions from fossil fuels and grid electricity by 20% through to 2020.


Target 1. Sharper CO_2 ambition

SCA has lifted its level of ambition even further as regards the company's climate impact by establishing a new, quantified CO_2 target. Through to 2020, emissions from fossil fuels will be reduced by 20%, using 2005 as a base year. As a major consumer of energy, SCA formulated a target to reduce emissions from fossil fuels as early as 2001. Now the next step has been taken.

Figure 5: Excerpt from Sustainability Report 2008 (SCA 2009b)

The time target of 2020 was attributed to external benchmarking:

… I thought that 2020 was a good (time) target since the EU had that, so it was something of a flirt with the EU you could say, or with the stuff that goes on outside. (VP Environmental Affairs)

After firstly benchmarking externally with the EU target of reducing emissions with 20% to 2020, a bottom-up "check" had been performed, to see if the 20% reduction would be attainable. The Director of Environmental Affairs had involved the people at Energy Sourcing, and together they listed the investments they knew would have to happen due to obsolescence before 2020 anyway. The idea described was that when these machines were to be replaced, it would be to a more energy efficient and environmentally sound machinery. These were for example limekilns in three factories and CHP plants, all in all around 20 investments, which had to be done before 2020.

The working group worked on a range of scenarios relating to different growth strategies in new markets and the related energy mixes, as well as strategic changes is countries' energy mix. Importance was attributed to this bottom-up process in reaching the conclusion that 20% would be possible.

It is based on facts and figures, it's not just taken from thin air. (SVP Corporate Sustainability)

Relating emissions to production

It was decided that a production-related target was the way to go forward, that is, that the target would be related to the production levels. Although the question about an absolute target had been debated, the interviewees today describe it as never having been a real option. This was attributed, for example, to specific internal conditions.

If you look at a company like Unilever, for instance, they have another approach, they talk about "de-coupling growth from environmental impact". They have chosen that measure. Unilever is another type of company and have another set-up, which means that maybe this is a relevant metric for Unilever as they have little, if any, own production. For us, we have to think differently, what types of paper machines are there, what will reasonably be available the next 20 years? /…/ We think it's good to have visions, but we also think… it's equally important knowing that there actually are ways to deliver on these targets. (SVP Corporate Sustainability)

Another explanation of the production-related target was that it was described as "strange" to measure absolute levels and still stay in business.

It would be a positive thing to discontinue our operations and reduce sales and so on, so it becomes strange in that sense. Because it would be negative for our operations to grow. (Sustainability Communications Director)

The construction of the CO_2 target was summarized in the "RMS environmental target calculation principles" (SCA August 2013). How emissions were mathematically related to production is summarized in the below equation:

$$Reduction\ in\ CO_2\ emissions =$$
$$= \left(\frac{Total\ emissions_{current}}{Total\ production_{current}} - \frac{Total\ emissions_{ref}}{Total\ production_{ref}}\right) \Big/ \frac{Total\ emissions_{ref}}{Total\ production_{ref}}$$

The target was also described as in need to be adapted to structural changes in the company.

> *I constructed the target so that, because SCA is a changing company, /.../ so the target is constructed in such a way that we can start producing cars if needed. But the target can still remain in its current form.* (VP Environmental Affairs)

A set of principles formulated by The Greenhouse Gas Protocol[12] was used to take changes in the structural set-up of the company into account. The main principles were that if a unit was closed down it would be deleted from the current year but *not* the reference year. That would mean a big decrease in emissions. However, if units were divested, as was the case with the Packaging business area during 2012, then it had to be deleted from the reference year, too. Somebody else would now take over the responsibility for these emissions, and the big reduction in SCA's emissions would be, it was argued, unfair. If a unit was acquired, then it had to be added not only to the acquisition year and the following years, it also had to be added to the reference year.

5.3.2 The ESAVE project

In SCA's sustainability report of 2012 (SCA 2013b), the efforts to achieve the CO_2 savings target were represented by two major projects. Firstly, the big chunk was described as consisting of the conversion investments part of the list compiled by the Director of Environmental Affairs and the Energy Sourcing staff. According to the Sustainability Report of 2012, "Investment is key" (SCA 2013b).

The second part was an effort called ESAVE, consisting of a big amount of small project at factory and mill level with the purpose of saving energy. In that sense, CO_2 was conceptually linked to energy consumption in SCA's Sustainability Report. ESAVE was initiated in 2001-2002, and as per the autumn of 2013 more than 1000 projects had been started. The final decision to implement ESAVE had been officially taken in the Environmental Committee.

The respondents stressed the economic importance of energy savings alongside the potential environmental impact.

> *Investment is one step. And another one is what is called the daily activities, turning of the lights when you leave, tweaking, fine tuning the machinery, that's something we call ESAVE, all of these small, small projects that go on all the time, all the time, all the time. And that's… That's definitely connected to profitability just as much as it's an environmental improvement, because it's money in the end. Tweaking some more, improving output, less energy usage per produced unit, so it is all very interlinked.* (Sustainability Reporting Director)

[12] http://www.ghgprotocol.org

SCA has an ambitious carbon dioxide target. It will take investments in new technology and a continued focus on efficiency improvements in day-to-day operations to achieve the target, and the roadmap is well in place.

Investment is key

SCA reduces its carbon dioxide emissions primarily through major investments in key technology improvements that will save energy, cut emissions and lower costs. SCA views its planned investments as part of the annual strategy process, analyzing investments for their potential to impact the company's sustainability targets and carbon emissions.

One example is the installation of the new lime kiln, powered by forest-based biofuels, at the Östrand pulp mill in Sweden in 2011, resulting in an 80% reduction in fossil CO_2 emissions (50,000 tons) compared with using oil to power the kiln, and reducing costs by SEK 50m annually. SCA is installing a similar bio-fueled kiln at the Munksund kraftliner mill in Sweden, to be operational by 2014. The project will reduce the plant's fossil CO_2 emissions by 25,000 tons annually, representing a total carbon emissions reduction of 75% compared with emissions from the current oil-fired lime kiln, and a reduced annual cost of SEK 50m.

New tissue technology

SCA is investing in new tissue production technology that will enable energy savings and carbon reductions. At the Kostheim production facility in Germany, SCA is investing SEK 1.1bn in new drying methods for premium tissue products. This project, to be completed in the first quarter of 2013, will allow increased tissue production at Kostheim as well as reduced energy usage and CO_2 emissions, compared with alternative technologies.

ESAVE everywhere

Since 2003, SCA has embedded the ESAVE (Energy Savings and Efficiency) program throughout its operational business units. It has completed about 1,700 projects that have generated estimated accumulated savings of SEK 700m in energy spending annually. ESAVE has its own ambitious Group target, adopted in 2010: the company plans to achieve a 14% reduction in energy used per ton of product produced by 2020. In 2012, over 225 ESAVE projects were implemented, resulting in a 1.7% (1.7) reduction in energy used per ton, which is well in line with the overall reduction target. This corresponds to a carbon emissions reduction of approximately 47,000 tons.

Typically, savings generated by ESAVE projects have derived from improving or replacing pumps, compressors, fans or lighting. As SCA's ESAVE focus has become more process-oriented, employees have become more involved in day-to-day energy and material savings. In addition, the company is constantly on the lookout for innovative technology solutions to cut energy consumption in ways that combine efficiency with profitability.

Figure 6: Sustainability Report 2012 (SCA 2013b)

The ESAVE projects together with the investments were visualized by the Sustainability Reporting Director in a graph, to represent the company's continued progress towards the goal of decreasing CO_2 emissions by 20%.

While the big vertical steps represent energy investments, the linear improvements in the periods in between two major investments represent the ESAVE "continuous improvement" described in the quote above.

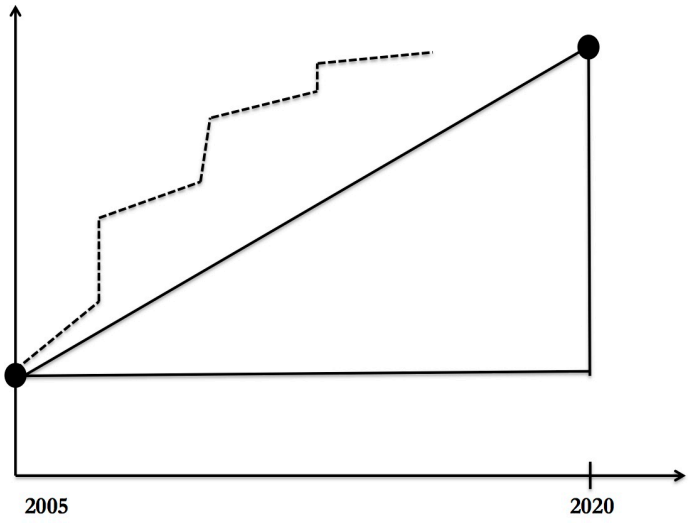


Figure 7: Visualizaton of progress towards CO_2 target

ESAVE target, organization, follow-up and reporting

ESAVE had a target of its own inscribed in the final section of the above excerpt from the Sustainability report (see figure). It was formulated in the form of specific energy consumption, defined by energy consumption (in MWh for Tissue, KWh for Personal Care and MWh for Forest Products) divided by total production (in Mton for Forest Products and Tissue and 100 pieces for Personal Care, to suit what as described as the respective business areas' energy consumption profile and internal management). The target was to reduce energy used per ton of product with 14%, and had been constructed by looking at the ESAVE projects the business units had in their pipeline.

There were ESAVE project groups on business area level, meaning there was one for Forest Products and one for Hygiene (Tissue and Personal Care). On the Hygiene side, there was support from a role in Global Hygiene Supply, the Director Energy Savings & Energy Technology, situated in Germany. These people, together with the Director of Energy Sourcing, the Sustainability Reporting Director and the SVP Corporate Sustainability constituted the ESAVE network. The SVP Corporate Sustainability was also described as the official group "sponsor" for ESAVE, meaning that she was the one responsible for it towards CSMT. The ESAVE network was to handle the implementation and follow-up on ESAVE projects and progress in the business areas and up to corporate level. They did a quarterly conference call, when they walked through the current status of the projects in the business areas and the progress and improvements. It had also been a forum to discuss the reporting formats, the reporting frequency and the usage and communication of the numbers.

There were two parallel reporting tracks relating to the ESAVE projects. First of all the projects were calculated based on their projected energy savings. This was done in Excel spreadsheets on business area level. Except for the business area representatives in the ESAVE network, there were also people on plant level dedicated to, on a part-time or full-time basis, working with the ESAVE projects. There were, it was claimed, some difficulties with differing motives of the reporting.

> *It gets difficult. They want information so they can see that they've done the right project, and to learn for the next project… and that bit. And up here you want some sort of condensate of this, what is the ultimate objective so to speak.* (Director Energy Sourcing)

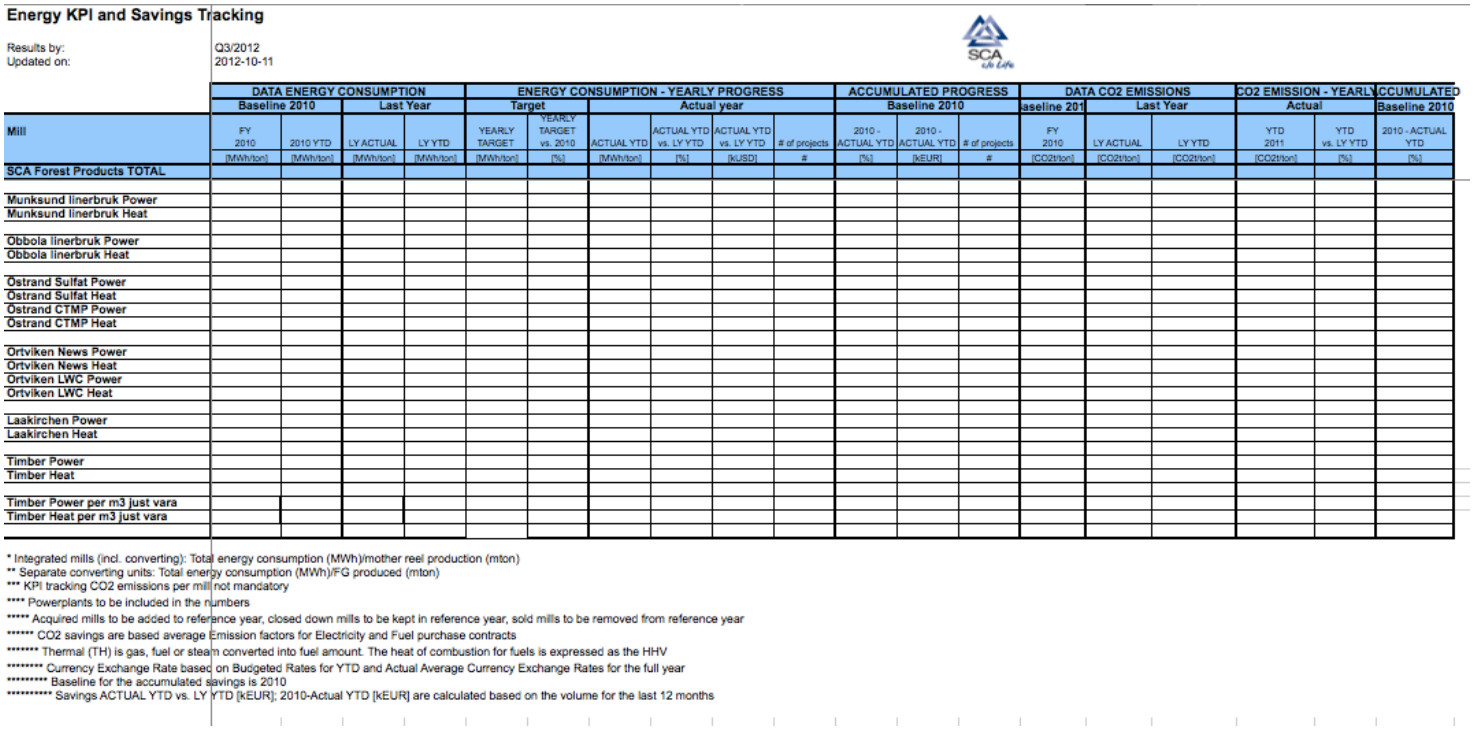
To measure actual progress on energy savings, reporting on specific, i.e. production-related, energy consumption was also produced. The input was done by the business area representatives in the ESAVE network, and this was submitted to the Director of Energy Sourcing to keep track of the savings made. Specific energy consumption was then also related to the 2010 baseline (the baseline had recently been changed) to show progress in energy savings.

> *… this tracking is going to provide direction, then we know that the things that we are doing, including investments, are paying off.* (Director Energy Savings & Energy Technology)

Since the quantified CO_2 target had been introduced, there was also a row in the spreadsheet with a formula calculating CO_2 savings from ESAVE, based on the same standard emissions factors as was used in the RMS. Previously the CO_2 savings had been based on average emission factors for the energy purchase contracts, but this had however been changed to create more alignment with the CO_2 reporting.

The two reporting processes did not always match, a fact that was attributed to the complex workings of energy usage at plant level.

> *I: Sometimes we have had an investment which as such has been successful, but then at the same time, while we have been focusing in this project, another part of the site might have started to deteriorate. Sometimes we might lose the focus in a specific process, and over time, for example, might see that the efficiency of heat recovery has gone down or some leakages have started to occur and we have not been taking care of this in our daily business. What that means is that even if the project itself is giving results, yet if we do not focus at the same time on maintaining standards, then we are not getting the full benefit of ESAVE.*
> *R: Right, because it's eaten up by something else?*
> *I: Exactly. Therefore we need to constantly monitor the total consumption of which we pay for.* (Director Energy Savings & Energy Technology)



Energy KPI and Savings Tracking

Results by: Q3/2012
Updated on: 2012-10-11

	DATA ENERGY CONSUMPTION				ENERGY CONSUMPTION - YEARLY PROGRESS						ACCUMULATED PROGRESS			DATA CO2 EMISSIONS			CO2 EMISSION - YEARLY		ACCUMULATED
	Baseline 2010		Last Year		Target		Actual year				Baseline 2010			Baseline 201	Last Year		Actual		Baseline 2010
Mill	FY 2010	2010 YTD	LY ACTUAL	LY YTD	YEARLY TARGET	YEARLY TARGET vs. 2010	ACTUAL YTD	ACTUAL YTD vs. LY YTD	ACTUAL YTD vs. LY YTD	# of projects	2010 - ACTUAL YTD	2010 - ACTUAL YTD	# of projects	FY 2010	LY ACTUAL	LY YTD	YTD 2011	YTD vs. LY YTD	2010 - ACTUAL YTD
	[MWh/ton]	[MWh/ton]	[MWh/ton]	[MWh/ton]	[MWh/ton]	[%]	[MWh/ton]	[%]	[kUSD]	#	[%]	[kEUR]	#	[CO2t/ton]	[CO2t/ton]	[CO2t/ton]	[CO2t/ton]	[%]	[%]
SCA Forest Products TOTAL																			
Munksund linerbruk Power																			
Munksund linerbruk Heat																			
Obbola linerbruk Power																			
Obbola linerbruk Heat																			
Östrand Sulfat Power																			
Östrand Sulfat Heat																			
Östrand CTMP Power																			
Östrand CTMP Heat																			
Ortviken News Power																			
Ortviken News Heat																			
Ortviken LWC Power																			
Ortviken LWC Heat																			
Laakirchen Power																			
Laakirchen Heat																			
Timber Power																			
Timber Heat																			
Timber Power per m3 just vara																			
Timber Heat per m3 just vara																			

* Integrated mills (incl. converting): Total energy consumption (MWh)/mother reel production (mton)
** Separate converting units: Total energy consumption (MWh)/FG produced (mton)
*** KPI tracking CO2 emissions per mill not mandatory
**** Powerplants to be included in the numbers
***** Acquired mills to be added to reference year, closed down mills to be kept in reference year, sold mills to be removed from reference year
****** CO2 savings are based average Emission factors for Electricity and Fuel purchase contracts
******* Thermal (TH) is gas, fuel or steam converted into fuel amount. The heat of combustion for fuels is expressed as the HHV
******** Currency Exchange Rate based on Budgeted Rates for YTD and Actual Average Currency Exchange Rates for the full year
********* Baseline for the accumulated savings is 2010
********** Savings ACTUAL YTD vs. LY YTD [kEUR]; 2010-Actual YTD [kEUR] are calculated based on the volume for the last 12 months

Figure 8: Spreadsheetfor tracking of energy and CO_2 savings within ESAVE. Emptied of content (SCA 2012f)

ESAVE and RMS start showing different savings figures

A problem described in the interviews was that the savings supposed to have been made according to the ESAVE reporting was not really visible in RMS's figures over total energy consumption and CO_2. The problem was described as having surfaced in the late 2000's.

> *We had a situation a number of years ago when it started to disaccord a little, RMS goes out with the numbers we have, you know, while we communicate, in other settings, heavy reductions. Both are true. But they can be difficult to understand.* (VP Environmental Affairs)

The difference was attributed to differing boundary conditions. In the RMS, they were described as being around the plant, while in the ESAVE measurement system the boundary conditions were around the specific machine.

> *There has been a process where ESAVE turned to RMS and to [RMS Manager], and that started 3-4 years ago. /.../ But it's a principal difference.* (VP Environmental Affairs)

The differences arising between RMS figures an ESAVE figures were attributed to two principal reasons. First of all, ESAVE was reported as energy savings from a specific project, per annum. If one project with a 1% savings had been initiated one year, this would add 1% to each following year. If then the next year a second project was initiatied, with another 1.5% in savings per annum, the accumulated per annum savings would be 2.5%. It was described as if ESAVE had a time axis and RMS did not. The difference was also described as relating to accumulation in absolute terms:

> *If, what should we say, say that in 2010 we had emissions of 100. /.../ And in 2011 had 90, if we 2012 have emissions of 90... Then RMS would say, well compared to last year it hasn't changed, it's constant, but ESAVE would say, we have saved 20.* (VP Environmental Affairs)

The effect of this accumulation could be that ESAVE would accumulate huge amounts of emissions savings while these were not visible on the overall level.

> *ESAVE doesn't do anything wrong. But they are different ways of reporting. It's true, I mean, if you improve something, initiate a process which reduces energy consumption one year... Then you get the benefits next year*

too, and the next one too. So I want to emphasize that. Nothing wrong. Absolutely not. It's important, because it's just different ways of reporting. (VP Environmental Affairs)

The missing savings were alternatively described as relating to other changes, such as new investment or production volumes.

You know it's also because as time goes by you change production volumes, maybe you change the quality of a product you manufacture, you get other environmental obligations so that you have to do something else. A lot of stuff is happening and the total effect including ESAVE, that's what you see in RMS: But ESAVE is just one part of this whole thing… (Director Energy Sourcing)

Importance was attributed to understanding the difference.

It's really not a problem as long as you know how these two systems work. Really. /…/
As long as we know the situation with ESAVE I don't see, there's no… from my perspective it's not an important and big problem. (VP Environmental Affairs)

Another described explanation was that it was rather a question of too much reporting and trying to extract too much information from something that was not meant for it. It was argued that one of the success factors of the RMS system and the ESAVE system, respectively, was their simplicity.

And the question is if it adds so much more than what a simpler, not as complicated reporting system would have done. And we might be able to produce huge amounts of figures, but what do we use them for? That's… And it's the same thing, RMS, it produces figures simply. You have decided on a number of figures to be reported once per year. /…/ Same thing with ESAVE. It's just specific energy consumption. How much money we have spent on the projects. How many we've done. And then, along come these things, we need to know CO_2 and we need to know this and we need to know that. And then you complicate the whole thing. (Director Energy Sourcing)

This problem was described as goal incongruence between ESAVE and the CO_2 target. On a higher level, that is, on the corporate senior management team level where the target had been instated, the purpose of the figures was described as being able to report on the progress to reduce emissions. On a business unit level, and in ESAVE, the purpose was to reduce costs and increase efficiency. The complication, it was claimed, had arisen when the CO_2 target had been added on top of the ESAVE system. That is, the problem with differing system boundaries became visible because the attempt to extract more than it was initially planned for.

I: But you must remember that ESAVE's target isn't to save CO_2.
R: No?
I: It's to save energy. And this CO_2 thing has been added on later. It has never been the primary, really. It has just complicated things.
R: How so?
I: Well you get this… how to calculate… and the system boundaries are different… And you get… EU ETS reporting and RMS reporting and you can't see that anything's been done over there, you know. They measure different systems. (Director Energy Sourcing)

Reaching "understanding" on the difference between the numbers

Around 2010, there was a perception that the problem with the differing figures needed to be resolved. What was described as the "ESAVE people" turned to the "RMS people" to attain a resolution. The trigger had been a presentation in which the Director of Environmental Affairs had been present, and where the ESAVE people had one figure and the RMS people another, for the same factory.

…it had happened so many times that we said that "Let's sit down and look at this" (RMS Manager)

A working group lead by the RMS Manager was instated. Although at the time when we leave the empirics there still seemed to be some confusion about the figures not adding up, it was described as having been resolved through mutual understanding of the differing objectives and system boundaries of the two systems.

We went in on a raw data level, before you start accumulating and compiling yearly figures. And went it through, number by number, plant by plant. So we've done that mapping. And that's where I reached the conclusion that ESAVE is on a much more detailed level, on machine level, on, well, different levels in the process, which we are not. /.../ So we understood each other in the end, and realized that we think about it differently. And the purposes are different. I understand ESAVE, for them there's no use in looking at a yearly figure, they want to go in and improve a specific part of the process. Well yes… In the end we should be able to see that improvement in RMS. If other parts of the process don't increase. (RMS Manager)

However, as reflected in the above quote, there still remains what can be described as uncertainty[13] as to exactly why the figures do not match, although understanding was described to have been obtained. There were no changes made to the reporting or measurement:

We agreed in the end, we haven't changed any system boundaries. (RMS Manager)

The problem was also attributed to communication.

The problem is on the communication side. ESAVE has clear objectives. /.../ It's a good system. Improvements are made. They describe the projects. I have no problems with that. It's just on the communication side, how to reach out, and there we used to have a deal that we have to limit ourselves to some extent when it comes to ESAVE's effects on CO_2, with exact figures. But rather to stay to RMS figures when it's about emissions reduction. (VP Environmental Affairs)

5.3.3 Which emissions, and whose?

It had been decided early on that Personal Care's and the part of Forest Products' emissions relating to the production of solid-wood products were not to be included in the target. Regarding Personal Care, firstly, the respondents returned to a couple of reasons explaining this. The first was described as a matter of materiality.

We looked at the manufacturing that actually has an impact on emissions. And the situation is that when it comes to our fossil fuel usage, our pulp and paper mills [in Tissue] contribute – I am guessing a little bit now - but around the level of 99%. And then we have production of diapers [in Personal Care]. /.../ They use almost no fuel at all, in comparison. And therefore it doesn't really matter, from a follow-up perspective… They're not included. We can throw them in, but it doesn't affect our result. If we look at the electricity side, they have a few per cents more. /.../ And I have talked to them, the people responsible in Personal Care, and they are welcome into the target if they want to, of course. (VP Environmental Affairs)

And although there seemed to be no clearly formulated plans on the table, there had been recent discussions, for example in the October ESAVE meeting, on the inclusion of Personal Care.

R: Because what I was thinking is that also it's not included in the CO2 target?
I: It was not, and our discussion was that should it be? And in my view, yes it should be.
R: Yeah. Why?
I: Because it's part of our company, which is also using fuels and electricity, so for me the question is why not include it.
(Director Energy Savings & Energy Technology)

Since the impact was seen as relatively smaller, there were no investment plans in the same manner as for Tissue. It was claimed that dedicating vast resources to the management of that would be inefficient, since it would have such a small impact on overall emissions. It was rather argued to be a communication issue.

It's really a question of communication. /.../ Personal Care, they are part of a company which is reducing its emissions, will reduce its emissions by 20%. They can communicate as much as they want. And it's true. (VP Environmental Affairs)

[13] As was discussed in the methodology, due to the ANT ideal of generalized symmetry, it has been deliberately attempted to avoid vocabulary like uncertainty et cetera to ascribe motives among human actors (non-human actors cannot experience the feeling of uncertainty). However, in this case, the uncertainty described has to some extent been left unresolved, and this has important implications from an analytical point of view. Thus, this word has been retained in this context. This will be developed further in the analysis.

The second argument for not including Personal Care was that if it were to be included it would dilute the production-related emissions ratio. This was attributed to the fact that Personal Care had comparatively low emissions, which would increase the numerator (CO_2) relatively less than the denominator (production), as in the illustrative example below, based on RMS figures.

To sum up:

> *It would sort of become easier for us to reach the target.* (RMS Manager)

A third argument was that the specific manufacturing profile of Personal Care had another, it was described, "strange" feature (RMS Manager):

> *The thing with Personal Care, in addition to their emissions being low… Their production… We always measure production in kilotons. /…/ But when it comes to this product type you want to, you always strive to make the products lighter, so the diapers and the pads and all these things are getting lighter, they should weigh less. So therefore you can, even though you increase energy, the total tons [of product] could be reduced, because more diapers have been manufactured.* (RMS Manager)

That is, although including Personal Care would "dilute" the specific emissions profile of SCA overall, this could over time be eroded, because of the relationship between emissions and production in tons. Also, they had not had the same development as the other business areas. The described problem of the relationship between emissions and production within Personal Care was to be handled by starting to input the production in pieces as well, parallel to tons, according to a decision to taken during the autumn of 2013. This was to be used in the internal follow-up, although it did not mean an inclusion in the CO_2 target and for external communication purposes.

As in the case of Personal Care, the first reason mentioned for not including Forest Products' emissions from solid wood production was the relatively smaller impact on overall emissions, although these were bigger than for Personal Care. It was also, again, described as an issue of units of production:

> *In the sawmills they make solid-wood products. We measure that in cubic meters. We convert this production into kiloton each year. So that's not a problem. But… it's not as neat in a way, when you compare with tissue production, or as previously, print paper. That's a more uniform production.* (VP Environmental Affairs)

This was described as the reason for including those emissions from Forest Products that related to the production of pulp and paper products and not the ones related to solid-wood products.

The inclusion of grid electricity

At the time of the instatement of the quantified target in 2008 it had been decided that emissions caused by the use of grid electricity should be included too. This was attributed to the relationship between fuel consumption and the price of electricity. If the price of electricity went up SCA would generally try to produce more electricity themselves to compensate, and that would increase fuel usage and emissions. If the price of electricity instead went down, there was incentive to produce less electricity, and therefore buy less fuel. This would then reduce emissions.

> *So that was a reason from my perspective that we needed a new target on the CO_2 area. So the new target was constructed to include not only our own use of fossil fuels but also emissions associated with the electricity we buy. That means you get the full picture of our total impact, on a factory level, on emissions. /…/ So if the price of electricity changes, or bio gas goes up or down, or big strategic changes in countries supply of energy and so on, it does not have the same impact, because now we cover both energy sources used to operate our factories. It feels coherent.* (VP Environmental Affairs)

With the inclusion of grid electricity there was need for calculating the emissions in RMS. The electricity bought from utilities varied in its so-called fossil intensity, both over time and across countries. To obtain CO_2 emissions from electricity, thus, the RMS team decided to use emission

factors on national energy mixes from the International Energy Agency, in that way relating a unit of energy consumption to an appropriate amount of CO_2 emissions. The IEA factors were to be updated as soon as there was a new official figure out.

Although it did not seem to be a hot topic right now, there were internally differing views as to the *accuracy* of these national energy mix factors.

> *Well, it's some sort of average over a year or a period. But then the question is, can you cut Sweden out of a system where a whole lot of energy is moved back and forth? Swedish companies like to lift out Sweden. Of course. It looks great. But it might not be right to do it because a reduction of a MWh might push away much more CO2 somewhere else. So that's a bit tricky, you know. But when it comes to these things, you just decide to go with a system and then you stick to it.* (Director Energy Sourcing)

Retained exclusion of transport emissions

A recent development on the area of CO_2 in SCA had been a discussion on instating a target on emissions from transports. A total figure was presented in the Sustainability Report for 2012, and a text section in the report described SCA as one of very few big companies aggregating and reporting on its full CO_2 emissions from transports (SCA 2013b). The total figure for 2012 was 0.82 million tons. It was described as if SCA was trying to find new targets all the time, and that, when sitting on so much data, why not use it?

> *And we have been thinking, what the heck, when we have all this data [on transports], shouldn't we do something good with it?* (VP Environmental Affairs)

The issue had previously been up for discussion as early as 2006. At the time, the Director of Environmental Affairs instated a network to discuss the issue together with transport and logistics functions. Since then, there had been several rounds of trying to deal with it. During the fall of 2013, however, there were no formulated propositions on the table to include it or set up a separate target.

The figure for CO_2 from transports was generated through a process involving purchasing departments, factory RMS reporters, the logistics function in Forest Products, a specific transport database and the RMS system. The purchasing department at factory level was responsible for adding any new supplier of materials to SAP. By adding the location of the factory, SAP produced transport kilometers times tons, i.e. ton kilometers. This meant that every time a new material was received in the factory, the associated ton kilometers of transport were recorded.

> *For example, if you buy chemicals from Akzo in Bohus they might just as well be manufactured in Vetlanda. And then it's the transport from Vetlanda to the plant here that we record, how many kilometers it is, and that material is then tied to transports. And in that manner we get ton kilometers, which are then turned into CO_2.* (Laboratory Manager)

On a yearly basis, the SAP figures were, with a click, exported to the RMS system. As a next step, to produce the transport CO_2 figure, a person working in TransForest, that is, the logistics function in Forest Products, had a separate database for transports. He would convert the ton kilometers into CO_2 emissions based on international emissions factors, and based on the different types of transport used. For trucks, for instance, a certain type of EU truck and the associated emissions were used.

> *We could do it in the RMS system. We actually today have all inbound data information in RMS for the Tissue and Personal Care operations but not the emissions it generates. It would certainly be possible to include in RMS. The total SCA emissions however is a pretty complicated calculation. You have to take in a lot of numbers, and it's not just data on inbound transports, it outbound transports too. And those are handled today by [Logistics and Environmental manager TransForest], who is part of the RMS network. He gets them from*

Logistics and uses a separate database for the total emission calculation from transports. So it's a bit of a different organization around the transport figures. (RMS Manager)

A described reason for the complexity was the many transport types used:

It can go some distance with train, some distance with a ferry, and then it can be reloaded onto a truck the last part. We have one pulp, for example, it goes from Portugal, so it goes with a boat up to Uddevalla, and then it is loaded onto a truck and goes here. And then we register on that material, from the enterprise system, we register how many kilometers by boat from Portugal to Uddevalla, and how many kilometers by truck. And it calculates the transport distance. (Laboratory Manager)

The Logistics and Environmental manager in TransForest was identified by several of the interviewees as a key person when it came to transports. The process to include transports in the CO_2 target or to instate a new target, it was argued, could be initiated by the Director of Environmental Affairs, but logistics would have to be involved.

The Director of Environmental Affairs had initiated an investigation on the matter of a target for CO_2 from transports. However, the idea had not been to include it in the existing CO_2 target, but rather to create a new one.

I: We have never, it has never been the ambition to include it in the CO_2 target.
R: OK.
I: Never. Because it doesn't fit in there. You get very different… Setting a target including transports, it would be vague, unclear and difficult to follow up. You would have to report them separately anyway.
R: OK, why? Since I am not so familiar with this, I don't understand why…
I: Well, for example… How would you formulate a target like that? (VP Environmental Affairs)

Importance was attributed to *controllability* and *manageability*:

Targets should be clear, relatively simple. You have to be able to understand them, and if we release a figure that we have reduced 10%, what does that mean? And the more components you have, the harder it gets. /…/ We buy a lot of pulp from South America which we transport to Europe, that is the big transportation we do really, ton kilometers, with boat. Something could lead to us having to increase that dramatically. And then it would hit our CO_2 target. This is an operation that we can't control to the same extent as our own production and our own purchases of electricity. (VP Environmental Affairs)

This was also attributed to the big amounts of suppliers on the transport side. For electricity there were 10-20 suppliers, but for transports, there were thousands, and they ranged from small family-run business to industrial groups. But it had mainly been an issue of actually being able to influence transports.

We have been working with what is called Scope 1 and 2 in this. Scope 3 and 4 is considerably more difficult to measure[14]. And it's a bit more variable. So what we started with, we are actually looking at reviewing the CO_2 target right now, but in that case we will probably opt to have it separate targets, regarding transport. Because we think, when it comes to CO_2, that we want to focus on our own plants, because, and that is maybe from a practical, internal perspective, that we want the right people responsible to deliver on the target. So we say "own plants including purchased electricity". That is a clear delimitation; it's 'Carl, Peter and Lisa' who deliver on this with their respective projects. Transport is another part of the organization, and then we want to separate targets for them to deliver on. (SVP Corporate Sustainability)

One reason that the smaller degree of *controllability* was ascribed to transports was the fact that SCA was often just one of many companies loading their goods on a specific boat over, for instance, the Atlantic. It was argued that they therefore had no possibility to influence the transport companies when it came to fuel efficiency and other CO_2 related issues.

[14] Scope 1-4 are the Greenhouse Gas Protocol's definitions of different types of CO_2 emissions, depending on where in the value chain they come from.

Furthermore, the organizational perspective came up again, and the possibilities of the environmental and sustainability staff to influence other parts of the organization.

> *An underlying factor when it comes to transport... Sometimes I go, or someone else from the environmental side, all jaunty, saying "This is a great area to do something with, jesus, it's a win-win, we make transports more efficient, we improve logistics, and then we reduce emissions, isn't it great!". But you have to remember that for every transports manager and logistics manager, improving efficiency is of course on top of their agenda. So it's really not a new issue…. It could be a push, of course, but we don't sit idly in SCA when it comes to transports. It's a lodestar to make transports more efficient and it is constantly being worked on*. (VP Environmental Affairs)

5.3.4 Measurement, presentation and reporting

When the RMS had been implemented in the late 90's, the idea had been that the mills and plants were to be responsible themselves for their numbers. In practice that meant, for example, using their own emissions factors and thus recording CO_2 emissions directly into the RMS.

Emissions factors for CO_2 were generally based on a chemical relationship between the amount of carbon in the fuel. This was explained to the researcher by one of the laboratory managers as an undisputable fact underlying all emissions factors. For carbon, the mol mass is 12,01 g/mol and for oxygen it is 16,0 g/mol. Because of that, the mol mass of CO_2 is 16+16+12,01, which adds up to 44,01 g/mol. The carbon to CO_2 factor, then, is 44,01 for CO_2 divided by 12,01 for carbon, producing the figure 3,664. This can then be exemplified by one unit of carbon producing 3.664 units of CO_2.

Emissions to air

Air emissions comprise emissions from all combustion units at SCA's production sites, including fossil fuel and biofuel emissions and emissions from purchased thermal energy. When energy (primarily thermal energy and/or electricity) is supplied to an external facility, air emissions are reduced in relation to the energy amount delivered and the reduction is distributed among SCA's main products.

Three chemical compounds are measured and reported in relation to air emissions: NO_X, SO_2 and fossil CO_2.

The stated CO_2 figures may differ somewhat from those reported to local authorities under the EU Emissions Trading Scheme (ETS). This is because the countries participating in ETS use different limits and definitions for their calculations, while SCA calculates and presents RMS data according to a separate set of rules. A global company such as SCA, with operations on several continents, needs a single set of rules for calculating data to enable uniform reporting and monitoring of emissions levels.

Figure 9: Excerpt from Sustainability Report 2012 (SCA 2013b)

Standardization of emission factors

Since the EU ETS[15] had been introduced in 2005, there were now also country specific government regulated factors which were used in that reporting, and this started to flow into the RMS because the factory reporters used the same factors for both ETS and RMS, This was described as a problem.

> *But we came to a situation where it… It was hard to compare numbers between the factories. Even if they used the same type of fuel.* (RMS Manager)

[15] The EU ETS is the European Union's emissions trading scheme. Emission rights are allocated to emitters, and the system has its own reporting and monitoring infrastructure. The ETS emissions factors are based on the carbon degree in the fuel used and usually received from the fuel supplier. The factors used must be verified by a third party, and must be reported to the national authorities. The degree of monitoring the emission point (factory) maintains is categorized according to a four-tier system of different building blocks of data quality, calculation and monitoring levels.

Instead of factory reporters having the flexibility to input their own input factors into the RMS, the interface was changed in 2011 so that the only option was to choose SCA standardized factors. These were based on standard factors developed by the Swedish Environmental Research Institute

RMS standard values

These numbers may be used if no other specification is given.
In case you have site specific values, please use them instead.

Fuel	Unit	Density	LHV	Efficiency	CO2
Fossil fuels		tonne/(n)m3	GJ/unit	%	kg/GJ (LHV)
Natural gas (NG)	1000 m3	0,00075	37,2	90-94	56
Liquified natural gas (LNG)	tonne	0,45	15,2	90-94	56
Liquified petroleum gas (LPG)	tonne	0,0024	46,1	90-94	65
Light fuel oil (LFO)	m3	0,84	36,0	88-92	74
Medium fuel oil (MFO)	m3	0,93	38,0	88-92	76
Heavy fuel oil (HFO)	m3	0,95	38,6	88-92	78
WRD oil	m3	0,88	37,3	88-92	76
Coal	tonne	0,80	27,2	85-90	92

Bio fuels					
Wood				83-88	96
Bark				83-88	96
Biogas				83-88	56
Sludge				83-88	130
Spent liquor (sulphate)				75-80	110
Spent liquor (sulphite)				75-80	110
Other biofuels				75-80	100

Source of information:
IVL – Swedish Environmental Research Institute (www.ivl.se)

Note 1: The CO2 emission is calculated based on the Low Heat Value (LHV). The heat values vary between different gas fields. Natural gas is mainly purchased on the High Heat Value (HHV). Roughly LHV= 0,9*HHV.
Note 2: Combustion of fossil fuel generates fossil CO2 emissions and combustion of bio fuels biogenic CO2. The combustion of bio fuels is considered climate-neutral since biogenic CO2 is not considered to give a net contribution to the atmospheric CO2 level.
Note 3: The biomass energy is normally calculated from a thermal energy balance. In case of that the fuel energy is obtained from recalculation, use the efficiency values specified in the table.
Note 4: The range of efficiency concerns steam rising in steam boiler with average values. The efficiency may vary in a wide range depending on the fuel mix, moisture content and technology and is normally measured. If you have site specific efficiency values we advise you to use them instead.

Figure 10: RMS standard factors PDF (SCA 2007).

(IVL), and displayed in a PDF document labeled "RMS Standard Factors 2007" (SCA 2007). In the document, different types of fuel were listed and displayed together, and related to a certain amount of CO_2 emissions, in kilograms, per Giga Joule of energy. Now, instead of putting in emissions numbers, factory reporters would record fuel usage and energy consumption, and this in turn produced an emissions figure based on RMS standard values. Another reason attributed to this standardization was that not all SCA production countries were part of the ETS system and that it was thus impossible to use these factors.

> *You could argue forever about which conversion factors to use or what to measure. But you better just decide.* (Director Energy Sourcing)

Although it could have effects on individual mills, so that the RMS figures differed from the figures used for the ETS reports, it was described as reasonable.

> *They (SCA) lump it together, and maybe it becomes plus minus 1-2% or something in the end. /.../ I've got the specific [factor] for [Supplier] in Gothenburg,. /.../ I have a much more accurate factor for exactly the fuel we burn. But I guess they've seen that the conversion of units turns out wrong sometimes and stuff, so to reduce the risk of that you go for standard factors for everyone. The total CO_2 for SCA should... it should be plus and minus in different mills and in that way approximately accurate. I think it's better from a quality point of view to do it that way.* (Laboratory Manager)

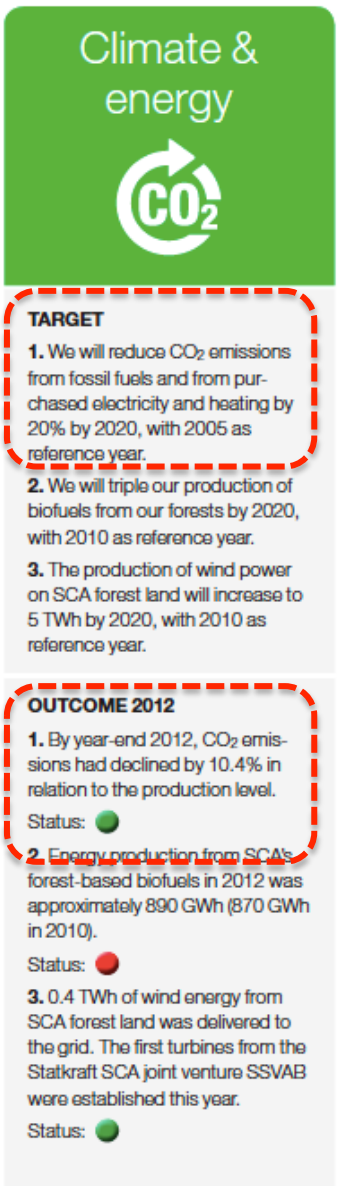


Figure 11: Excerpt from Sustainability Report 2012 (2013b)

This was described as being related to the need for *comparability*.

When they reported CO2 themselves… We realized that it's hard to get a consistent, that they report they same type of… the same types of calculations slash measurements every year/…/ … now within the RMS you have an invoice for a certain fuel usage. And we multiply that with the exact same factor every year. Then we really follow up on a real figure that is measured and verified. But if you have a measurement instrument there is always some variability there that can influence the outcome. There are no sites today measuring CO_2. It is all calculated. /…/ When we went over to using consistent factors for all mills it got much easier to follow up on the target. (RMS Manager)

And then I mean, we set a target… that we are going to reduce 20% before 2020. And then you might get a… maybe the expected reduction doesn't come about, as expected from the level of fuel consumption. If you look at fossil fuels and see that you have reduced with 30% - and then you see that the CO_2 has only been reduced with 20. Then you have to explain this difference. And that becomes difficult if you don't use consistent measurement methods. (RMS Manager)

Reaching a number on the progress

The sustainability report of 2012 presents the progress towards the 20% reduction in CO_2 emissions together with the presentation of all the sustainability targets. The number for the period between 2005 and 2012 displayed in the report was 10.4% (SCA 2013b). This number was attained through a process of extracting yearly emissions numbers from the RMS. The process was handled by the RMS Manager by the end of the year, for the production of the Sustainability Report. The numerical operation was executed in a spreadsheet listing all the pulp and paper plants, including their production, CO_2 from fossil fuels and from grid electricity, for the current year and for the baseline year of 2005.

The progress was described as "on track" (VP Environmental Affairs):

It's funny, it's fifteen years from 2005 to 2020, and we have done almost half of the target, and we are on minus 10.4. (VP Environmental Affairs)

The columns displayed absolute production and emissions levels, which were then summed up in a section further down. Here CO_2 from fossil fuels were added to CO_2 from electricity, to constitute total emissions for each of the two years. This section also included total production, and through division the specific CO_2 emissions figure was produced. In the blue cell, the reduction between 2005 and 2012 was calculated with the formula described above.

TOTAL CO2 FUEL+EL	Ref year 2005	2012
Production	4505	4706
CO2 fuels	1576	1410
CO2 el	1381	1357
Tons CO2	2957	2766
Specific	0,6563	0,5879
DEVELOPMENT SINCE 2005		-10,43%

Figure 12: Excel spreadsheet for calculation of progress towards CO_2 target (SCA 2013e)

Integration into business plans and quarterly reporting

There had been a recent discussion on including progress on the CO_2 target and follow-up on CO_2 saving investments on a quarterly basis. The Sustainability Reporting Director attributed importance to quarterly reporting to raise engagement on the CO_2 target.

> *If you want the boardroom's attention, is it enough to do [reporting] yearly? I doubt it.* (Sustainability Reporting Director)

The Director of Environmental Affairs described it differently.

> *The investments we make are over 20-30 years. There's no ambition from my perspective to do follow-ups every month or quarter, that would be meaningless. It's the big movements [that matter]. And through RMS I can see how it has progressed, and that's the central part. Because then I can also draw conclusions about the future.* (VP Environmental Affairs)

At the time the empirical data collection was concluded, this was still an unresolved issue.

5.4 Case 2: The Sustainable Innovation Target

The effort to measure product sustainability can be traced back to the establishment of so-called life cycle assessments (LCAs), a method to calculate the environmental "footprint" of products, which the hygiene business, especially Personal Care, had been performing since the early 90's. LCAs were described as assessing the whole "life cycle" of the product, from the supplier, via production to the product's after-use impact. The importance for Personal Care to perform these analyses was attributed to the fact that very much of the environmental impact lay outside SCA's manufacturing, that is, with the suppliers and after use. For Tissue, on the other hand, the main part of the impact was on the manufacturing level. In addition to performing LCAs, SCA had also been an active participant in the standard setting community around LCAs. This was described as important from the perspective of assuring fair comparison across product types and to influence new standards so as to not discredit SCA product types.

The LCA team was part of the Environment & Product Safety unit of Science & Innovation in GHC. There were around 10 environment specialists employed in the department and for six of these performing LCAs constituted a majority of time spent. Two of them were part of the RMS network on behalf of Personal Care and Tissue, respectively, to make sure the factories and mills did their reporting every year, and as representatives of the users of the RMS information. For the purpose of performing LCAs, data was collected from a variety of sources such as the RMS, Hygiene's own database Hermes, supplier data and a database included in the software used, GaBi.

A big part of the LCA team's job was to calculate carbon footprint over time for specific product assortments. In this process two reference points were chosen, 2008 and 2011 in the 2012 report, and from a constructed product assortment at these two points in time the reduction would be calculated. This therefore involved reconstructing a "portfolio" of what had been sold at the earlier reference point, based on sales volumes in pieces or in cash value. In addition to assortment LCAs, there were LCAs performed related to product development. In the process descriptions of innovation projects, there were several check points established where it was recommended that an LCA was performed. Sometimes the process would involve calculating the life cycle impact on several different technological alternatives for comparison. This would then be brought back as decision support in the product development process.

Product	Carbon footprint reduction 2008–2011, %
TENA Flex	–7
TENA Lady	–17
TENA Men	–3
TENA Pants	–7
TENA Slip	–11
TENA Comfort	–6
Libero open diaper	–19
Libero pants	–8
Feminine thin towel	–18
Feminine panty liners	–7

Life Cycle Assessments are calculated annually. Carbon footprint data for 2008–2013 will be presented in the 2013 Sustainability Report.

Figure 13: Assortment LCAs. Excerpt from Sustainability Report 2012. (SCA 2013b)

5.4.1 Innovation in SCA

A re-organization of the hygiene business had occurred in the years preceding this study. The Global Hygiene Category organization was introduced in 2008, described as aiming to ”create the conditions for global growth in the hygiene businesses” (SCA 2009a). The focus of the new organization, which went transverse to the business units within Hygiene, was inscribed for example in this paragraph in the annual report of 2008:

> *The unit will focus on long-term strategies for all segments in tissue and personal care products. In order to capitalise on synergies among the business areas, GHC is responsible for customer and consumer insight, innovation, technology processes and brand development.* (SCA 2009a)

A second re-organization was made at the end of 2011 for the beginning of 2012. Several respondents claimed that it was after getting this new configuration into place the new focus on innovation and products could really get going.

> *A number of years ago when GHC was created… all the intentions were right but it was'nt finalized with responsibilities et cetera… So there were… collisions /…/ It wasn't deep enough. And if the change of the organization only happens at the top it's not gonna work all the way down. One and a half a year ago, it was like –, this is going to work now, let's make it happen. /…/ that meant giving GHC the mandate to drive innovations*. (VP GHC)

A new innovation management system

Together with the Hygiene re-organization there were also efforts to establish what was described as a coherent way of managing product development. This process was described as having two purposes; firstly, to internally manage the product development process. Secondly, to be able to report on KPIs such as “innovation rate”.

SCA's general innovation definition was the development insightful solutions (SCA 2013b). For the purpose of the innovation management system, this had been operationalized to establish which innovations would be categorized as so-called innovation projects, thereby being included in the innovation funnel.

Identifying the projects was a first step, but as a next one there was also a perceived need for identifying those innovations that were an improvement the consumer actually could perceive. This, too, was described as important in relation to the production of certain KPIs.

> *What we are currently working on is defining those projects that are innovations from a consumer perspective.* (VP GHC)

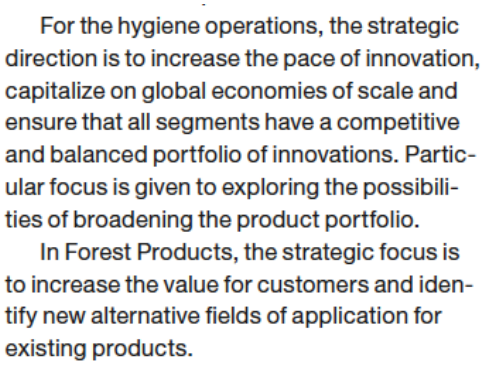
So the next step then, was to identify and “flag” those innovations the consumer could perceive, to be able to follow sales on “consumer perceived innovation”. From the perspective of the president of GHC, that consumers could actually see the difference was described as imperative.

Pure efficiency or production improvements were not included in this definition, which was constructed within the GHC organization. These were instead related to the supply chain organization GHS and ended up outside of the innovation definition.

> *We don't include pure efficiency, production improvements. And you can think a bit about that… A pure machine investment, leading to an/…/ increased production per hour, doesn't necessarily end up in what we call the innovation portfolio, because it's not driven by that organization.* (Sustainability Reporting Director)

Investor pressure for innovation?

The pressure to be able to show a high degree of innovation, in KPIs such as the innovation rate, was ascribed to the new analysts and investors following the company because of the re-classification from pulp and paper to consumer goods. Innovation as a strategic priority was inscribed in many parts of the annual report of 2012, both in visual representations and in text. (SCA 2013a)


For the hygiene operations, the strategic direction is to increase the pace of innovation, capitalize on global economies of scale and ensure that all segments have a competitive and balanced portfolio of innovations. Particular focus is given to exploring the possibilities of broadening the product portfolio.

In Forest Products, the strategic focus is to increase the value for customers and identify new alternative fields of application for existing products.

Figure 14: Excerpt from Annual Report 2012 (SCA 2013a)

> *There's a clear focus on innovation, because that's a key to success. That's our way of showing that we understand our customers and consumers./…/We have a unit working globally, GHC, /…/ with focus on innovation and branding. /…/ A big focus now when we are a leading global hygiene and forest products company, a consumer goods company.* (Director Investor Relations)

> *Generally, what happens is that we get completely new questions. Earlier, it was a lot about raw material prices and volumes. Partly, it's still that type of questions, but today it is for instance more about market shares, positions, brands and innovation. This type of change, and the questions that are asked, drive a certain behavior from us and new processes in order to respond to the requirements.* (VP Strategy & Business Intelligence)

In the transcripts from the last two years' interim report presentations and Q&A sessions, no traces of explicit questions from analysts about innovations our product launches. Once, however, an argument on coming product launches was included in a reply by the CEO to a question regarding volatility in raw material prices. It was also mentioned in the presentation part of the press conference. (SCA 2013j)

In the Q3 presentation of 2013, the issue was mentioned several times by the CEO.

> *We also have several new product launches during the quarter, and you of course all understand the importance of innovation, that we do get new products, new launches into the market, and that is accelerating, and of course, in doing that, that will also impact short term, the margin slightly negative, but of course, with new features on the market, there's an argument to discuss with the consumers, with the customers on a different price level, so all in all, it's very positive to get new products on the market.* (SCA 2013i)

This was brought up by the researcher.

> *R: I haven't seen any questions on innovations. But I have seen them in answers.*
> *I: We do get questions on innovations and new product launches in investor meetings. At the interim report calls questions regarding innovation might not have been that common but that is improving.* (Director Investor Relations)

However, in the Q3 2013 Report Q&A, there was also a question on new product launches.

> *[Analyst, Bank]*
> *You talked a little bit about the product launches, which should come in towards the end of the year, or next year, and them being one of the reasons for the higher A&P spend that we've seen in this past quarter. Should we expect the product launches to have a positive impact on earnings next year?* (SCA 2013i)

However, the GHC President described that it was not so much a question of innovation becoming more important. The implementation of the GHC organization, however, has induced an increased visibility on both R&D and marketing. Previously, by his description, SCA was much more organized as regional silos. The innovation function was very focused on Europe. Now there was a consolidated group strategy. Others described it as going back to something that used to be common:

Measuring innovation rate

For the autumn of 2013 there were plans to implement a process to be able to follow-up on the company's so-called innovation rate, i.e. the proportion of sales coming from product innovations. The task of leading this process was assigned to a VP in GHC. He had sent out an e-mail to all the business units, outlining the new approach to follow-up of innovations. These were also instructions for the business units on how to contribute to the new innovation KPIs.

This compiling of previous product innovations were to be used to create a baseline, to attain *comparability* over time.

> *[The way of calculating the innovation rate] varies a lot from company to company. And that really means nothing when comparing them. You have to define a method and then you can compare with yourself….* (VP GHC)

The funnel process

With the re-organization came also a new take on innovation management, especially in terms of follow-up, described as the innovation funnel. The innovation funnel was a visualization of a set of projects that had been identified as "innovations", and consisted of a set of stages with related documentation. At each stage-gate there was documentation that had to be delivered to CatEx for decision – a "go" or a "no-go".

[16] Each stock keeping unit is a certain type of packaging of a product. A certain type of diaper might come in 5-pack, 10-pack et cetera. These are different SKUs.

5.4.2 Developing a Sustainable Innovation target

The Sustainable Innovation target had been introduced together with the thirteen sustainability targets for the year of 2012. The first time they appeared in a printed report was thus in the 2011 Sustainability Report. In the beginning of the report, the "CEO's message" section displayed the new target structure. A link between innovation and sustainability was made: "Innovation is central to SCA's growth going forward. Sustainability is a major engine in that process, in everything from how we manage forests to how we develop hygiene products and services from that resource." (SCA 2013b).

The pressure to measure Sustainable Innovation was linked to the pressure, described above, for measuring innovations overall. Furthermore, from the perspective of the SVP of Corporate Sustainability, it was described as an attempt to influence consumers and "help them consume sustainably" (SVP Corporate Sustainability).

Defining "Sustainable Innovation"

What then, was a Sustainable Innovation? How should it be measured? And what would be the target? It was described as agreed early on that no specified target could be set before the current state – such as how many of current innovations were sustainable - had been investigated.

> *Sometimes you can be visionary. And say that everything should be [sustainable]. But you could also... we are a bit like "Let's understand first where we are. So that we can set a relevant target. Ah – it turned out that on average 20% were Sustainable Innovations, let's set a target, now we should get to 50%". /.../ Only when we know that – 20% - only then can we say 50% (as the target). /.../ But if it already is 51%, is it reasonable to set a target of 50%? (Sustainability Reporting Director)*

Therefore, it was described as a first step to establish what was meant by a Sustainable Innovation. Early on, it was conceptualized in terms of environmental performance, basing the assessment on the life cycle analysis.

> *SCA's sustainability strategy requires that all new innovation connect to the company's sustainability objectives. Its target underscores that the resulting product or service should aim for improved resource efficiency and environmental performance of its predecessor, based on a life cycle approach. As of 2012, performance against this target will be measured in the innovation processes across the company, starting with the hygiene operations.* (SCA 2012b)

People ambitions

We build our position as one of the most trusted companies in the world, delivering sustainable growth and value for our stakeholders.

We improve hygiene standards worldwide with our hygiene solutions. For the millions of existing users of our products and services, and for the billions of people in emerging markets, we develop innovative solutions that make it easier to live healthy, sustainable lives.

We support women's empowerment and their freedom to participate fully in society – socially, educationally and professionally – across the world by giving them access to and education about hygiene solutions.

We drive resource efficiency through our packaging solutions by securing product protection and content integrity in the distribution chain, at the same time supporting brand and consumer communication.

Figur 15: Excerpt from Sustainability Report 2011 (SCA 2012b)

A working group had been formed (which will be described in more detail below in section 5.4.3). LCA improvements were described as early on having been defined as the primary criteria for the environmental aspect of Sustainable Innovations. This was described as being so embedded into the GHC way of doings this that it was given that this would constitute the environmental part. For Tissue and Forest Products, however, it was not as established.

The social side, however, was described as having generated the major part of the challenges involved in the definition. A first step for the Sustainability Reporting Director, around the time of the start-up of the project, that is, in early 2012, was to benchmark on what the competitors were doing, especially in terms of definitions on social innovation. Few examples could be found, however, and those that did exist were described as irrelevant to SCA.

Another issue that was described to have come up early in the project group was that of defining innovations.

> *When we talk about innovation, what… what type of innovations, and what are we covering? Because there are changes to the products that are not innovations. And there are sustainability improvements happening out e.g. in the factories, which are not innovations either. So we talked a lot about that too. What is a subset of what? And I feel we have spent a lot of energy on that, we have worked to gain an aligned understanding of this.* (VP R&D Personal Care)

Over the course of the project, it was described as growing more and more important to align the Sustainable Innovation project with that relating to general innovation management. Sustainable Innovation had to be a subset of the funnel innovations and be based on the same definition. This excluded operational and resource improvements in the production process and limited Sustainable Innovations to product innovations.

> *And you can question that, sometimes, because there [in the production process] we can make a lot of environmental improvements.* (Sustainability Reporting Director)

This also excluded the so-called "enabling" innovations, which were more long-term projects aimed at providing new solutions to the products on a more general level. It was described that these would come anyway, as they would influence all innovations.

The alignment ambition also meant that using external models, such as one defined by the Dow Jones Sustainability Index which had been discussed in the early stages of the process, was deemed irrelevant.

> *We want to build on the innovation model already in place in the company. If we say it's a subset of the whole innovation process, then it's unfortunate if we develop another model*. (SVP Corporate Sustainability)

There were challenges with the definition of "socially sustainable". In the summer of 2013, a presentation describing the project stated: [redacted] (SCA July 2013)

During the fall of 2013, the VP of R&D in Personal Care had brought this definition of Sustainable Innovations with her to a GHC Management Team (GHCMT) meeting. The president of GHC had expressed a concern that only qualifying functional improvements as socially Sustainable Innovations would be "counter-productive".

> *We [the project group] had a suggestion that to be able to measure this, let's use functionality. But what came back, rightly, was "Is that what we want to drive?". Is this how we want to drive our product development? On functionality only? No. And then the KPI isn't relevant. We want to drive, I mean disregarding if it's functional or a perceived improvement, we want to drive on both. And then… you take away an important aspect if you… And again, it's a great example of, if you want this integrated as a normal part of doing business, people are gonna say "Well, only measuring functionality, then I don't care"* (Sustainability Reporting Director)

This was attributed to the overall innovation management not only focusing on functional improvement.

> *[Only going for functional benefits] is not how we want to drive our business, we also want to go for perceived effects. It's sufficient that the consumer thinks it's a better product, emotionally. It looked better. It was pink*

instead of white. That's an innovation too, from that perspective. /.../ Then that also needs to be a part of how we drive innovation. So, therefore we still need to work a bit on the exact criteria of social innovations. (Sustainability Reporting Director)

It's devised to fit in with the total [innovations]. /.../ So it's logical, again, we shouldn't separate this by doing something we don't stand for. (Sustainability Reporting Director)

This new definition including emotional improvements lead to new issues.

The functional benefit, we can measure that, in a consumer group. The emotional benefit, we can measure that in a consumer group, too… But the thing is, that all our innovations would count as sustainable since our products are about improving everyday life for our consumers and customers. You end up pretty close to greenwashing. *Because what happens is, if we make an improvement of some kind, and put it in a consumer test... Our consumer will say they prefer this. And since we work… since we work with the type of products that impact quality of life, you could say for all [innovations] that as long as it's better than the previous one you have an emotional benefit. And if we don't get a result like that we won't even put it on the market. /.../ But because of this, things which we don't, where our gut feeling says that this isn't right to call a Sustainable Innovation anyway.* (VP R&D Personal Care)

The solution was that the decision on what qualified as "socially sustainable" was categorized as a "judgment" rather than a measurement. The next issue, then, was to decide who was to make the call.

We've said that if we'd gone for the functional only, then we knew the solution and the metric. That would have been that as a consequence of that we have to get it into our consumer panels. Now when we have said that that is not all that matters, then we say, let's wait with the consumer panel change, with additional questions in those forms. Since it's emotional too, and we've said it's not as binary, it's much more vague. So we've instead said, let's initially have a committee. (Sustainability Reporting Director)

The Sustainability Reporting Director described an idea that more exact criteria for social innovations would emerge over time.

Simply to try to make the judgment calls, yes, no, do we think this is social? Hopefully the empirics from that will give criteria in the end. That's the maturity process, here /.../ We have to try to crawl before we start walking. To try to see, with three quarters of work, if we manage to get that routine with the committee… That we notice the red thread is that and that. Good. Let's set that as the criteria, and send it out,… And then we've found it. (Sustainability Reporting Director)

R: So you're deliberately leaving it a bit vague initially, to be able to…

I: Mm, but – because that is interesting when it comes to all judgments. As soon as you want to measure… when you make judgments. I am convinced that if we don't know… At least you can start with something. And when you have a data set… If you don't have anything, you can only speculate. But when you have started to measure and you report on something. In the end you have a data set that you can analyze, look at.

R: And when you say measure, in principle you mean "compile" as the first step?

I: Yes, compile. (Sustainability Reporting Director)

The social innovations are a journey. I think you have to start and work with the qualitative phase to find credible quantitative methods for social innovations. (Director Environment & Product Safety)

During the autumn of 2013 there were continued discussions between SVP Corporate Sustainability, VP R&D Personal Care and the President of GHC, who had evolved to become more involved in the process. Although it had been discussed previously, this discussion established that the "judgment" ought to be made in the GHCMT. We will return to this in the below section on presentation and reporting.

The discussions continued into late October, when the researcher made a visit to the Hygiene headquarters in Gothenburg to interview people within GHC. It turned out a meeting had been held the same day between SVP Sustainability, President GHC and VP R&D Personal Care. This had also been preceded by a discussion with only the SVP Sustainability and the President GHC, which

was then discussed between him and the VP R&D Personal Care, before they sat dawn all three of them. This was described by the President of GHC to be the "final" version (President GHC).

> *It has really been a process of step by step anchoring. From setting up the goal, working with measurements, evaluations and integrating it in the Innovation way of working. It is important to show the added value of going from Innovations to Sustainable innovations.* (Director Environment & Product Safety)

This meeting was described as resolving the issues surrounding the social definition:

> *R: And the snags… what were they?*
> *I: Well the snag was mainly this thing on the social side.*
> *R: But more specifically?*
> *I: To manage to capture those innovations… give credit to the innovations which actually go in the right direction when it comes to the social aspects, in a measurable way, without ending up in greenwashing. (VP R&D Personal Care)*

The main features of the new configuration of implementation and definition of Sustainable Innovations were concluded in a PowerPoint, dated November 2013. In one of the slides, the new definition was summarized. One of the main new features was that financial benefits had now been taken from the social side to create a third area. As such, this definition was linked to the official SCA approach to sustainability presented in for example the Sustainability Report (people, nature, economy). The President of GHC described the previous version as having been too technical and impractical.

The environmental requirements were still the same, consisting of three criteria. There were, however, more complex definitions in other materials:

> *This is still underlying. What has happened in the discussion, it's more a simplification of the matrix. (Director Environmental & Product Safety)*

The "People" bucket consisted of three types of possible benefits [redacted]

Since it had been agreed that the social part was to be a judgment made in GHCMT, it had also been agreed that just a social aspect would not be enough to qualify as a Sustainable Innovation. Again the issue was that the framework was described as risking being too broad. However, as opposed to the previous discussion on *all* emotional benefits qualifying as social benefits, it was now described to be an issue of accountability towards stakeholders. The solution had been that two out of three "buckets" needed to be fulfilled for an innovation project to qualify as a Sustainable Innovation. Within the "buckets", one out of three criteria needed to be fulfilled.

A financial benefit for society was described as [redacted]

5.4.3 Which innovations, and whose?

There never was a formally formulated project description. Rather, the definition of the group's tasks evolved over time, as the project evolved. The most recent set-up of the project group, the task and the progress towards a definition and implementation process were continuously inscribed in a PowerPoint.

> *It has being going up and down a bit, we have had periods when we almost haven't focused on this at all, at least not from my side. After some meetings the [Sustainability Reporting Director] paused and didn't call for more meetings, and I thought that now we might be there. I didn't reach out and ask for the status, because there were simply so many other things to focus on, Then it came up again, and so on.* (VP R&D Personal Care)

The project group had been recruited by the SVP Corporate Sustainability and the Sustainability Reporting Director. The Director of Environmental & Product Safety had been recruited for the environmental and chemicals related perspective. The Sustainability Reporting director was to deliver the controlling and accounting perspective. Initially the Director of Environmental Affairs was included too, but over time, he was no longer part of the official working group.

> *I was included in the beginning, but… It's [Sustainability Reporting Director] and [Director EPS] who are supposed to be driving that. We have said that it is not really organized within environmental, because it entails other aspects too. We talk about effects on… social aspects and things like that. So therefore we have today presented it on the social side and do so in the Sustainability Report too.* (VP Environmental Affairs)

From Forest Products, there was initially a representative in the form of the head of R&D. The VP of R&D for Personal Care was recruited in a GHC Management Team meeting, in which the SVP Corporate Sustainability participated, talking about sustainability and the need for suitable representatives from GHCMT for a project group on Sustainable Innovations. It was decided in the meeting that VP R&D Personal Care and her equivalent in Tissue were to participate.

> *[VP R&D Personal Care] has a broad competency generally about how we work with innovation, and she has also worked with the customer and consumers perspective. So she can think from that perspective, "What is relevant for customers and consumers?"* (SVP Corporate Sustainability)

The brand focus was also argued to be important.

> *Consumer, and brand focus, I would like to say too. Because in the discussions we have it's a lot about connecting where we want to go with the brands and what is good for consumers and the brands with what is right from a sustainability perspective. And often that goes hand in hand, but then you have to clarify these connections.* (VP R&D Personal Care)

Over time, there was, as was discussed previously, an increased focus on the integration of Sustainable Innovation into the overall innovation process. For the purpose of aligning with the innovation KPIs, a VP in GHC was enrolled in an extension of the group together with the Sustainability Reporting Director.

As visible in this coming and going of project members, the boundaries of the project had been somewhat fluid all along. This was described as a deliberate strategy.

> *We have tried to keep this in a small team. The core group has been [Director EPS], [VP R&D Personal Care] and [Sustainability Reporting Director]. And then they have involved other people along the way.* (SVP Corporate Sustainability)
>
> *I: In practice, if we had a group of initially five or six persons, concretely the drive and the contribution has been from maybe three. You could say. /…/ We haven't had a formal project organization of our task, the definition, our toll-gates, done, signed and sealed.*
>
> *R: So there is no document like "this is the group's objective - this is the group".*
>
> *I: No not "this is the group", but… Well it does, in every stage it has been "This is the group"* (Sustainability Reporting Director)

Because the funnel management of innovations was used foremost within Hygiene, and although Forest Products had a representative in the group initially, this changed over the course of the project. The difference in innovation management was described as the reason.

> *We used to have Forest in on it too, and I don't know if you can say that in some way they are not any more. They are in on the thinking, but Hygiene and Forest work in such different ways and are at so different maturity levels in their work on innovation. So we have chosen to focus very much on Hygiene.* (Sustainability Reporting Director)

The difference in maturity between Hygiene and Forest when it came to R&D was explained by the fact that Hygiene had GHC with a clear focus on innovation, while in Forest Products, it was only during 2013 that a new role was instated to drive an overall approach to innovation.

> *It's not that they don't do innovation, but the big measurability, consolidating, looking at – this is our funnel, our early stage projects, how far we have come. They don't have that. But they have begun, and they are on track.* (Sustainability Reporting Director)

Another issue mentioned was the social aspect of Forest Products not being the same as for Hygiene.

5.4.4 Measurement, presentation and reporting

Being the first sustainability report since the instatement of the target, the progress during the first year was inscribed in the Sustainability Report of 2012 under the heading "Outcome 2012" (SCA 2013b).

The Director of Environment & Product Safety (EPS) initiated, on behalf of the SVP of Corporate Sustainability, a process to be able to report on the environmental aspects. This was then the first time, and the process was organized so that the Director of EPS asked the Category VP's (organized in GHC) to nominate the product launches during the year which they thought would qualify as Sustainable Innovations.

> *Last year we said, since we weren't all the way there, [Director EPS] produced lists with products. And we ticked them off, which were to be regarded as sustainable. We didn't have the sales figures then to do the calculation of... And not the total innovation sales either, disregarding sustainability. /.../ We had a genuine list of projects and since we didn't have a total compilation of the KPI's we chose to exemplify.* (Sustainability Reporting Director)

The LCA team would then go back to their initial LCA assessments performed in product development. In some cases there were several versions of the products discussed initially, so the LCA team then had to first establish which solution the product development team had gone for, and then compare this to their own LCA of that particular solution. They confirmed, deleted and added products to the list consisting of the Category VP suggestions.

> *It started, well, a year ago, when it started to get pressing for the sustainability report, to evaluate our product launches with respect to sustainability. And then I worked with the environmental part, of course. Does this one fulfill the criteria or not? That's part of this role.* (Environmental Specialist)

Figure 16: Excerpt from Sustainability Report 2012 (SCA 2013b)

Because, of course, they don't have the information. So they were guessing. But we at least had, we had measured quite a lot of stuff so we looked at what we had measured. (Environmental Specialist)

Figure 17: Excerpt from 2012 Sustainability Report 2-page spread on Sustainable Innovations (SCA 2013b)

For the social aspects of Sustainable Innovation the Sustainability Communications Director and the SVP of Corporate Sustainability had looked through the product launches of the year to "flag" those that involved what was described as entailing a social improvement. The status of the project was displayed as "yellow light".

We are on a journey here. /…/ There's a lot going on, and it's interesting and dynamic in that sense. Because of course, being able to be behind this in the end, to really be able to have quantifiable stuff to talk about there, would feel very, very nice, very good. And we've put yellow status on this because of the fact that we haven't come further than the definition. We don't have measurability yet. So really, the ambition is to reach green flag both when it comes to the definition, the process, and the number. (Sustainability Reporting Director)

Yearly measurement and reporting process

The yearly reporting process to produce the Sustainable Innovation KPIs was visualized in relation to the innovation funnel. The environmental aspects, it had now been decided, could be evaluated all through the funnel, in the project documentation. This was due to the perception that these judgments were described as measurement and quantification.

The social aspects would be evaluated by some sort of committee. In late October 2013 it was established that this committee would be the GHCMT.

Practically, the latest thing now, is that this will be the same as GHCMT. That is [President GHC]'s management team, where [VP R&D Personal Care] is included, among others. So the Category VPs' management team will be the people deciding if an innovation is considered social or not. (Sustainability Reporting Director)

The decision to not evaluate social sustainability in the product development or CatEx team like the environmental aspects, but rather in GHCMT, was attributed to the *judgmental* nature of the evaluation and to the need for *integration* and *alignment*.

They have the project insight. It's not illogical, that choice. But… but again, to make this an integrated part of the business, I think it's…. I support this thinking that let's not create an array of new constellations, that, except

you really maintain them, manage it, just slip away into something non-existent. And then it's better that – here, a part of you daily agenda which you already have when you meet and talk /.../ a standing agenda point each quarter – Sustainable Innovation. So… It feels like a good way to go. (Sustainability Reporting Director)

The new "judgment" model introduced was described to solve at least the problem with the emotional aspect allowing too many products.

We were pretty tied up in the beginning because we… we were a bit focused on the measurability. So when we opened up for making a judgment, as a company, it loosened up a bit. (VP R&D Personal Care)

The idea was that the Category VP would bring the project to GHCMT to nominate it as a socially Sustainable Innovation, and for GHCMT to then decide whether they agree or not.

They will say "I think this is a Sustainable Innovation because of this and this and this" based on this matrix. And then we say… We challenge it, or we say, it's logical… (VP R&D Personal Care)

The decisions taken would then, it was described, be evaluated on an overall basis by the corporate Ethics Committee, bi-annually.

It would be too heavy a model if [the Ethics Committee] were to look at all the innovations, and they aren't informed enough to make the calls on all innovations. But on the other hand, to be a sort of…. Governance model. To make sure that we make reasonable judgments. We can show on an annual basis that these are the judgments we've made, on these bases, and they… can have input on that. (VP R&D Personal Care*)*

Creating a baseline for the Sustainable Innovation KPI

The set-up then built on an approach where the project managers in the innovation teams were to "be made aware of the KPI on sustainability" (VP R&D Personal Care). The actual follow-up, which would in the end lead to the sales from Sustainable Innovation KPI and the innovation rate, would happen after launch.

Since there had been some difficulties in getting a baseline of general innovation rate, the Sustainable Innovation baseline dragged on too.

The VP of R&D in Personal Care had been assigned to the task of creating an initial baseline in the winter of 2013. She looked at all product launches from 2010, 2011 and 2012, and those in the pipeline for launch, making a judgment based on the current definition. It had not been updated in pace with the definition being changed. It was described as being "in the drawer" for now.

That feels a bit… obsolete now, almost. But we might be able to use the work done when we are going to create a baseline. (VP R&D Personal Care)

Integration into the overall innovation KPIs was again described as important.

I: If you struggle with something which isn't really top of the agenda… for example supplier contracts, that we should be ethical and make sure the suppliers follow the Code of Conduct... /.../Then we have an operative business unit over here, which has as its target to deliver margins. They might not care as much, if you generalize, how ethical it is. Therefore it's important that things which you might not think is important… That it's a subset of a normal process. And that's why I think Sustainable Innovation has to be part of a normal innovation follow-up process.
R: So that it doesn't become another silo that needs to be maintained for its own sake?
I: Exactly. That I demand from the whole organization, because nobody else sees the value. (Sustainability Reporting Director)

When we launched these targets two years ago… We weren't ready to really tackle it. Now we have an organization in place, definitely, the right organization driving the issue. That feels… good, because the people responsible for it, make sure to work it in as a natural part of their own KPIs. That feels secure, it turns out right, you don't get this window dressing. It gets integrated into the business. (Sustainability Reporting Director)

Sustainable innovations must be integrated in the Innovation funnel! If you don't want to create a little sustainable island which isn't integrated with the rest of the operations. (Director Environmental & Product Safety)

This development was attributed to having the VP of R&D in Personal Care in the project group, as she was involved in driving the whole innovation process, although the categories were responsible for the projects. It was argued that even though there would be from her perspective an interest in the issue, it had to be included in an overall whole.

> *So we are taking a new grip on it, and in that context we are also doing the tagging of all the projects that are Sustainable Innovations. So it falls out well, and again, it becomes an integrated part of how we look at it. Because if I have to extract all these subsets in a process on its own, it gets cumbersome.* (Sustainability Reporting Director)

For the purpose of creating the Sustainable Innovation KPIs, the project group awaited a compilation of product innovations from the past years, with the purpose of creating a baseline for the general innovation KPIs (in terms of sales and number of projects).

We leave the case company in the late fall of 2013. The discussions then continued regarding how to simplify the process of identifying sustainable innovations and create the Sustainable Innovation KPIs.

6. Analysis

In this section, Callon and Muniesa's (2005) framework is applied to the empirical findings to provide an understanding of the construction of manageable and reportable objects. The concepts objectification and singularization are applied to the main issues described in the development of the two studied sustainability targets and their associated calculative apparatus. Objectification is the process whereby the object is defined and delimited. Singularization, on the other hand, is the process of choosing which objects to take into account, moving them into the calculative space, then ordering, comparing and manipulating them to extract a result. It also entails the construction of a standard.

The analysis is structured so as to first describe the "most recent version" of the two respective targets and their related calculative apparatus. Thereafter follows a discussion on the overflows, that is, the issues surrounding setting up the arrangements and maintaining them. In this process issues arising can be incorporated into the frame or left outside, that is, internalized or externalized.

Finally, objectification and singularization are conceptualized as a simultaneous and ongoing process, constantly framing and reframing the object and the calculative space as the intended user changes. Moreover, by constructing manageable and reportable objects intended for a certain user, that same user is enrolled and re-enacted. All in all, this analysis aims at elucidating the issues, challenges, overflows, internalizations and externalizations that the creation of a manageable and reportable object implicates.

6.1 Objectification: Defining an object that can be managed and reported on

Objectification (Callon and Muniesa 2005) is the process by which an object is defined. Although not necessarily physical, the object must be material, in the sense of being delimited and detachable. Objectification entails establishing the properties or traits defining the object. In the current study the relevant objects were a unit of CO_2 and a Sustainable Innovation, respectively. For the purpose of the two sustainability targets, however, the two respective objects had to be defined in such a way as to be possible to manage internally and report on, internally as well as externally. This analysis outlines the definition of the two objects as well as the overflows involved in this definition process, and how they were either internalized or externalized in the definition frame.

6.1.1 Objectification through established arrangements: The case of CO_2

In the case of CO_2, objectification entailed defining a unit of CO_2 emissions. The empirical account of the evolution of the CO_2 target showed that this was not described as a big issue. On the contrary, among several of the interviewees, *measurability* was recurrently attributed to CO_2. When the target was introduced, there already was an RMS in place in the company, which included a set of factors converting a unit of fuel consumption and electricity usage to a unit of CO_2 emissions. These had been imported from national and international standard setters such as the Swedish Environmental Research Institute and the International Energy Agency. Thus, at the time of the introduction of the target, a unit of CO_2 emissions was already a somewhat established and defined object. It was

already managed internally and reported internally and externally. This had been made possible by an arrangement linking an external standard setter with the established RMS.

Although there were differing views on the exact *measurability* of CO_2 as well as the degree of *accuracy* obtainable, the respondents described the definition solution as acceptable. There were references made to the chemical relationship (the combined molar masses of carbon and oxygen) underlying the mathematical definition of emissions factors and the reasons for different factors existing alongside each other, without either one being incorrect solely because of the existence of the other. It was described as an effect of an engineering-like choice when the RMS had been developed (in both senses of the word), underpinned by a chemical relationship that was described as an *undisputable fact* established in the world of *science*.

This, however, does not imply that overflows did not occur. One example occurred in 2011 when the use of separate emissions factors for each factory was described to impair *comparability* between the producing units. The company, it was claimed, was in need of a *consistent* set of emission factors to ensure *comparability*. The ideal of *comparability* had to some extent been externalized in the initial set-up of the arrangement. Thus, an overflow occurred when the current CO_2 definition, which was based on customized emissions factors, was challenged by a described need on an organizational level (*comparability*). Through standardization of emissions factors to overall SCA factors this *comparability* was described as being attained. The overflow relating from the initial externalization of *comparability* was internalized in a new CO_2 definition. This would have effects on the RMS figures for particular factories in terms of *accuracy* (where the ETS figures were described as more *accurate* and the RMS showing another figure). Again, fundamental importance was attributed to *comparability*, and the reduction in *accuracy* was described as an acceptable consequence of that. That is, when the overflow occurred (through what was described as an arising organizational need for *comparability*) it was internalized (through emission factor standardization), with the result of the CO_2 definition being re-framed and redefined, that is, re-objectified. It could be argued that *accuracy* was now to some extent externalized from the definition of a manageable and reportable object. Obtaining *comparability* through standardization of emission factors was thus a step to re-objectify a manageable and reportable object, one that could, it was claimed, be used in internal reporting and management. CO_2 emissions measured in the ETS calculative apparatus were already external to the CO_2 target because of it having its own set of rules, monitoring, third-party verification and follow-up – arrangements of its own. Since now even the emissions factors would differ, the externalization of the ETS apparatus was reified.

6.1.2 Objectification as a protracted process of overflowing and re-framing: The case of Sustainable Innovation

In the Sustainable Innovation case, the issue of defining a Sustainable Innovation went on for years and proved to be both an organizational and a definition challenge. Initially displayed in the Sustainability Report of 2011, it was not until late in the autumn of 2013 it was described that a robust arrangement as to how to define Sustainable Innovations had been somewhat obtained. Up until then the process had involved multiple human actors, PowerPoint presentations, e-mails, meetings and workshops. Dilemmas and trade-offs had emerged and been resolved.

In the process of objectifying Sustainable Innovation, it turned out several objects had to be defined. What was *innovation*, really? Was it both changes in processes and in products? Could so-called enabling innovations be included? On top of that, there was the concept of *sustainability*. How would that be defined? And how would all of these definitions add up to constitute that of Sustainable Innovation? Two years were spent asking these questions.

The fall 2013 solution, which was described as "final" – although to varying degrees among the respondents - was based on the general innovation definition: "Creating or finding insightful solutions and bringing them successfully to the market". This had been operationalized in the sense that only those product changes that went outside of the so-called "mandatory parameters" would be included in the innovation funnel. It was decided that Sustainable Innovations would be a subset of these innovations. The described reason was to avoid creating a separate measurement practice taking effort and resources on top of everything else, one that nobody would really care about. Thus, the general innovation definition was enrolled. This could, again, be understood from the perspective of manageability. *Integration* of sustainability related practice into overall management was described as crucial.

The word *sustainable* had been broken down into three areas (People – Environment – Financial) and three criteria within each area, whereby the definition constituted a three-by-three matrix. For an innovation to qualify as sustainable, it had to fulfill one out of three criteria in two out of three areas. The People area consisted of the three criteria *health benefit*, *social benefit* and *individual benefit*, while the environmental ones were *improved LCA score*, *improved post use waste management* and *eco label*. On the financial side the three criteria were *value to customer*, *end-user* and *society*, respectively.

Although objectification is a continuous process, not only occurring at a specific time but constantly (Callon and Muniesa 2005), late in the fall of 2013, there was a somewhat robust definition in place. The road there had, as was shown in the empirical account of the target's evolution, been far from free from issues and dilemmas, that is, overflows. External benchmarking had initially been performed, but it was claimed that the company could not make use of any of the externally available definitions. Constructing the company's own definition was necessary, it was claimed.

One overflow relating to objectification occurred when the project group members gradually started to attribute this aforementioned importance of aligning the Sustainable Innovation definition with the general innovation definition in the company and the related innovation management (the funnel) that was developing in the organization. Firstly, this had the direct effect that only product innovations could qualify, as opposed to enabling innovations and process innovations. In the early versions of the definition, process innovations would be included too. But process innovations were dealt with by GHS and not GHC. That is, an overflow in the form of non-alignment of the two definitions occurred, and it was contained by changing – that is, by narrowing down - the Sustainable Innovation definition. Process innovations were externalized to obtain *manageability* in the form of attachment to another practice of objectification.

The establishment of the properties of a social innovation entailed constant overflows. One occurred when there had been feedback from the GHCMT that it was "counter-productive" to only include functional benefit improvements in the socially Sustainable Innovations definition, whereas the general innovation management included emotional ones too. This time the definition was changed

again so as to allow for emotional benefits. Emotional benefits were internalized in the definition of socially Sustainable Innovations. In the fall 2013 solution, this was labeled an *individual benefit.* The object, again, had to be *manageable* in the form of alignment with general innovation management.

The final definition also to some extent left safety outside the Sustainable Innovation definition by displaying it next to, and not inside, the three-by-three matrix. It was also mentioned that although not included in the definition, financial value to SCA was to be achieved for each innovation. These, however, were described as self-evident and therefore not required to be included in the definition. We can note, therefore, that concepts like safety and financial value to SCA were a potential (re)source for future overflows.

6.2 Singularization: Making objects manageable and reportable

Singularization is the process by which an object is transformed so that economic agents can assign value to it. For this, a calculative space such as an account, a list or a spreadsheet, has to be established. Objects to take into account are chosen, that is, qualified. The qualified objects are classified, clustered, compared and sorted in the calculative space. Formulas and algorithms are applied. Numerical operations are performed. It is thus both a process of qualification (choosing what to take into account) and of metrological manipulations. It also entails constructing a standard against which to compare the objects. The purpose is to be able to extract a result that can travel outside of the calculative space without taking the calculative apparatus with it.

In the present study, CO_2 and Sustainable Innovations, respectively, had to be chosen, accounted for, sorted and compared. A result in the form of emissions reductions or increased Sustainable Innovation rate was to be produced. That is, the objects had to be made manageable and reportable in the setting of corporate sustainability accounting. Singularization also aims to transform the object so that it is adjusted to the user's world. From this perspective, there is no subject and object here in the sense that the subject defines or assesses the object. That is, agency is not exclusive to the user or buyer. If necessary, the object will be adjusted to the user's world by transforming that world. A number on progress towards *sustainability* that is to be used for internal management and to report to external parties described as stakeholders is to be obtained. The singularization process is therefore also a process of co-production with the user.

There are thus four theoretically distinguishable steps producing singularization: Qualification, manipulations and operations, the creation of a standard and the extraction of a result.

6.2.1 Singularization as an arrangement including business areas, stakeholders and mathematical operations: The case of CO_2

When it had been established that the CO_2 target were to be quantified, a first challenge was to decide what the target, in the sense of a future goal, would look like. How much should SCA reduce emissions? And when? The target was formulated as a reduction of 20% until 2020, with 2005 as reference year. An external benchmark in the form of the EU target was enrolled, although it was decided that it could not be in absolute terms but had to be related to production. Although it was described as *logical* and *reasonable* to use absolute emissions (attributed to the wishes of the fish and the birds – that is, the external natural environment) it was described, also, to be necessary to

have a production-related target for SCA. The respondents described an absolute target as never having been a serious alternative, and no artifacts said the opposite.

At the time of the construction of the quantified target there already was a process whereby yearly emissions figures were input, aggregated and reported in the Sustainability Report. Factory reporters would input fuel consumption from production and electricity usage based on consumption invoices and the RMS would use emissions factors to produce a yearly figure of emissions for each of the factories. For the purpose of relating emissions to the 20% reduction target, emissions and production figures were extracted from the RMS and moved into an Excel spreadsheet, where they were listed and summed. Relative emissions in the current year were compared to relative emissions of the reference year. For what was described as reasons of *comparability*, the Greenhouse Gas Protocol Principles were enrolled and used to update the reference and current year according to acquisitions, closures and divestments made.

Instructions on which business areas and types of emissions to include were summarized in the RMS Environmental Target Calculation Principles. As the diagram below attempts at showing, these guidelines served as a qualification principle on which numbers to move to the calculative space, the Excel spreadsheet. The spreadsheet itself listed plants, emissions and production, and as such did not bear any trace of the process of choosing and qualifying which had preceded the material movement of the numbers into the space.

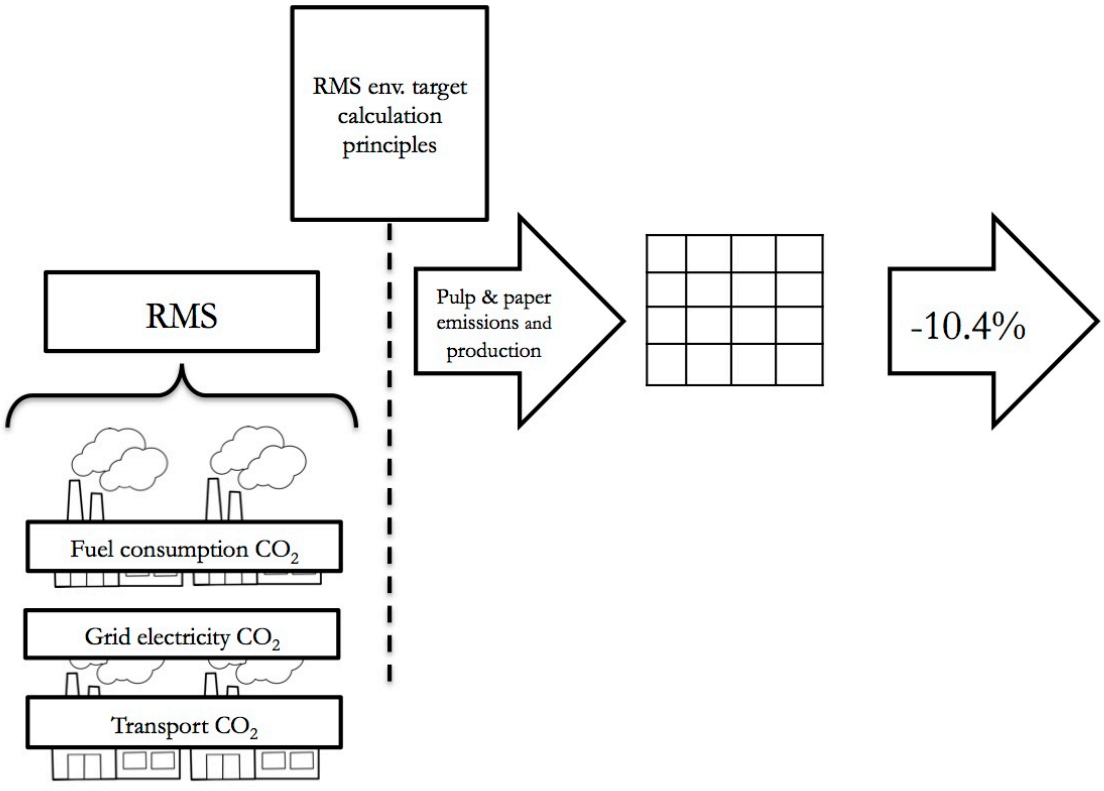


Figure 18: Qualification of emissions, extraction of numbers, manipulations in Excel and the extraction of an emissions reduction figure.

Although the CO_2 target had initially been formulated in terms of emissions from consumption of fossil fuels, grid electricity had been included the same year as the target was quantified. Another issue was which business areas would participate in the target. In Callon and Muniesa's (2005) terminology, which emissions and from which business areas to take into account would be described as the process of qualification. The choice of the production-related measurement (which numerical operation to perform) had implications for which business areas to include (qualification). This was because Personal Care's emissions would firstly dilute the ratio of emissions to production, and secondly they would potentially evolve in what was described as a "strange" direction over time. For Forest Products' production of solid-wood products the problem described was the units of production. None of these issues, however, would have surfaced if the company had opted for an absolute target instead of a production-related one (the numerical operation then being only to produce a sum). Therefore, this analysis shows that there was interdependency between how to numerically manipulate them in the account and choosing which emissions to take into account. This implies that one should be cautious with describing singularization as an orderly step-by-step process. Although the authors do describe them as separate and occurring orderly in the framework, there is really nothing to suggest that they actually intend it that way. It could also simply be an effect of following a logical track in the writing up of a paper. Nonetheless, it should be noted that it is worthwhile to be cautious with ascribing a logical order to the concepts when using them. In practice, they probably often are interdependent, like the analysis of the CO_2 case showed.

The issue of qualification produced overflows. As the data, it was argued, was available, an issue arose regarding whether to take transport emissions into account, either as a separate target or included in the existing target. This was however argued to be too big a challenge, from several perspectives. One of the main reasons was the claimed limited possibility for SCA to influence transport emissions. This was attributed both to inter- and intra-organizational conditions, and so at the time of writing there was no active proposition made.

Constructing manageable and reportable objects, according to Callon and Muniesa (2005), should really be understood as a process of setting up socio-material arrangements capable of doing this. In this case, we should construe of this description of not being able to manage transport emissions as not being able to set up a socio-material arrangement capable of managing transport emissions. It was, as was shown, not merely an issue of "numbers" but also on which organizational units would have to be involved. A million tons of transport emissions were thus externalized in the construction of a manageable object.

As external to the CO_2 target, these emissions could produce new overflows in the future. At that point in time, arrangements could be different, causing an overflow of greater urgency. Although no material changes were made to the qualification of emissions for the CO_2 target, this does shed light on how qualification is never a stable process. Rather it is under constant influence from issues arising, external pressures perceived and numbers and calculative instruments presenting themselves as available.

Although these overflows had all required some extent of containment, it seemed the biggest challenge had been that of dealing with the fact that the ESAVE system and the RMS system presented different versions of the progress towards the target of reducing CO_2 emissions. The

ESAVE system could be seen as a competing calculative apparatus presenting itself. This calculative apparatus produced overflows. The emissions were the same as they used the same emission factors, but the metrological set-up (such as the boundary conditions) differed, and so the extracted results differed. The RMS and the ESAVE system provided two differing accounts of carbon emissions reductions. The difference between the extracted results from the ESAVE system versus the ones from the RMS related firstly to issues of qualification, as the differing system boundaries meant including different emissions. Secondly it related to the numerical operation, since the time axis in ESAVE meant the systems summed up the reductions differently.

This overflow was described as problematic, since the differing accounts kept materializing in meetings and discussions. There was also risk attributed to executive management talking about the emissions reductions externally that had to be avoided. Therefore, there were efforts and investments made to contain the overflow. Meetings were held, emissions were mapped and analyzed and system boundaries were compared. The only material change made, however, was that for the purpose of talking about CO_2 emissions reductions, RMS numbers would be used primarily, and ESAVE figures avoided. They could still, however, be described (internally and externally) as an effort to reduce energy and emissions in general terms. Primarily, though, it was described as if the meetings and mapping provided *understanding* of the different ways of looking at energy and CO_2 savings. *Understanding* was obtained at least to the extent that the issue did not have to instigate any re-arrangements or re-definitions.

The empirics also showed that although some of the respondents could describe the difference verbally, some still expressed that it did not fully make sense to them that the numbers would differ.[17] To conclude, although the ESAVE reductions were thus made external to the CO_2 target, this ambiguity remains as a source for potential future overflows relating to progress towards reducing CO_2 emissions. ESAVE could present itself as an account of reductions in the future, and if accepted and used, new discussions and potential controversies could arise.

6.2.2 Singularization as a complex socio-material arrangement: The case of Sustainable Innovation

In the case of Sustainable Innovation, the objectification had been a challenge, and so was singularization. Firstly, in terms of which innovations could be taken into account, as in the objectification process, the funnel innovation definition was enrolled as a qualifying parameter. The environmental criteria would be taken into consideration in the funnel documentation throughout the product development process, and environmental innovations were thus to be "flagged" according to the criteria. That is, evaluation would be ongoing in the funnel. For the social innovations, however, just like in the case of objectification, the issue was more complex. This was attributed to the fact that no external benchmark or previous practice was in place, as well as social factors being inherently harder to "measure". The final version of the process was that the category VP would pick out potential socially Sustainable Innovations from the funnel at the capability gate. These would then be nominated to, and challenged by, the GHCMT. The Ethics Committee would

[17] As was discussed in the section of the empirics describing this issue, the approach of generalized symmetry would prohibit the use of this type of vocabulary (”make sense”), however, it has been retained here as the ambiguity in itself increases the future potential of overflows.

validate the GHCMT decisions yearly. That is, in the case of Sustainable Innovation, the numerical or algorithmic operations envisioned by Callon and Muniesa (2005) were constituted by a rather complex socio-material arrangement involving two different calculative spaces (the funnel documentation at each stage-gate and the funnel itself, materialized in a spreadsheet) and three different management groups (the category VPs, the GHCMT and the Ethics Committee), notwithstanding the LCA team involved in ongoing measurements in the product development process. It was argued that while the environmental aspects were "measurable", identifying socially Sustainable Innovations could not be merely a mechanical process applying a set of rules. Human judgment was fundamental because of the particular nature of social innovations and SCA's products, it was claimed. Finally, it had been argued that there was potential for a more defined set of criteria to evolve based on how GHCMT would make decisions, and on the basis of feedback from the Ethics Committee.

Singularization would also entail creating a standard to compare the progress towards "more Sustainable Innovation". This baseline would be in the form of KPIs, such as a ratio of net sales from Sustainable Innovation to general net sales, and one relating net sales from Sustainable Innovations to that of general innovations. The creation of this baseline, however, had to be performed during the autumn of 2013, before it was time to produce the Sustainability Report of 2013 that was supposed to include the progress on the new target. It was recurrently claimed that it would be useless to set a target (in the form of a desired ratio) before the current state had been investigated and established. The enrolment of the general innovation management (socially, materially and conceptually) had implications on this process, too. There was a process going on in parallel to that of Sustainable Innovation, which had to with general innovation rate KPIs. For the purpose of these, all product launches from the past three years were to be compiled, listed and compared according to a set of rules. This would enable the construction of innovation KPIs such as innovation rate. For the purpose of Sustainable Innovation, a group would sit down with this same list when it was to be ready in late autumn or early winter of 2013 and flag Sustainable Innovations according to the definition. A ratio based on the current state would be produced, and a target ratio would be decided based on that.

Arriving at the described arrangement, deciding who would make the judgments and a solution for aligning Sustainable Innovation KPIs with total innovation KPIs had been a complex ordeal. It entailed constant overflowing and new arrangements.

The attachment to general innovation management had implications not only on the definition of the object, but also on how the calculative space would be established. The Sustainable Innovation KPIs, the presentation of which were the ultimate goal, were to be aligned with general innovation KPIs both definition-wise and measurement-wise. The baseline against which to measure progress towards "more Sustainable Innovations" was to be constructed alongside the baseline of the innovation rate KPI. Another evolving calculative practice was thus enrolled. Integration with general management was described as important, by respondents involved in defining Sustainable Innovations.

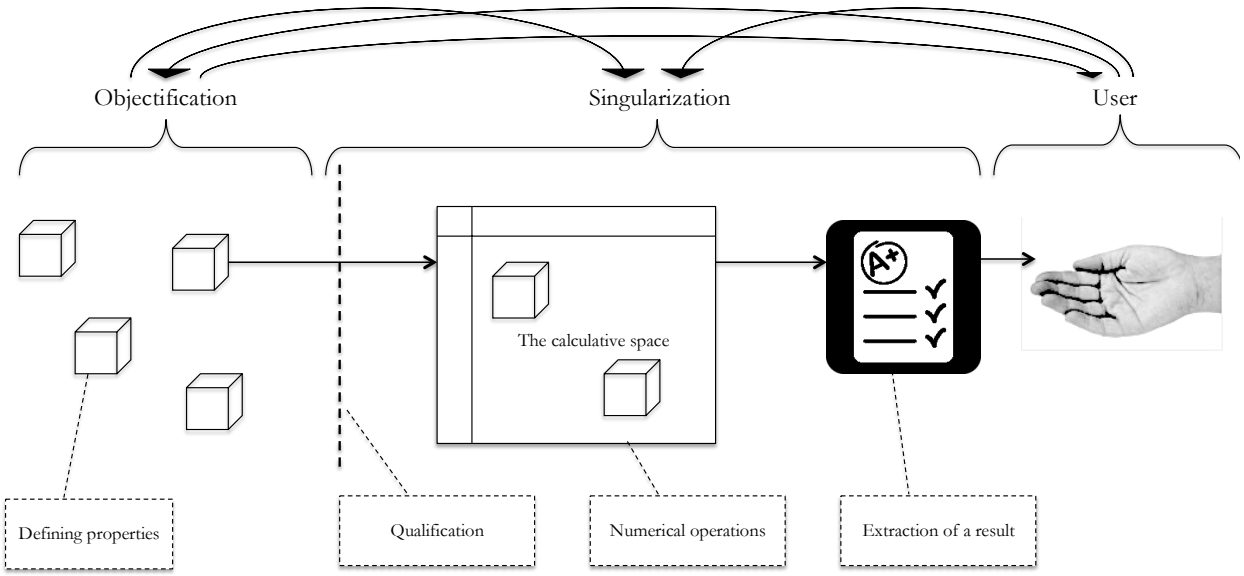
As was discussed in the analysis of objectification, after this alignment emotional improvements would be included in addition to functional ones. Trying to measure emotional improvements in customer panels, however, was described as too close to "greenwashing", since "too much" would

qualify. This was attributed to the specific nature of SCA's products, having an impact on *quality of life*. It has been discussed how *human judgment* was described as required. But, then again, the process had to provide *accountability* towards stakeholders. These challenges – making the definition big enough to capture "all" Sustainable Innovations - but not too big – was described as having been solved with an organizational set-up whereby the GHC Management Team were enrolled as a panel on social innovation and would make *judgment calls* based on what the category VPs nominated. The socio-material set-up seemed to manage to internalize two years of overflowing when it came to socially Sustainable Innovations. Human *judgment* would make sure the *right* products were chosen. The arrangement, the frame if you will, had been constantly widened, narrowed, re-defined, changed, aligned and re-aligned. When there was agreement on who would make the call, the total arrangement could be agreed upon. It meant that both qualification, the numerical operations and manipulations as well as the standard would be arranged according to a GHCMT version.

6.3 Objectification and singularization as a simultaneous and continuous process

In this section, an attempt will be made at taking one step back (or, it could be claimed, inwards) and analyzing objectification and the different processes of singularization as a whole, and to relate it to the concept of the intended user. While Callon and Muniesa (2005) envision assessment and calculation going on in market exchanges, thereby describing goods and recipients, this analysis attempts at understanding how the objectification and singularization of manageable and reportable objects are influenced by those who will be using the numbers for managing and for reporting. In the context of this analysis, these are thus conceptualized as intended users. However, these users have intended users of their own, in terms of what they described as external stakeholders. These were described as traditional as well as SRI investors, environmental and social NGOs, auditors and so on. The section aims at providing a picture of how objectification and singularization should not be seen as separate and orderly steps, but rather as a constant and continuous process of establishing and re-establishing properties of the object and calculative apparatus, so as to transform the object to the world of the user. We must therefore understand the two concepts together. An attempt will also be made at characterizing how this process is not one-directional. Rather, the enrollment of a new user will transform that user's world. The diagram below attempts at depicting this flow of the object into the calculative space, the singularization taking place through qualification, numerical operations and manipulations and finally the extraction of a result to an intended user. It also depicts how the intended user influences the objectification and singularization. The object, Callon and Muniesa (2005) argue, is objectified because the properties qualifying it have gradually been stabilized. It has been singularized because these properties have been determined in such a way as to adjust to the user's needs.

Furthermore, as the process of setting up the socio-material arrangement constituting the construction of manageable and reportable objects, the user is enrolled in the arrangement. It is not merely a process of "choosing" a recipient and adapting the object to that user. The process also entails a re-enactment of that same user, since the user now is equipped with a new calculative apparatus.



Figur 19: The object is qualified and numerically manipulated and a result is extracted for the intended user. The user co-produces the objectification and singularization, and this enrollment entails the re-enactment of the user.

In the case of CO_2, it was at least possible to schematically describe objectification and singularization as separate steps, although Callon and Muniesa (2005) not necessarily see them as disentangled. This should probably be understood from the fact that at the time of the instating of the target, there already was an accepted objectification of CO_2 in place. This should not be interpreted, however, as CO_2 being essentially easier to identify because of some inherent characteristics of the object. Indeed, from an ontologically constructivist perspective, we do not ascribe essential characteristics to objects. On the other hand, neither do we describe them as "only" social constructs. CO_2 was objectified because of previous efforts and investments in socio-material arrangements: The RMS system, factory reporters, the RMS manager, fuel invoices, emissions factors, external standard setters, rules and guidelines, et cetera. But since the object was established, the singularization was what required effort and investment. This analysis also allows us to note that the object cannot be distinguished from its calculative apparatus. Objectification is possible because of the arrangements enacting the object. This enactment occurs both through objectification and singularization. Since the CO_2 object was enrolled in the apparatus enacting the CO_2 target, the CO_2 target was part of the enactment of the CO_2 object. It was because of the target that standardization of emissions factors was described as important, because the target entailed the reporting on progress. When emission factors were *accurate* but *incomparable*, it became problematic. To conclude, singularization affects objectification.

For Sustainable Innovation, on the other hand, neither the object nor the apparatus was established, and the objectification and singularization analysis showed that it was often difficult to analytically disentangle one process from the other. It could be argued, for example, that the social arrangement surrounding social innovations, although analyzed from the perspective of singularization, is also an example of objectification. Objectification of social innovation could only occur in an arrangement involving human judgment, such as the combination of the funnel and the GHCMT. Thus, the objectification of Sustainable Innovation should probably not be understood only in terms of the definition in the "final" PowerPoint. Objectification would occur also in the GHCMT meetings

evaluating social innovations. The object of a socially Sustainable Innovation was not enacted merely in the definition, but also in the judgment process in GHCMT. Comparing it to CO_2, where the object's definition was somewhat robust, here *everything* was fluid. As overflows relating to singularization occurred, this had implications on objectification as well.

In the case of CO_2, the ESAVE versus RMS controversy was described as relating to wanting to extract more information from information which was not intended for that purpose – i.e. to make it part of a sustainability narrative for external reporting. The user of the object defined and calculated in the ESAVE system had thus been changed as it had been enrolled into the CO_2 target apparatus. When they were both enrolled to enact CO_2 reductions, two differing accounts surfaced. This overflow was attributed to the purpose of numbers – that is, to the intended user. An effect of the *understanding* described as obtained, and the decisions regarding communication, implicated a re-constitution of the CO_2 target. This was because the ESAVE reductions were now externalized. It also implicated a re-constitution, a re-enactment, of the sustainability organization, since it was no longer equipped with the ESAVE calculative apparatus. Again, changes in objectification and singularization implied the re-enactment of the user, or as in this case, the non-user.

Sustainable Innovation was a target that had been formulated in the context of the thirteen sustainability targets, which although signed-off on in the Corporate Senior Management Team, belonged to the sustainability organization through the SVP of Corporate Sustainability. But since *integration* was described as important, and since therefore the general innovation management, which was organized in GHCMT, was enrolled, the project changed. It was now not only a question of sustainability; it had to do with overall innovativeness in SCA. The initial objectification and singularization was adapted to the GHCMT world. It could be argued that the GHCMT now was an additional user, in addition to the sustainability organization. Since GHCMT was enrolled in the Sustainable Innovation apparatus, GHCMT was re-enacted. It was now an organization sub-unit which was to measure innovation rate, as well as Sustainable Innovation rate. It was thus equipped with a new calculative equipment. That is, in adapting the properties of the object to the user's world, the world of the user was adapted too. From an ontologically constructivist perspective, GHCMT had no essential characteristics defining it. Rather, it was enacted through the current arrangements of which it currently was part, now consisting also of Sustainable Innovation.

To conclude, enrolling GHCMT had implications on the conditions under which a manageable and reportable object could be objectified and singularized. It had implications for the enactment of sustainability in SCA (it now entailed Sustainable Innovation) and it had implications on the enactment of GHCMT (through this unit being equipped with a new calculative apparatus).

It can also be noted, as an additional finding of the study, relating to Sustainable Innovation, that there were active attempts at influencing the intended users. In the case of general innovation rate, Investor Relations had been working deliberately to make investors ask about new innovations. This shows how arranging calculative apparatus in this case was not merely a response to outside pressures, but also an active attempt at influencing those same users. Getting a new group of analysts was *one* source of pressure to increase innovation rate, but the process went in the opposite direction too, namely through attempts at enrolling investors in the innovation rate arrangement. In adapting to what was described as user pressures, these users themselves are re-enacted, as they are now becoming equipped with a new calculative apparatus.

The analysis above also showed that although there was a solution opted for in both the cases, this had undergone development and been subject to many overflows in the process. These overflows had either been internalized into a new definition or a new arrangement, or externalized. In the latter case they are still "out there" when we leave the case company, with the potential of creating new overflows in the future. In describing both the objectification and singularization occurring in the most recent version separately and the overflows which related to the establishment of this set-up, the analysis showed that we cannot see objectification and singularization merely as something taking place when a result is to be extracted – that is, for example for the production of the sustainability report. Rather, objectification and singularization are constantly ongoing as the present arrangements are challenged by new overflows.

6.4 Summary and conclusions

As the previous analysis attempted at showing, describing a socio-material arrangement only ever provides a snapshot of the most recent version of it. Arrangements are constantly challenged by overflows from that which has been left outside the frame. Some of these overflows are internalized through adjustments of the arrangements, while others are kept external through various mechanisms. Some overflows occur in the set-up of a new arrangement – others occur as time goes by and conditions outside the frame shift. That which is within the frame is never independent of what goes on outside. The mere existence of a frame implies connections to the outside world.

CO_2 was already objectified at the time of the instatement of the quantified CO_2 target. However, it was reified as a manageable and reportable object through the standardization of emissions factors, thereby causing a re-arrangement of objectification. Furthermore, when it came to singularization, CO_2 became manageable and reportable only when the "right" emissions were taken into account, that is, those who followed the logic instated by the numerical operations taking place in the calculative space, and those that SCA could influence. The numerical operations that were to be performed thus had implications on the qualification process. This excluded Personal Care emissions and some of Forest Products'. And again, because of the need for the CO_2 object to be manageable, all transport emissions were excluded. Including transport emissions would entail setting up a socio-material arrangement capable of managing CO_2 emissions that, it was described, was unobtainable, at least currently.

Sustainable Innovation became a manageable and reportable object only when the Sustainable Innovation definition had been aligned with that of general innovation. This excluded process innovations, but included emotional improvements along with functional ones. Furthermore, an acceptable definition came only when judgment could be used to determine socially Sustainable Innovations. With regards to singularization, the somewhat robust solution obtained late in the fall of 2013 was a complex socio-material arrangement involving both humans and non-humans.

It was also found, when analyzing objectification and singularization as continuous and simultaneous, how they are never merely a process of "choosing" a user and adapting the object to this user. It also entails enrolling the user in the arrangement, thereby equipping it with new calculative equipment, and thus performing a re-enactment of that same user. GHCMT was re-enacted through enrollment in the Sustainable Innovation arrangement. The sustainability

organization, on the other hand, was re-enacted by "losing" access to the ESAVE arrangement in the case of CO_2.

The overall finding, however, was that *measurability* relating to the two sustainability targets was obtained through complex processes requiring major investment in time and resources and involving humans and non-humans alike. The frame constructing manageable and reportable objects was under constant influence from overflows from outside (re)sources. These overflows were either internalized or externalized, and the frame was re-framed or maintained accordingly. Manageable and reportable objects, needed for the construction of corporate sustainability accounting, do not materialize from thin air. Arranging, stabilizing and maintaining a calculative arrangement is a resource-demanding, complex and continuous endeavor.

7. Concluding discussion

This thesis started from an idea of *measurability* as not being an essential characteristic, but something that is created by effort and investment. In previous research in the field of sustainability accounting, issues like *fact vs judgment*, *accuracy vs consistency* and *measurability* in general had been identified as challenges in the construction of sustainability accounting. In the above analysis these two notions were tied together to study the construction of manageable and reportable objects within sustainability accounting in detail. It applied a framework by Callon and Muniesa (2005) including the concepts objectification and singularization. The analysis was extended to using also the concepts of framing, overflowing, externalization and internalization. The analysis explored the construction of socio-material arrangements, within which objectification and singularization occur continuously and simultaneously. These are constantly under influence – overflows – from sources outside this frame, sources that had been excluded at the time of the initial set-up.

In the following section, these findings will be discussed from a few different perspectives. Firstly, the empirical implications of using an ontologically constructivist approach like Callon and Muniesa's (2005) will be discussed. There, the results of this study will be related to previous research within the field, having identified issues such as *measurability*, *fact-vs-judgment* and *consistency-vs-accuracy* as challenges in the creation of sustainability accounting. In the next section, the emphasis is shifted to the potential managerial implications of the findings, taking an approach focusing on the use for practitioners of these findings. Thirdly, the results will be discussed from a methodological perspective, extending the analysis beyond the common positivist ideals of validity and reliability to foremost discussing the plausibility of the results. Lastly, some potential fruitful areas for future research will be drawn up.

7.1.1 The empirical implications of using an ontologically constructivist approach

While Spence and Rinaldi (2012, in press) found a contradiction between *hard facts* and *judgment*, and described this as an issue perceived by the respondents in their case study, this study has attempted at suspending that distinction. This places this study in a theoretical tradition hailing from ANT. The empirical result of that was to show that the *judgment* versus *hard facts* dichotomy is not something that is produced independently of the material and non-material world surrounding it. This became visible in both the case studies. Measurability was not obtained through essential characteristics of the objects in questions, but through continuous effort and investment in socio-material arrangements.

That is, this study attempted at understanding the construction of manageable and reportable objects not merely as a numeric operation, but also including the setting up of a socio-material arrangement that can produce an acceptable result. The construction of manageable and reportable objects occurs simultaneously and constantly as the object, the calculative space and the user are framed and re-framed, and the construction entails all of these processes.

When it came to Sustainable Innovation, social innovations could only be defined when the material arrangements were such that the definition (a choice in GHCMT) would be accepted. That is, the suspension of the *fact-vs-judgment* dichotomy in this study contributed to shedding light on the

importance of the organizational configuration, and as such provided an empirical account of what is often, quite normatively, described as "integration" in the accounting for sustainability literature.

A corresponding result can be shown when it came to the CO_2 case study. The suspension of the *fact-vs-judgment* distinction enabled an understanding of calculation of CO_2 emissions as depending on the material arrangements surrounding it. It was these (meetings, for instance) that lead to the questioning of what was the correct way to measure progress on CO_2 reductions and it was a material arrangement (meetings mapping the definition, purpose and boundary condition difference) that eventually lead to the two distinct calculative practices (ESAVE and RMS/the CO_2 target) being accepted alongside each other. That is – calculation involves humans and non-humans and numerical operations as well as intra-personal and material-semiotic arrangements.

Relating to Bowen and Wittneben's (2011) discussion on *accuracy*, *consistency* and *certainty*, this study rejected any essential characteristics of these concepts. Instead, the analysis showed how the concepts *accuracy* and *comparability* (used by respondents similarly to how Bowen and Wittneben (2011) describe *consistency*) were used for bargaining in the construction of manageable and reportable objects. In this study the concepts were construed of as resources drawn upon in establishing a calculative apparatus, rather than essential problems in the process of obtaining *measurability*.

The theoretical framework thus proved fruitful for studying a concept like *sustainability*. This study is distinct from much sustainability accounting research, which generally takes sustainability as something essentially good and tends to end up in conclusions about the *failure* of integrating social and environmental concerns in organizational decision-making. The ANT approach is devoid of grand theories or explanations, and rather provides a descriptive account of how socio-material arrangements are formed, challenged and maintained. In this study, therefore, *sustainability* was not seen as something that can either fail or succeed. Instead, it was seen only as the result of the socio-material arrangements enacting it.

Lastly, a sub-theme based on previous theorizing in the field of sustainability accounting was that of integration of sustainability into general management control (Gond et al. 2012) Through studying a particular practice, that of constructing manageable and reportable objects, an account of *integration* could be provided in the sense that this ideal (integrating sustainability into general management) was a resource drawn upon to establish calculative arrangements.

7.1.2 Managerial implications

Although it could be argued that it is not the main purpose of the theoretical approach chosen to contribute to managerial practice, the present study however did produce findings that could be managerially relevant. In the case of Sustainable Innovation, it was shown that a lot of investment had been made in trying to establish the best possible definition of, especially, a socially Sustainable Innovation. However, it seemed the real resolution came only when a social arrangement involving the GHCMT had been enrolled. What are the implications of this, then? The conclusion was drawn that creating manageable and reportable objects is not only a question about defining its properties. Investment is also required into social arrangements, that is, the organizational set-up. Manageable and reportable objects are not only those that are logically, definition-wise and mathematically elegant. Instead, they are the ones that manage to become

accepted in a socio-material setting such as a big multi-national corporation like SCA. This finding could be important for any organizational actor, perhaps even more so when it comes to sustainability, aiming to raise awareness or engagement on a particular KPI. We could argue that effort should be made in effecting change in the organization, involving the "right" people, rather than constructing the "perfect" definition.

Furthermore, the comparative case study approach provided an interesting approach to contrasting two targets that were created quite differently. While CO_2 had its origins in established measurement apparatus, the Sustainable Innovation target was established when basically nothing was in place. It could thus be understood as CO_2 being created from already available numbers – a bottom-up approach, perhaps. In the case of Sustainable Innovation, on the other hand, the target was set from an idea. The definition and measurement apparatus had to be created subsequent to the target, in general terms, having been set. A target in more exact terms, however, was still not in place at the time the case company was left, late in the fall of 2013. That was to be created from an examination of the current state. Comparing to CO_2 this was more of a top-down approach. Simply comparing the two targets from this perspective, it could be argued that for the purpose of simplicity, creating targets from readily available data is a smaller endeavor than going in the opposite direction.

Furthermore, this account of the development of two sustainability targets provided insight into the importance of external benchmarking. In the case of CO_2, setting up the target was a fairly marginal activity in terms of entailing dilemmas and issues, as there was a ready-made solution in the form of the EU target that could be imported. What SCA, and especially the Director of Environmental Affairs, had to do was to establish whether a reduction of 20% was obtainable, based on an analysis of planned investments. When it came to objectification the were emissions factors available both in terms of ETS factors and standard factors from the Swedish Environmental Research Institute, which could be enrolled. In the case of Sustainable Innovation, on the other hand, there had been initial attempts to find some external benchmark for social innovations, but without success. Instead the definition had to be constructed "from scratch". On the environmental side, there already was a measurement apparatus relating to LCAs, which made the definition of an environmentally Sustainable Innovation a simpler task. Since it was argued that the fluidity of the object Sustainable Innovation had implications on the singularization and vice versa, having an external benchmark at hand would probably have created a less complicated process, taking less time. It was, however, argued that for the purpose of integration of Sustainable Innovation it would not be a good idea to use an external definition. It had to be a definition adapted to the organizational and operational setting of SCA.

7.1.3 The *plausibility* of the results

As was discussed in the methodology section, taking a qualitative research in general renders positivist concepts like validity and reliability less meaningful. This is, it was argued, is even more the case when taking an ontologically constructivist approach. The theoretical approach in itself rejects such concepts. Kreiner and Mouritsen (2005) instead suggest discussing the plausibility of the result in the analytical setting constructed for the purpose of the study. An attempt at this will thus be made.

Reliability and validity in the positivist sense would entail that reproducing the study under similar conditions would produce similar results. We could in this perspective question the analysis – is, to take an example from the previous section, the analysis whereby the Sustainable Innovation definition is seen as objectification the only way to see it? Or is it an effect of some specific methodological "failure" in the data collection and coding?

Another version, of course, would be to see the objectification as occurring when innovations in general were delimited and defined. The Sustainable Innovation definition would then instead be seen as a calculative apparatus, a standard, against which all innovations would be evaluated. Although it would be possible to analyze the case in this manner, this would not give the case full justice. After all, the target was formulated in terms of Sustainable Innovation and considerable effort went into this definition. In parallel to this, objectification of innovations was going on, too. These two definitions were later linked to produce the new definition and the related arrangements. Therefore, we could use this alternative interpretation as a reminder, again, that objectification and singularization are interlinked and that a strict separation is less fruitful.

More important, however, are the implications of the theoretical approach taken. Indeed, thus, the specific account obtained is an effect of starting the inquiry from the specific time and place in the field. Following measurements, definitions, artifacts and humans starting from another spatio-temporal location would, by definition, lead to another "version". This of course also involves the role of the researcher. Through researching the construction of manageable and reportable objects in SCA, the researcher is participating in the co-production of manageable and reportable objects. Undeniably, this thesis is now an artifact in the same network it studied. The researcher and the thesis have been enrolled.

However, one important condition to point out in the analysis of the singularization of Sustainable Innovation is that most of these arrangements were still, at the time of writing, on an imaginary level. That is, they had not been tried in practice. However, that does not mean that they do not materially exist. They are inscribed for example in the PowerPoint presentations of the project. Thus, it has material existence, although it could be argued that the arrangements have not been tried and tested in practice.

7.1.4 Future research

In this section some potential fruitful avenues for further research will be discussed. First of all, integration of sustainability was a sub-theme of this study, responding to several calls in the sustainability accounting literature. Several of the respondents described integration as crucial in mobilizing sustainability in the organization, and the importance of numbers in this endeavor. In the same theoretical vein as this study, this could be researched using the concept of calculative power discussed for example by Callon and Muniesa (2005). This study gave some tentative insights into how the sustainability accounting department equipped, (or attempted to equip) themselves with numbers to mobilize on the sustainability targets.

Furthermore, the account given here was focused on the overflows involved in establishing socio-material arrangements for the construction of manageable and reportable goods. An extension of this would be to delve deeper in to the mechanisms drawn upon to resolve these issues. This

research conceptualized of these re-arrangements as externalization and internalization. Future research could examine this in more detail, to explore how these issues were dealt with.

Finally, another possible future research approach would be to study how the attributed degree of measurability relating to sustainability targets differs depending on the organizational location of actors. MacKenzie (1990) developed the concept of the *certainty trough*, which describes how, in the process of knowledge production, the distance from the knowledge production practice influences the degree of accuracy attributed to the knowledge produced. In the context of this study, some tentative differences were noted, for example between corporate management being certain of measurability while technical experts were more skeptical. This is in line with MacKenzie's findings (1990), but would need further exploration to establish in the setting of the current study. This could be an interesting avenue for future research in sustainability accounting.

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9. Appendices: Interview data

9.1 Appendix 1: Conducted interviews

Role	Location	Interviews	Medium
Acting VP Business Development	Stockholm, Sweden	1	Face-to-face
Director Energy Sourcing	Stockholm, Sweden	1	Face-to-face
Director Environment & Product Safety	Gothenburg, Sweden	1	Telephone
Director Investor Relations	Stockholm, Sweden	2	Face-to-face
Director Sustainability Communications	Stockholm, Sweden	1	Face-to-face
Director Sustainability Reporting	Gothenburg/Stockholm, Sweden	3	Face-to-face
Environmental Specialist	Gothenburg, Sweden	2	Face-to-face & telephone
Environmental Specialist	Gothenburg, Sweden	1	Face-to-face
Laboratory manager	Lilla Edet, Sweden	1	Telephone
Director Energy Savings & Energy Technology	Germany	1	Telephone
President GHC	Gothenburg, Sweden	1	Telephone
RMS Manager	Spain	2	Telephone
SVP Corporate Sustainability	Stockholm, Sweden	2	Face-to-face & telephone
VP GHC	Gothenburg, Sweden	1	Face-to-face
VP Environmental Affairs	Stockholm, Sweden	1	Face-to-face
VP R&D Core Personal Care	Gothenburg, Sweden	2	Face-to-face & telephone
		23	

9.2 Appendix 2: Interview guide examples

The interviews were adapted depending on whether the respondent was relevant for either one or both of the case targets. Below is a list of sample questions excerpted from the customized interview guides used for each respondent depending on role and position.

You and your organizational role

What are you main responsibilities and tasks?
Your "location" in the organization?

The CO_2 target

Background: The initial introduction of the CO_2 target
Who were involved?
Can you tell me about the discussions at the time – trade-offs and decisions
Follow-up: What caused the decision?
What would the alternative have been?
Is there documentation of the decision?
The figure in the 2012 report – can you tell me how that was obtained?

Sustainable Innovation target

Why a target for Sustainable Innovation?
Can you tell me about the project group?
Why do you think you were recruited to the group?
Can you tell me about the process so far?
Difficulties, dilemmas, choices, trade-offs
Decision follow-up: What lead to that specific decision?
Decision follow-up: What was the alternative?
Is there any documentation of the decision?

General innovation management

Why innovation KPIs?
How will they be used?
Innovation management
Can you tell me about the general innovation management process?
How is this documented?
Why this innovation definition?

The RMS system

The development – when and by whom?
Can you tell me about the development process at the time?
Difficulties, dilemmas, choices, trade-offs
Decision follow-up: Why? And what would the alternative have been?
Factors, algorithms and calculations?
Are there instructions, internal documents, process descriptions and so on?
Can you tell me about the yearly reporting process?

Concluding questions

Anything you would like to add?